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**FOREIGN DIRECT INVESTMENT, SPILLOVERS AND INNOVATION:
THE CASE OF KENYAN MANUFACTURING INDUSTRY**

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THE CASE OF KENYAN MANUFACTURING INDUSTRY**

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aan de Universiteit Maastricht,
op gezag van de Rector magnificus Prof. Mr. G.P.M.F. Mols,
volgens het besluit van het College van Decanen
in het openbaar te verdedigen op vrijdag 19 mei 2006 om 12.00 uur

door

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ty, Institute for New Technologies (UNU-INTECH),
ands

urch Consortium (AERC),

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The God Almighty

for his protection, kindness and mercy;

Grace Akosua Acheampomaah Bandoh

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Geoffrey G. Gachino
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TABLE OF CONTENTS

LIST OF TABLES.....	xiii
LIST OF FIGURES.....	xv
LIST OF CHARTS.....	xv
LIST OF MAPS.....	xv
LIST OF BOXES.....	xvi
LIST OF APPENDICES.....	xvi
LIST OF ABBREVIATIONS.....	xvii

PART ONE: INTRODUCTION AND THEORETICAL CONSIDERATIONS

Chapter One	1
INTRODUCTION	1
1.1 Background: Technological Capabilities and Foreign Direct Investment.....	1
1.2 Research Problem and Questions.....	3
1.3 The Study Objectives.....	6
1.4 A Brief Summary of the Thesis Approach.....	7
1.5 Justification and Limitations of the Study.....	7
1.6 Data Collection and Scope of Study.....	10
1.7 Thesis Outline.....	10
Chapter Two	14
FOREIGN DIRECT INVESTMENT AND TECHNOLOGICAL SPILLOVERS	
CRITICAL REVIEW AND CONCEPTUAL FRAMEWORK	14
2.1 Introduction.....	14
2.2 International Technology Transfer.....	14
2.3 Foreign Direct Investment and Technological Spillovers.....	18
2.3.1 Types of Technological Spillovers.....	20
2.3.2 Technological Spillovers and Foreign Presence: A Critical Analysis of Issues.....	23
2.3.2.1 <i>Technological Spillovers: Foreign Presence and Productivity of Domestic Firms</i>	24
2.3.2.2 <i>Technological Spillovers and Technology Gap</i>	28
2.3.2.3 <i>Technological Spillovers and Foreign Equity Participation</i>	32
2.3.2.4 <i>Technological Spillovers and Absorption Capacity</i>	34
2.3.2.5 <i>Endogenous Spillovers: Competition, Demonstration and Interactions</i>	36
2.3.2.6 <i>Technological Spillovers and Government Policies: Does the Level of Protection Matter?</i>	45
2.4 Emerging Issues and Alternative Theoretical Framework.....	46
2.4.1 A Brief Summary of Emerging Issues.....	46
2.4.2 Spillover Occurrence: Towards an Alternative Theoretical Framework ...	49
2.5 Analytical Framework for Measuring Spillovers Based on Technological Changes, Learning and Capability Building.....	57
2.6 Formulation of Study Propositions.....	60
2.6.1 Presence of Multinationals and Spillover Stimulation.....	60
2.6.2 The Determinants of Spillover Occurrence.....	60
2.7 Research Design and Methodological Setting.....	73
2.8 Summary and Conclusion.....	76

PART TWO: EMPIRICAL ANALYSIS

Chapter Three	77
MANUFACTURING INDUSTRY AND FOREIGN DIRECT INVESTMENT IN KENYA: ORIGIN AND INSTITUTIONAL SETTING	77
3.1 Introduction	77
3.2 Kenya: A Brief Overview.....	78
3.3 Industrial Policy and FDI: Origin and Institutional Setting	82
3.3.1 Pre-Independence: The Colonial Period	83
3.3.2 Post-Independence: The Early Decades of Import Substitution	89
3.3.2.1 FDI and Industrial Capability Development: The Role of Institutions During the Import Substitution Period	93
3.3.2.2 Brief Summary of Emerging Issues Based on the Role of Institutions Examined	103
3.3.3 Structural Adjustments: The Era of Liberation and Export-Promotion .	104
3.3.3.1 FDI and Industrial Capability Development: The Role of Institutions During the Export Orientation Period.....	108
3.3.3.2 Brief Summary of Emerging Issues Based on the Role of Institutions Examined	117
3.3.4 Recent Performance and Effort towards Industrialisation	118
3.4 Summary and Conclusion	119
Chapter Four	121
FOREIGN DIRECT INVESTMENT AND FIRM LEVEL PRODUCTIVITY	
A PANEL DATA ANALYSIS	121
4.1 Introduction	121
4.2 Theoretical Framework, Data and Estimation Technique.....	122
4.2.1 Theoretical Framework: The Productivity Approach Revisited	122
4.2.2 Data Description.....	124
4.2.3 Empirical Analysis: A Panel Data Estimation Technique.....	125
4.3 Comparative Behaviour of Foreign and Locally Owned Firms: Analysis based on Panel Data Trends in the Manufacturing Industry.....	127
4.3.1 Important Firm Trends in the Panel Data Sample: Comparing Foreign and Locally Owned Firms based on the Entire Manufacturing Industry	128
4.3.2 Important Trends in the panel Data Sample: Comparing Foreign and Locally Owned Firms based on the Manufacturing Industrial Sectors ...	130
4.3.3 A Brief Summary of Emerging Trends in Kenyan Manufacturing Industry Based on Panel Data Examined	140
4.4 Effect of Foreign Presence on Firm Level Productivity	141
4.5 Effect of Foreign Presence on Firm Productivity: Analysis by Scale.....	148
4.6 Effect of Foreign Presence on Firm Productivity: Analysis by Technology Gap	151
4.7 Summary and Conclusion	153

Chapter Five	156
FOREIGN PRESENCE AND TECHNOLOGICAL SPILLOVER	
EXTENT; DETERMINANTS AND MODE OF OCCURRENCE	156
5.1 Introduction	156
5.2 Sample Characteristics	156
5.2.1 Labour Mobility in Food and Beverages and Machine and Engineering Industries	158
5.2.2 Linkages in Food and Beverages and Machine and Engineering Industries	161
5.2.3 Competition in Food and Beverages and Machine and Engineering Industries	162
5.2.4 Demonstration Effects in Food and Beverages and Machine and Engineering Industries	163
5.3 Occurrence of Technological Spillovers: Technological Spillover Index	164
5.3.1 Occurrence of Technological Spillovers in the Manufacturing Industry	166
5.3.2 Comparison of Technological Spillover Occurrence by the Two Industries	172
5.4 Determinants of Technological Spillover Occurrence in the Kenyan Manufacturing Industry	182
5.4.1 Descriptive Statistics of the Sampled Firms	182
5.4.2 Econometric Setting: Binomial Logit Estimation for the Determinants of Spillover Occurrence	188
5.4.3 Econometric Setting: Multinomial Ordered Logit Estimation for the Determinants of Spillover Occurrence	191
5.4.4 Binomial and Ordered Logit Model Estimation: Results and Discussion	195
5.5 Summary and Conclusion	200
Chapter Six	210
TECHNOLOGICAL CHANGE FROM FOREIGN FIRMS IN KENYA	210
6.1 Introduction	210
6.2 Framework of Analysis	210
6.3 Brief Analysis of the Firms: Background and General Information	213
6.3.1 Food and Beverages Industry	213
6.3.2 Machine and Engineering Industry	218
6.4 The Case Studies of Foreign Firms in the Food and Beverage Industry	219
6.4.1 Firm Selection and Justification: Emphasis on Production Technology, Learning and Innovation	219
6.4.2 Human Resources Development and Labour Mobility	224
6.4.3 Linkage Effects	232
6.4.4 Competition Effects	237
6.4.5 Demonstration Effects	246
6.5 The Case Studies of Foreign Firms in the Machine and Engineering Industry	247
6.5.1 Firm Selection and Justification: Emphasis on Production Technology, Learning and Innovation	247
6.5.2 Human Resource Development and Labour Mobility	252
6.5.3 Linkage Effects	255
6.5.4 Competition Effects	260
6.5.5 Demonstration Effects	262
6.6 Summary and Conclusion	263

Chapter Seven	268
TECHNOLOGICAL LEARNING AND INNOVATION IN THE LOCAL FIRMS	268
7.1 Introduction	268
7.2 Framework of Analysis.....	268
7.3 Brief Analysis of the Firms: Background and General Information	271
7.3.1 Food and Beverages Industry Briefly	271
7.3.2 Machine and Engineering Industry Briefly	274
7.4 The Case Studies of Locally Owned Firms in the Food and Beverage Industry.....	275
7.4.1 Firm Selection and Justification: Emphasis on Production Technology, Learning and Innovation	275
7.4.2 Human Resources Development and Labour Mobility	283
7.4.3 Linkage Effects	287
7.4.4 Competition Effects	293
7.4.5 Demonstration Effects.....	298
7.5 The Case Studies of Locally Owned Firms in the Machine and Engineering Industry.....	301
7.5.1 Firm Selection and Justification: Emphasis on Production Technology, Learning and Innovation	301
7.5.2 Human Resources Development and Labour Mobility	308
7.5.3 Linkage Effects	313
7.5.4 Competition Effects	319
7.5.5 Demonstration Effects.....	321
7.6 Perceived Government Role in the Spillover Process	323
7.7 Summary and Conclusion.....	324
Chapter Eight	328
SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS	328
8.1 Introduction	328
8.2 Research Problem and Objectives	328
8.3 Theoretical Considerations and Conceptual Framework Design	328
8.4 Summary of the Study's Findings	329
8.5 Policy Implications of the Study	339
8.6 Recommendation for Further Research Works.....	342
REFERENCES	344

LIST OF TABLES

Chapter 2

Table 2.1	Reaction to Competition Pressure Ranked by Order of Importance (58)
Table 2.2	Computation of Spillover Index, SPO INDEX (59)
Table 2.3	List of Institutions and Number of Interviews Conducted, Kenya (75)

Chapter 3

Table 3.1	Selected Population and Social Indicators for Kenya, 1970-2002 (79)
Table 3.2	Selected Economic and Technology Indicators for Kenya, 1970-2002 (82)
Table 3.3	Principal Foreign-Based Firms in Kenya Before 1945 (86)
Table 3.4	Major Foreign Investments 1945-63 (88)
Table 3.5	Sectoral and GDP Annual Average Growth Rates, Kenya, 1972-2002 (105)
Table 3.6	Average Sectoral Share of GDP, Kenya, 1972-2002 (105)
Table 3.7	FDI Inflow and Stock, Kenya, 1977-2001 (108)
Table 3.8	Performance of Export Processing Zones, Kenya, 1994-2002 (111)
Table 3.9	Capital and Employment of IPC Processed Project, Kenya, 1990-2000 (112)
Table 3.10	IPC Projects Approved, Kenya, 1990-2000 (113)
Table 3.11	Foreign Investment Capital, KShs. Million, Kenya, 1990-2000 (114)

Chapter 4

Table 4.1	Important Firm Trends in the panel data sample: Percentage based Shares, Kenya, 1994-2001 (129)
Table 4.2	Important Trends in the Panel data sample: Percentages Based on Annual Averages, Kenya, 1994-2001 (133)
Table 4.3	Growth and Shares of Manufacturing Industries, Kenya, 1964-2000 (136)
Table 4.4	Two-Tail T-Test Results Comparing productivity Performance Behaviour of Foreign and Local Firms, Kenya Sample, 2004 (139)
Table 4.5	Impact of Foreign Presence on Total Factor Productivity: Panel Regression Estimates for All the Firms, Kenya, 1994-2001 (146)
Table 4.6	Impact of Foreign Presence on Total Factor Productivity: Panel Regression Estimates for Domestic Firms, Kenya, 1994-2005 (147)
Table 4.7	Key Indicators: Percentage Shares by Scale Dummy and Firm Ownership (148)
Table 4.8	Impact of Foreign Presence on Total Factor Productivity by Scale: Panel Regression Estimates for All the Firms by Scale (150)
Table 4.9	Impact of Foreign Presence on Total Factor Productivity by Technology Gap: Panel Regression Estimates for All the Firms by Technology Gap (152)

Chapter 5

Table 5.1	Distribution of Sample Firms by Ownership, Kenyan Firms, 2004 (158)
Table 5.2	Labour Mobility: Food Processing and Beverages, and Machine and Engineering Industries, Kenya, 2004 (160)
Table 5.3	Linkage Effects: Food Processing and Beverages, and Machine and Engineering Industries, Kenya, 2004 (162)
Table 5.4	Competition Effects: Food Processing and Beverages, and Machine and Engineering Industries, Kenya, 2004 (163)

Table 5.5	Demonstration Effects: Food Processing and Beverages, and Machine and Engineering Industries, Kenya, 2004 (164)
Table 5.6	Computation of Technological Spillover Index, SPO INDEX (165)
Table 5.7	Occurrence of Technological Spillover in Local and Foreign Firms, Food and Machine and Engineering Industries Combined, Kenya, 2004 (167)
Table 5.8	Occurrence of Technological Spillover in Local Firms Only, Food and Machine and Engineering Industries Combined, Kenya, 2004 (170)
Table 5.9	Two-Tail T-Test Results Comparing Technological Spillover occurrence from Foreign and Local Firms, Kenya sample, 2004 (171)
Table 5.10	Occurrence of Technological Spillover in Local and Foreign Firms in Food Processing Industries, Kenya, 2004 (173)
Table 5.11	Occurrence of Technological Spillover in Local Firms Only in Food Processing Industry, Kenya, 2004 (175)
Table 5.12	Occurrence of Technological Spillover in Local and Foreign Firms in Machine and Engineering Industry, Kenya, 2004 (177)
Table 5.13	Occurrence of Technological Spillover in Local Firms Only in Machine and Engineering Industry, Kenya, 2004 (179)
Table 5.14	Two-Tail T-Test Results Comparing Spillover Occurrence from Foreign and Local firms, Kenya Sample, 2004 (180)
Table 5.15	One-way Results Comparing Spillover Occurrence in Food and Machine and Engineering Industries, Kenya Sample, 2004 (181)
Table 5.16	Descriptive Statistics, by Industry and Firm Ownership, Kenya, 2004 (188)
Table 5.17	Variables Included in the Empirical Models and their Hypothesised Influence on Spillover Occurrence in Kenya's manufacturing Industry (194)
Table 5.18	Marginal Effects: Determinants of Spillover Occurrence, Binomial Logit Estimation, Food Processing and Machine and Engineering Industries – Pooled (197)
Table 5.19	Determinants of Spillover Occurrence, Ordered Logit Analysis, Food Processing and Machine and Engineering Industries Pooled (200)

Chapter 6

Table 6.1	Basic Data and Information on Foreign Firms Interviewed, Kenya, 2002-2004 (217)
Table 6.2	FBF3 Comparative Yearly Accounts (Figures Provided in Millions) (218)

Chapter 7

Table 7.1	Basic Data and Information on Locally Owned Firms Interviewed, Kenya, 2002-2004 (273)
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LIST OF FIGURES

Chapter 1

Figure 1.1 Organisation of the Study (13)

Chapter 2

Figure 2.1 Framework Model for Spillover Analysis: Determinants, Mechanisms and Effect on Technological Learning and Capability Building (56)

Figure 2.2 Industrial Organisation Framework (61)

Chapter 3

Figure 3.1 Inflation, Real Interest Rates and Exchange Rates, Kenya, 1980-2000 (107)

Figure 3.2 Ownership of EPZ Enterprises: 2002 (109)

Chapter 5

Figure 5.1 An Ordered Structure of Technological Spillover Occurrence (189)

Chapter 7

Figure 7.1 Simplified Soft Drink Production Process in **FBL2** (278)

Figure 7.2 The Metal Pipe Making Process in **MCTL2** (303)

Figure 7.3 Production of Aluminum Cookware in **MCTL3** (305)

LIST OF CHARTS

Chapter 4

Chart 4.1 Comparisons between Foreign and Locally owned Firms, Kenya, 1994-2001 (130)

Chart 4.2 Foreign Presence Determined by Capital, Employment and Output Sales (131)

Chart 4.3 Average Firm Age by Manufacturing Sector, Kenya, 1994-2001 (132)

LIST OF MAPS

Chapter 3

Map 3.1 Kenya, Provinces, Principal Cities and Neighbours (81)

LIST OF BOXES

Chapter 4

- Box 4.1 Synopsis Based on Aggregate data from Secondary Sources (135)

Chapter 6

- Box 6.4.1 Human Resource Development: The Case of **FBF2** (226)
Box 6.4.2 Labour Mobility: The Case of **FBF2** (230)
Box 6.4.3 Labour Mobility: The Case of **FBF6** (231)
Box 6.4.4 Linkage Effects: The Case of **FBF2** (234)
Box 6.4.5 Linkage Effects: The Case of **FBF3** (236)
Box 6.4.6 Competition Effects: The Case of **FBF3** (240)
Box 6.4.7 Competition Effects: The Case of **FBF5** (242)
Box 6.4.8 Competition Effects: The Case of **FBF6** (244)
Box 6.5.1 Linkage Effects: The Case of **MCTF3** (258)

Chapter 7

- Box 7.5.1 Technological Spillovers through International Labour Mobility: The Case of **MCTL2** (311)
Box 7.5.2 Technological Spillovers through International Labour Mobility: The Case of **MCTL4** (312)

LIST OF APPENDICES

Chapter 4

- Appendix 4.1 Annual Growth Rates for All Firms and Some Selected Manufacturing Sectors, Kenya (155)

Chapter 5

- Appendix 5.1a Labour Mobility: Analysis of Workers Lost by Owners and Industry (204)
Appendix 5.1b Labour Mobility: Analysis of Workers Employed by Ownership and Industry (205)
Appendix 5.2 Linkage Effects: Analysis by Ownership and Industry (206)
Appendix 5.3 Competition Effects: Analysis by Ownership and Industry (206)
Appendix 5.4 Demonstration Effects: Analysis by Ownership and Industry (207)
Appendix 5.5 Correlation Matrix of All the Independent Variables used in the Analysis (208)
Appendix 5.6 Determinants of Spillover Occurrence, Ordered Logit Analysis, Food Processing and Machine and Engineering Industries Pooled (209)

LIST OF ABBREVIATIONS

ACEG	African Centre for Economic Growth
ADB	African Development Bank
AGOA	African Growth Opportunity Act
ARIPO	African Regional Industrial Property Office
ASK	Agricultural Society of Kenya
ATIA	African Trade Insurance Agency
ATPS	African Technology Policy Studies
CBS	Central Bureau of Statistics
CBIK	Centre for Business in Kenya
CIC	Capital Issues Committee
CMA	Capital Market Authority
COMESA	Common Market for Eastern and Southern Africa
COYA	Company Of the Year Award
DBK	Development Bank of Kenya
DCs	Developing Countries
DEG	Germany Investment Corporation
DFCK	Development Finance Company of Kenya
DSO	District Statistical Officer
E-O	Export Orientation
EAC	East African Community
EIB	European Investment Bank
EMS	Environmental Management System
EPC	Export Promotion Center
EPZ	Export Processing Zone
EPZA	Export Processing Zone Authority
FDI	Foreign Direct Investment
FIPA	Foreign Investment Protection Act
FPEAK	Fresh Produce Exporters Association of Kenya
FKE	Federation of Kenya Employees
GDP	Gross National Product
GFCF	Gross Fixed Capital Formation
GMK	General Motors Kenya
GoK	Government of Kenya
HIV	Human Immunity Virus
IBRD	International Bank for Reconstruction and Development
ICDC	Industrial and Commercial Development Corporation
ICDCIC	Industrial and Commercial Development Corporation, Investment Corporation
ICSID	International Center for the Settlement of Investment Disputes
IDB	Industrial Development Bank
IDC	Industrial Development Corporation
IDS	Institute of Development Studies
IMF	International Monetary Fund
IPAR	Institute of Public Affairs Research
IPC	Investment promotion Council
I-S	Import Substitution
ISO	International Organisation for Standardisation
KAM	Kenya Association of Manufacturers
KANU	Kenya African National Union

KBS	Kenya Bus Service
KEBS	Kenya Bureau of Standards
KIE	Kenya Industrial Estates
KIM	Kenya Institute of Management
KIPI	Kenya Industrial Property Institute
KIPPRA	Kenya Institute for Public Policy Research and Analysis
KIRDI	Kenya Industrial Research and Development Institute
KITI	Kenya Industrial Training Institute
KNCCI	Kenya National Chamber of Commerce and Industry
KPB	Kenyanisation of Personnel Bureau
KQA	Kenya Quality Award
KShs	Kenya Shillings
MDGs	Millenium Development Goals
MEST	Ministry of Education, Science and Technology
MIGA	Multilateral Investor Guarantee Agency
MNC	Multinational Corporation
MoF	Ministry of Finance
NPC	New Projects Committee
MPND	Ministry of Planning and National Development
MTI	Ministry of Trade and Industry
MUB	Manufacturing Under Board
NCST	National Council for Science and Technology
NPC	New Projects Committee
OHSAS	Occupational Health and Safety Assessment Series
PCT	Patent Cooperation Treaty
QMS	Quality Management Systems
R&D	Research and Development
RPED	Regional Programme on Enterprise Development
SGS	Société Générale de Surveillance
SAB	South African Brewery
SABCO	South African Beverages Company
SEFCO	Small Enterprises Finance Company Limited
SIC	Swiss Investment Corporation
SMEs	Small and Medium Enterprises
TPM	Total Productive Maintenance
UK	United Kingdom
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organisation
UNESCO	United Nations Educational, Scientific and Cultural Organisation
US \$	United States dollars
USA	United States of America
VSAT	Very Small Aperture Terminal
WCP	World Class Performance
WIPO	World Intellectual property Organisation
WTO	World Trade Organisation

Chapter One

INTRODUCTION

1.1 Background: Technological Capabilities and Foreign Direct Investment

The importance of technology in industrial production came to the fore in the immediate years after World War II. It was believed that in order to achieve high and sustained levels of economic development, technological progress was necessary and this had to take place through a steady process of technological accumulation. This process enabled a continuous and increasing introduction of entirely new processes and new products into an economy (Landes, 1969; Maddison, 1991; Freeman and Soete, 1997). The debate on economic development was of particular importance to the underdeveloped countries, which were trying to devise ways to overcome levels of poverty and low productivity. Although alternative sources of technology transfer such as licensing, turnkey projects and consultancy existed, it was largely thought that the successful accumulation of technology mainly depended on foreign investment into a host country. Such investment was believed to result in the transfer of technology and other capital goods. The technology transferred was however dominated by a focus on 'embodied' capital – machinery and equipment (including at times human capital) and included less of the 'dis-embodied' capital.

During the 1950s and 1960s little effort was therefore made to analyse technological change in underdeveloped country industries. Technological change was either presumed to be absent or was assumed to result from technological innovations that had been made elsewhere in industrialised countries and could simply be selected and applied in underdeveloped countries. Accordingly much of the technology and development literature was located within neo-classical framework where the choice of technology became the main point of concern to the underdeveloped countries: hence the coining of the concept of 'appropriate technology' in the 1970s. The prime objectives of appropriate technology were to maximise social welfare and to optimise the use of available resources in a given environment [Stewart, (1972: 1979); Willoughby, 1990]. More attention was therefore given to how to access and transfer foreign technology at low and affordable prices. Technology mastery was assumed to automatically result from learning by doing in the course of production in the firms using the transferred technology.

Nevertheless, by the mid 1970s the debate over whether imported technology was appropriate or inappropriate took a new turn. Transfer of machinery, equipment and other capital goods to underdeveloped countries failed to contribute to economic development in a number of countries. The perceived automatic mastery of foreign technology by locally owned firms often failed to materialise and the whole notion and relevance of technology transfer was beginning to be queried. The need for change was advocated and the debate revolved around a highly significant issue at the time: ***"why some countries were more successful in acquiring, learning and diffusing technological knowledge from imported technology or from foreign investment than others"***. Evidence from research conducted in some of the newly industrialised countries (NICs) supported the need for local effort to develop technologies – whether indigenous technologies or of the imitative kind developed through reverse engineering (Ernst, Mytelka and Ganiatsos, 1998: p. 6). The notion of technological capability came

to the fore and ostensibly became a central focus of further research and discussion [Fransman, 1984); Lall, (1982: 1987: 1992); Katz, 1985; Bell, 1984; Bell and Pavitt, (1992: 1993)]. Further studies were conducted widely for instance in Asia by Dahlman and Westphal (1982); Westphal, Kim and Dahlman (1985); Westphal, (1990); Hobday, (1995); Kim (1997: 1999); Ernst, Mytelka and Ganiatsos, (1998). In Latin America by Katz, (1987) and Dahlman, (1987). Finally, in the Andean Group by Mytelka (1978) and in Africa by Mytelka (1985: 1989); Langdon (1981: 1984) among others.

On the basis of lessons from the NICs and Latin America the consensus that emerged out of this phase was that developing countries needed some degree of technological capability. This was more so if they were to be successful in choosing, adapting, and making incremental improvements in imported technology or better still if they were to be able to imitate foreign products and processes. Researchers therefore introduced the phrase *technological capability* and since then it has been embraced in the developing countries especially with regard to firms, as they try to identify and formulate their strategies to meet the ever increasing challenges of intensified innovative competition resulting from liberalisation and globalisation measures among others. Despite the adoption of this phrase, it is nonetheless difficult to interpret it partly because the resources firms accumulate are diverse and difficult to categorise. Examples of such resources comprise human capabilities: skills, experience and knowledge vested in people along with institutional resources: the internal procedures, routines and organisational structures of the firm, and the external linkages cemented with other firms and institutions.

Just as it is difficult to interpret technological capability it has also proved difficult to understand how it can be acquired and/or built in firms, industries or economies particularly in the underdeveloped economies. Acquisition of technological capability is a complex learning process that comes from many sources for instance international, domestic and in-house sources (Kim, 1997: p. 90). The point we are trying to emphasise here is that technological capability building is a difficult process that takes time, results from continuous effort and involves diverse resources. As a result of this, many developing countries such as those in sub Saharan Africa (SSA) have not been successful in acquiring and/or building these capabilities and are therefore characterised by low capability levels in choosing, adapting and making incremental improvements in imported technology or imitating techniques employed by foreign investors. In this study we shall try to ***understand how such countries whose technological capabilities are relatively low stand to benefit from foreign direct investment (FDI)***. This study shall not limit its analysis to the firm level as has commonly been done in the past. It will be emphasised rather that the firm is situated in a broader context, which some theorists have described as a national system of innovation (NSI). These theorists emphasise that learning and innovation at the firm level are stimulated by interactions with other firms e.g. clients or competitors and the process is supported by other actors in the system, notably research institutes and production centers. This thesis will conceptualise the firm in this systemic context and within the evolutionary framework that has resulted from theoretical developments in the economics of technical change extended widely since 1980s with the pioneering work by Rosenberg (1982), Nelson and Winter (1982) and Freeman (1982) among others.

1.2 Research Problem and Questions

FDI is regarded as one of the driving forces integrating underdeveloped countries into the globalisation process that has characterised the world economy over the past several decades. It is presumed to be an important channel through which international diffusion of knowledge and technology takes place. Since the underdeveloped countries lag behind in the world technology frontier, they rely considerably on inflows of foreign technology from the technically advanced countries (Lall 1987: p. 193; Pack and Saggi 1997: p. 81). This however, should not be interpreted to mean that underdeveloped countries do not generate indigenous technology. Technicians & artisans, weavers and metal workers in underdeveloped countries possess considerable technological know-how and the material technology needed for production. Some underdeveloped countries have significant packages of technical knowledge (even in more advanced technologies) and there is no reason to suppose that many technologies cannot be developed indigenously.

However, absorption of new and advanced technologies in underdeveloped countries may be problematic for firms in the short run especially when the technology gap is wide. It would require much time to nurture research and to develop human capacity – for instance training scientists and engineers. This would call for sustained expenditure on education and research and development (R&D). All this notwithstanding, it would also take a long time to ensure that findings from research were transferred to locally owned firms for exploitation. This long process does, however, represent an alternative to FDI as does the import of machinery and equipment and the hiring of technical and engineering personnel with a mandate to train local personnel in its use and maintenance. Unfortunately, the scarce resources in the underdeveloped countries and the amount of time this process would take before it can be accomplished leads many to stress the need to import technology and the role of FDI in facilitating this process. In this respect, we will argue that FDI is not only important in the international transfer of technology and skills to the underdeveloped countries but could also act as a stimulant to the technological development process which in turn enhances industrial development and eventually long run economic growth. Based on this proposition, a relevant task would therefore be to investigate whether imported technology is absorbed locally not only into a single firm, but through spillovers, into a wider system of innovation that could be created as a means to develop a dynamic process of innovation in an industry.

Technology transfer irrespective of the channel through which it occurs is not easy. It requires much effort and investment in various resources on the side of the recipient to facilitate the adaptation of the technology before it is implemented (Teece, 1977: p. 245; Nelson and Pack, 1997: p. 18). Contrary to the over-simplified assumptions accorded to technology in the neo-classical framework, the characteristics of technology are quite complex making it different from other normal market products. The tacit¹ nature of technology makes it ill defined to the extent that, it becomes difficult to transact in a normal commodity market. The seller has more information than the buyer, has greater bargaining power and can exercise imperfect competition hence making the buyer operate under a situation of information asymmetry (Arrow, 1962: p. 615). It is difficult to judge the value of any specific technology and agree about prices and licensing costs

¹ The term tacit is taken here to imply that technology cannot be codified and that tacit knowledge is unique and specific to individual firms. It cannot be exchanged among firms as it is derived after a long period of learning experiences of individual firms through accumulation of technological capability. It is embodied in the "organisational routines and collective expertise or skills of specific production, procurement, R&D and marketing teams" (Ernst, Mytelka and Ganiatsos, 1998: p. 6).

that are acceptable to both parties. The benefits of technology transfer are also difficult to determine. In the short-run technology transfer benefits the recipient by increasing productivity, contributing to the development of new products and by raising profits. In the long run the benefits depend on how much recipients learn from the technology and are able to deepen and develop their own capabilities (UNCTAD, 1999: p. 203).

To the contrary, there are those who hold a different view on the importance of FDI in a host country. From the old dependency theory in development, MNCs are viewed as major instruments of capitalism underdeveloping developing economies to expand accumulation in the developed world [Frank, (1973: 1978)]. Increased MNC penetration was considered to de-skill workers. This was so given that MNCs considered minimum and/or low wage employment to be the basis of incorporation in developing economies. Taking as an example, when a small market size exists it restricts the number of firms to only a few at a given time. This has untold repercussions in that it can present monopsony powers to firms making them pay skilled workers wages at par with unskilled workers which in turn discourages Labour from acquiring skilled workers. In support of the same arguments advanced above, Amin (1973: 1976: 1977) further reiterated that MNCs transfer inappropriate capital-intensive technology to the developing countries. He argued that such technologies once transferred increases their cost of adoption and diffusion thus making the process of technological development difficult in the host developing countries. These arguments are founded in Marx earlier arguments that increased capitalism by MNCs in a given industry would deny the underdeveloped countries the chance and potential to learn and develop their own technological capabilities. The same sentiments were expressed by Lall and Streeten (1978) who observed that while MNCs enjoyed the potential to generate strong efficiency spillovers to locally owned firms it was also possible for them to create bias towards capital intensive technology. This would have adverse effects on employment, income distribution and consumption pattern. Most importantly competition created by the MNCs may crowd out domestic investment. This would again result in an industry without strong indigenous technological capabilities². The same dependent relationship long run results would be an industry deprived of the opportunity to generate own knowledge and innovations that are necessary for self propelled economic growth and development.

This thesis will investigate whether technology, knowledge and other skills transferred to the underdeveloped countries from developed countries contributes to the development of technological capabilities in the former, which would in turn enable them to learn and innovate. This aspect has not been accorded due recognition in the spillover literature whose work, mainly placed in the neo-classical literature, tends to naively reduce technological change to production. Production function was considered to be the dominant framework to measure and determine the impact of technological spillovers [see among others studies by Caves, 1974; Globerman, 1979; Blomstrom and Persson, 1983 using data for Canada, Australia and Mexico respectively]. The effort by the locally owned firms, for instance to learn, imitate or copy production, processing, marketing, managerial or organisational techniques demonstrated to them by the foreign firms was neglected as was done to the understanding of dynamics and mechanisms through which

² This is supported by Lall (1992, p. 179) argument when he remarked that “a strong foreign presence with advanced technologies can prevent local competitors from investing in deepening their own capabilities”.

specific spillovers occurred³. As will be shown at a later chapter, the production function approach, which conceptualises spillovers in terms of labour or total factor productivity rather than learning, capability building or innovation, does not actually measure spillovers or capture their economic impact. There has been little work if any which directly investigates spillovers taking learning, capability building or innovation as their point of departure in line with Schumpeterian tradition, which emphasises the importance of learning and innovation in development.

This thesis aims to fill in this gap in the spillover literature taking an evolutionary perspective. The analysis will be done by examining the effect of spillover 'externalities' from subsidiaries of MNCs to locally owned firms in the context of a technologically underdeveloped country namely Kenya in sub Saharan Africa. Despite the existence of voluminous literature on FDI spillovers in both developed and advanced developing countries, little if anything is known about spillovers and their effect particularly in SSA where economies differ substantially from other developing countries. Most of these are characterised by very fragile economies where markets are small, firms are weak, capital poor and still 'locked into' low levels of traditional skills and non-competitive techniques and where institutions and infrastructure are weaker than in many other developing countries (DCs). All these factors demonstrate why the case of third world countries in SSA⁴ is therefore unique and one that ironically failed to receive any significant attention in the spillover literature in the 1970s, 1980s and into the 1990s. In this respect, the current study will address five broad questions that focus on analysing the benefits of FDI in the context of technically underdeveloped countries with particular reference to Kenyan manufacturing enterprises. The specific questions can be stated as follows:

- (1) Does the presence of MNCs stimulate spillovers to local manufacturing enterprises in Kenya?
- (2) If so, what kind of spillovers occur and to what extent?
- (3) What are the main mechanisms and/or channels through which these spillovers occur?
- (4) Under what conditions do spillovers occur in the Kenyan enterprises?
- (5) How do spillovers influence technological innovations at the enterprise level in the Kenyan manufacturing industry?

The thesis will argue that over time as subsidiaries of MNCs located in an underdeveloped country use technologies new to that country, leakage of knowledge and skills in the form of spillovers may take place. These spillovers include new knowledge, skills and other resources that would enable locally owned firms to generate and manage technological change, and may lead to sustained technological capability development and technology self-sufficiency in the long run. Such spillovers, we shall argue, take place as firms compete and interact through the formation of industrial network linkages or co-operative activities [Richardson, 1972; Brusco and Sabel, 1981; Brusco, 1982; Piore and Sabel, 1984; Best, 1990; Rasiah, (1994: 1995); Saxenian, 1991]. These arguments are as well raised in the new endogenous growth and trade theories, which emphasise the importance of positive externalities in technological development and subsequent economic growth. In addition, endogenous growth theory stresses that for technological development to take place, positive spillovers must be accompanied by accumulation of

³ By failing to examine the mechanisms through which spillovers take place, the production function approach treats them as a 'black box', denying us full understanding of the spillover process.

⁴ For an elaborate discussion see Freeman and Lindauer (1999): "Why not Africa" *NBER working Paper No. 6942*, <http://www.nber.org/papers.w6942>.

capital and accumulation of knowledge through R&D, human capital formation and technological learning [Arrow, 1962; Nelson and Phelps, 1966; Lucas, 1988; Romer, (1986: 1990), Griliches, (1984: 1992); Benhabib and Jovanovic, 1991; Grossman and Helpman: 1991]. On the basis of this theory, technological change therefore results from conscious effort to investments and from different decisions undertaken by economic agents. The theory emphasises that without spillovers, externalities, or other sources of increasing returns, economic growth cannot proceed at a constant, undiminished rate into the future.

1.3 The Study Objectives

The broad objective of this study is therefore to examine the role of FDI in the industrial development in Kenya. Investment in the form of FDI is likely to spur development in a host country by playing a supportive role or by acting as a complement to local investment and innovation. Under certain conditions, FDI could serve to improve host countries' industrial development effort and their competitiveness by bringing into them some desirable attributes such as best practices in production, new skills and trainings, leading-edge or new technology, new managerial and marketing know-how, facilitate supply and knowledge linkage formation. Such linkage formation facilitates spread of skills and information to the economy and might catalyse the existing entrepreneurial efforts through demonstration effect. Further, FDI might help strengthen local systems of innovation within underdeveloped countries when the subsidiaries of MNC encourage local R&D institutes to enhance commercialisation of their accumulated capability. This study therefore arises out of concerns to understand how FDI affects industrialisation process in Kenya with particular emphasis on MNCs' influence in promoting a dynamic manufacturing industry. The specific study objectives formulated to guide this study can be outlined as follows:

- (1) To investigate the extent to which the presence of MNCs stimulates spillovers to local manufacturing enterprises in Kenya.
- (2) To determine the conditions under which spillovers occur in Kenyan manufacturing enterprises.
- (3) To investigate how spillovers from MNCs impact on technological innovations at the enterprise level in the Kenyan manufacturing industry⁵.
- (4) To draw some lessons and policy implications for a spillover driven industrial development in Kenya.

⁵ This is based on two selected manufacturing industries: Food processing and beverages, and machine engineering industry.

1.4 A Brief Summary of the Thesis Approach

This Thesis will take an empirical approach using a firm level survey method, which will be backed up by several case studies with a strong interview questionnaire instrument aimed at providing deeper insights into the underlying issues observed in the survey findings. To achieve this goal, this thesis adopts three strands of literature. The first one is the literature on technological spillover. This was pioneered by Caves (1974: 1982) applying the production function framework and latter led to a plethora of other works employing a similar framework [Globerman, 1979; Blomstrom and Persson, 1983; Blomstrom, 1986; Kokko, (1992: 1994); Blomstrom and Wolffe, 1994; Blomstrom and Sjöholm, 1997; Djankov and Hoekman, 1998]. This has been advanced by recent studies which have introduced new methodologies which have taken into consideration new dimensions, instruments and dynamics such as time variations, industry type, locational and other spatial variables (Hadda and Harrison, 1993 and Aitken, Hansen and Harrison 1999). The spillover literature has also been advanced by the proponents of new growth theory who emphasise endogenous technological change, accumulation of human capital and openness to international trade and investment [Lucas, 1988; Romer, (1986: 1990); Aghion and Howitt, 1990; Coe and Helpman, 1995; Grossman and Helpman, 1995]. The literature emphasises the importance of technological spillovers in long run economic growth and development.

Second, the study adopts the literature on clustering and network dynamics⁶. This is founded in industrial organisation and begins with the pioneering work by Coase (1937), Chandler (1961: 1977), Richardson (1972) and Williamson (1975: 1979: 1985). The literature extracts elements of transaction costs and institution economics. Additionally, several works exist that support examples of effective industrial networks, where cooperation, market forces and social capital such as trust have been cited as important elements in the formation of production relationships (see Brusco and Sabel, 1981; Brusco, 1982; Piore and Sabel, 1984; Best, 1990; Saxenian, 1991) among others. In the proposed framework, we shall rely on industrial networks of individual enterprises to reveal various kinds of technological spillovers that occur (pecuniary or non-pecuniary) and investigate their impact on technological learning, capability building and innovation.

The third literature strand adopted relates to economics of technological innovation, which emphasises the importance of firm technological learning and capability in incurring technological change and innovation. This literature is founded under the broad framework of evolutionary economics recently advanced by Nelson and Winter, 1982; Rosenberg, 1982; Freeman, 1982; Stoneman, 1983: 1995; Dosi, Freeman, Soete and Silversberg, 1988; Metcalfe, 1989; Freeman and Soete, 1997 among others. This has in addition motivated the development of national system of innovation framework [Freeman, (1987: 1995); Lundvall, (1988: 1992: 2000); Nelson and Rosenberg, 1993; Nelson, 1993; Edquist, 1997; Mytelka, (2000: 2004)].

1.5 Justification and Limitations of the Study

The existing literature on FDI and technological spillover is mainly based on the traditional neo-classical approach, production function framework, which is employed as

⁶ However network dynamics in our context could also be referred to as social networks.

the dominant approach to capture technological spillovers and their economic impact⁷. This is problematic in that the spillover literature has failed to maintain pace with the growing importance of technological learning, capability building and innovation in technology development for economic growth. This problem is further compounded by another shortcoming in that spillovers are conceptualised in terms of productivity, which is inherently static and does not actually capture potential spillovers from the perspective of learning, technological change and innovation. The direct implication of this is that there is yet a lot of investigation that ought to be done to fill this void in the spillover literature. This thesis is therefore justified as it intends to analyse technological spillovers in the perspective of learning, capability building and innovation contrary to productivity technique, which takes production function framework as its point of departure.

With regard to distribution of studies examining technological spillovers from foreign investment and their effects on a host country, it is notable that such studies are skewed to the developed countries. The existing theory and empirical studies have to a large extent been based on scenarios and case studies illustrated by experiences in developed countries or advanced developing countries. Systematic studies rooted in least developed countries, especially sub Saharan Africa have been limited. Such a study would take the structural specificities and other characteristics of such countries into consideration. This study is therefore relevant and justified in its attempt to contribute towards bridging this knowledge gap. We provide some examples to explicitly demonstrate why relying on developed country studies to draw general conclusions on spillovers would be misleading. First, studies done in the developed countries focus on instruments that are of little relevance in developing countries. A voluminous literature exists where spillovers are measured taking R&D as the starting point [Griliches, (1979: 1992)]. Whereas R&D based knowledge spillovers may exist in developed countries, this may not be the case in developing countries since firms there undertake little R&D and even MNCs hardly conduct R&D there [Mansfield, Teece and Romeo, 1979; Lall, (1979: 1980); Dunning, (1993: 1994); Rasiah, 1995]. The technology and scientific infrastructure or the broad national system of innovation in developing countries offers minimum support for R&D activities as it does to other technology development initiatives. Business and financing institutions are in their weakest form to offer credible financing opportunities capable of supporting innovation – there is a general lack of credible information and knowledge flow in the existing knowledge systems.

Second, a plethora of studies exist in developed countries that use patent citation to measure knowledge spillovers [Jaffe, 1986; Jaffe, Trajtenberg and Henderson, 1993; Jaffe and Trajtenberg, 1999; Maurseth and Verspagen, 2000; Criscuolo, 2004]. The logic behind patent citation is that a patent document often makes reference to an earlier existing patent document. The proponents of this approach then argue that citations of earlier patent documents could be interpreted as spillovers from the knowledge described in the cited patent to the knowledge in the citing patent. This is exactly where the problem lies in a developing country context in that only a few patents are granted in developing countries and even then only a few of them are translated into actual production. Patents are therefore not relevant in a developing country setting. This is more so given that their capacities in terms of resources to innovate are weak even when an idea around a patent may appear plausible. As indicated above, a strong financing mechanism to sustain an innovation process is not in place as well as a solid knowledge base to support innovation e.g. developed R&D and national system of innovation.

⁷ Although the empirical models estimating the production function may have been extended and refined the basic approach is still, by and large, the same.

In this light one of the countries with a relatively mature manufacturing base in the Sub Saharan Africa was opted for in this study and Kenya was chosen based on several factors. *First*, Kenya is a unique country in Sub Saharan Africa in that it is not richly endowed with natural resources but because of the scale of its local production in her industry, it tends to be resource-intensive. This does not depend on domestic raw materials only but also on imports and on the trading linkages established by local or foreign firms. *Second*, the earliest inward foreign direct investment in Kenya tended to be local market-oriented or trade-related. MNCs started coming into Kenya long before her independence in 1963. It is believed that the early entry of MNCs enabled Kenya to develop a comparative advantage in manufacturing compared to other countries in the region. *Finally*, although there was a slight decline in FDI inflow in the early 1990s, foreign entrepreneurs and expatriate firms have already developed a major presence, and constitute an important linkage between MNCs and localities. These arguments tend to support a widely held belief that Kenya's success in the manufacturing industry could be attributed to the existence of FDI, a fact that needs to be ascertained empirically.

This study is also relevant for policy making particularly in view of the current initiative for structural transformation in Kenya. As documented in a major strategy paper entitled "industrial transformation to the year 2020" the country will undergo a process of structural change aimed at fully industrialising the country by the year 2020 (Kenya Government, 1997 (a)). This thesis is therefore relevant and significant as might offer several insights towards understanding the role (both dynamic and complementary) that FDI in Kenya could play in such an important industrial development process. Further this thesis is timely in that its findings will contribute to the on going international debate on the best interventions and policy measures that are necessary in order to achieve the United Nations Millennium Development Goals (MDGs). The United Nations millennium development project is spearheaded by the United Nations to identify "practical strategies to eradicate poverty by scaling up investment in infrastructure and human capital promotion while promoting gender equality and environmental sustainability" (UN Millennium Project – UNIDO, 2005). The study is equally relevant for policy particularly at this point in time when neo-liberal prescriptions seem to be increasing pressure on the developing countries. Policy prescriptions of multilateral agencies and international organisations such as World Bank, IMF, WTO are critical of discriminatory policies towards FDI, exports, globalisation, privatisation.

In terms of innovative aspect, the study is highly justified in that its scope of analysis is not limited to the firm level as has commonly been done in the past. In this study the firm will be conceptualised as situated in a broader context, which some theorists have described as national system of innovation (NSI). These theorists emphasise that learning and innovation at the firm level are stimulated by interactions with other firms e.g. clients or competitors and the process is supported by other actors in the system, notably research institutes and production centres.

One of the limitations to the study is that of data inadequacy. Until recently most underdeveloped countries lacked strong technology policies on technology issues e.g. technology generation, acquisition, transfer and diffusion. Data on technology was therefore scarcely collected or not collected at all. Issues of technical change and innovation still appear somehow new to most underdeveloped countries. Kenya is not unique in this respect, as very little data if any on technological change is collected and/or documented. However to justify the feasibility of this study, we will conduct the

study in two phases first by utilising the data at aggregate level and secondly by going behind the aggregate and conduct firm level interviews, which will be followed by specific case studies to complement the survey data/information. However, data and information collected through the firm level interviews was limited to only food processing and beverages and machine and engineering industries⁸. The two industries were selected on the basis of their dynamism compared to the other industries. As will be shown extensively in Chapter 3 and 4 the two industries were the most productive with the fastest growth rates; high FDI levels, value added, employment generation and contribution to the GDP.

1.6 Data Collection and Scope of Study

Data collection for this study was done in two phases and then supplemented with a few case studies. The first phase included collection of data from secondary sources and was only concentrated in Nairobi while in the second phase interviews were carried out basically in six regions in Kenya believed to have the most industries – Nairobi, Mombasa, Nakuru, Kericho, Eldoret and Kisumu (See Map 3.1).

In the second phase, interviews were conducted using a pre-tested structured questionnaire. Purposive, and proportionate and probability sampling techniques were employed in the selection of the firms to be included in the survey. To begin with, two sectors were purposively selected on the basis of high levels of FDI and their activities; food processing and beverages and machine and engineering industries. Similarly the sub sectors were also selected in the same manner. Firms in the sub sectors were then divided into local, joint ventures and fully foreign. Then on the basis of this classification, proportionate and probability-sampling technique was used to select the firms to be incorporated in the survey. The firms were then interviewed using a questionnaire guided technique.

The case studies were selected on the basis of the survey done in the second phase. This was done by interviews coupled with organised firm visits to acquaint with production technology, learning mechanisms and innovation. The objective of the interview was to collect qualitative information, which would shed further insight into our understanding the impact of FDI in Kenya's industrial development. By so doing we were able to clarify more concretely what happened in the domestic firms as a result of MNC's presence, and answer the questions of how and why. A few institutions selected from business associations, government departments and institutions such as R&D, academic and financial institutions were also interviewed in order to understand the role of institutions and systemic influences in the spillover occurrence process. The information sought was obtained from government officials, professionals and academic scholars knowledgeable in investment, industry, innovation, privatisation and FDI.

1.7 Thesis Outline

This thesis is organised into nine chapters which comprise an introductory chapter, a theoretical and conceptual setting chapter, a chapter on FDI overview in Kenya, two

⁸ Note that "food processing and beverages" and "food processing" will sometimes be used interchangeably. Similarly, "machine and engineering" and "machine engineering" will be used interchangeably.

empirical chapters, two detailed case studies and a concluding chapter which presents the summary of the findings and policy recommendations. In Figure 1.1 a schematic overview of this thesis is presented.

Chapter 1 presents the thesis background, outlines the study objectives and states the main study questions. The chapter presents justification and limitations of the study and provides a summary of the data collection methods. The research methods to be employed and the theoretical approach are highlighted.

Chapter 2 presents an analysis of the literature on technological spillovers from FDI. The chapter commences with a brief discussion on international technology transfer. This is followed by a detailed analysis of FDI and technological spillovers. A discussion on the emerging issues from the technological spillover analysis is presented from which an alternative analytical framework to govern the study is offered.

Chapter 3 presents an analysis of industrial policies pursued by the Kenya government for the purpose of industrialisation and to attract foreign investment. This chapter attempts to put FDI and manufacturing industry evolution into context by tracing FDI from the origin and institutional setting in Kenya's manufacturing industry. The chapter discusses the importance of institutions in spillover occurrence, learning and capability building in firms.

Chapter 4 presents an empirical analysis. It begins with an analysis of technological characteristics of Kenyan manufacturing industry based on an in-depth analysis of panel sample characteristics. We also undertake to discuss comparisons of technological characteristics between local and foreign firms. Finally, we determine empirically the effect of foreign presence on total factor productivity using panel data estimation technique.

Chapter 5 uses the analytical framework designed in Chapter 2 to examine the extent of spillover occurrence in the Kenyan manufacturing industry. The chapter begins by presenting detailed descriptive characteristics of the survey data collected in food processing and beverages, and machine and engineering – two most dynamic industries. The kinds of spillovers occurring as well as the modes through which they occur are examined. We compute a technological spillover index, which offers tremendous insight on the extent to which technological spillovers conceptualised in terms of technological learning and capability building do occur in the manufacturing industry. The chapter uses limited dependent variable estimation technique to investigate the determinants of spillover occurrence.

Chapter 6 presents ten detailed firm level case studies of foreign firms operating in the Kenyan manufacturing industry. The case studies included wholly owned foreign firms and joint ventures (JVs) drawn from food processing and beverages, and machine and engineering industries. Using the selected case study firms, this chapter illustrates the extent to which foreign firms stimulated spillover occurrence to the locally owned firms. For this purpose, a framework based on the approach utilised in Chapter 2 and 5 was adopted taking into consideration four critical spillover mechanisms identified – firm level training and labour mobility, competition, linkages and demonstration effects. The study argues that foreign firms played an important role in stimulating technological learning, capability building and innovation in the locally owned firms as well as in the domestic institutions and business associations. This seemed to suggest a possible role

FDI plays in accumulation of technological capability in manufacturing industry and in-turn industrial development.

Chapter 7 uses a similar approach to that employed in Chapter 6 to examine spillover occurrence from the perspective of locally owned firms. Subsequently, eight detailed case studies are drawn from the same industries as in the previous chapter. Conceptualising technological spillovers in the form of skills and knowledge, this chapter presented an extensive analysis on how such knowledge spillovers engendered technological changes and learning processes with subsequent accumulation of technological capability in locally owned firms. We also discuss the government's role in spillover occurrence process.

The summary and conclusions of the study are presented in Chapter 8. The chapter also offers policy implications based on our findings with respect to the role of FDI in industrial development in Kenya. Limitations of the study and possible future directions for further research are also illuminated in this section.

Figure 1.1 Organisation of the Study

Chapter Two

FOREIGN DIRECT INVESTMENT AND TECHNOLOGICAL SPILLOVERS CRITICAL REVIEW AND CONCEPTUAL FRAMEWORK

2.1 Introduction

Chapter 1 presented a brief introduction for the entire study by outlining the research questions and objectives, relevance and justification, theoretical approach in brief and the study's structure. This chapter presents a critical analysis of FDI and technological spillovers literature and integrates it with two alternative theoretical literature strands to develop an analytical framework for examining spillovers in Kenya's manufacturing industry. The two alternative literature strands included technological innovations, and clustering and network dynamics. The chapter begins with a brief discussion on international technology transfer in section 2.2 followed by a detailed analysis of FDI and technological spillovers in section 2.3. In section 2.4, we discuss the emerging issues from the literature review and present an alternative theoretical framework. In section 2.5, we develop the analytical framework to be used in analysing technological spillovers. The propositions to be tested in our study are formulated in section 2.6. Section 2.7 presents the research design and methodological setting employed. Summary and conclusion are presented in section 2.8.

2.2 International Technology Transfer

This section begins by trying to conceptualise industrial technology in a bid to provide a basis for the analysis of technology transfer and how technological spillovers take place. This is deemed important since analysing the two requires a well-grounded understanding of technology's nature and its characteristics. Over time two distinct conceptualisations of technology have evolved. The first one is the traditional neo-classical perspective, which treats technology narrowly and in a very simplified manner. Technology was regarded as a public good that was freely available, costless and existing in a form that could be easily codified in designs, blue prints or operating manuals making it transferable with little effort. The second one and the more current is the endogenous perspective which views technology as something that is possessed by individuals, firms or institutions and includes a strong tacit element in that, it cannot be expressed in a completely explicit form. This is the kind of knowledge that is usually accumulated through experience as firms undertake their operations like design, production, and investment activities over time [Kaldor, 1957 Penrose, 1959; Polanyi, (1966: 1973); Ernst, Mytelka and Ganiatsos, 1998; Rasiah, 2002]. During various problem solving and trouble-shooting activities in firms, knowledge is generated and experience accumulated. Such knowledge acquired over time remains in the firms and in a substantially tacit form even during times of technology transfer, implying that other firms would have difficulties accessing it (Rosenberg and Frischtak, 1985). A more rigorous way of putting it is that a considerable portion of technology is individual and firm specific with less of it explicitly expressed making it unavailable in a more complete form. Understanding of a particular firm's technology by other firms thus becomes difficult, as does its copying and imitation.

The two perspectives demonstrate how the concept of technology has been viewed differently by different participants in the technology debate. The current discussion starts from the second perspective, which regards technology as something that is complex, difficult to define precisely and is far more than a mere collection of patents, blue prints, machinery and equipment. By the same token technology transfer would therefore be anticipated to be a much more complex affair than the transfer of objects from firm to firm or shipment of capital equipment from country to country. Technology is transferred from multiple sources and in multiple ways. These differ from one country to another: sometimes due to a particular country's technological capability. The entire process involves many participants demonstrating a kind of integrated systemic framework involving a process that is non-linear, continuous, dynamic and interactive.

The main channels of international technology transfer include FDI, market transactions such as international trade in capital goods and selling directly through technology licensing arrangements [Dunning, (1973: 1993); Lall, (1979: 1980); Romer, 1990; Coe and Helpman, 1995; Grossman and Helpman, 1995]. Others include joint ventures and strategic alliances (for an elaborated analysis of international channels of technology transfer see: Mowery and Oxley, 1997: pp. 140-9). Technology transfer also arises due to patent disclosures, publications or technical meetings, conversations with employees of innovating firms, possibly in the context of informal networks, hiring of employees of the innovator (international consulting services) and reverse engineering (Caves: 1974, p 185; Mansfield: 1985, p 269). Despite the existence of these mechanisms of technology transfer, empirical evidence indicates that the dominant channel is MNCs. As an example, intra firm transactions in royalties and license fees between parent MNCs and subsidiaries have been reported to account for seventy percent of total global flows of royalties and license fees (UNCTAD, 1997: p. xvi). Transfer of technology by parent MNCs to their subsidiaries should however not be taken to reflect technology absorption and its diffusion to locally owned firms in the receiving countries where subsidiaries locate their operations. Unless otherwise specified for example when talking about the strategy of parent firms, the term MNCs in this study will be used interchangeably with subsidiaries.

Since it is outside the focus of this thesis, a detailed comparison of the various technology transfer channels will not be provided. However, it is important to indicate briefly that FDI differs distinctly from market transaction mechanisms in that, despite being a dominant technology transfer channel it deals with the transfer of relatively newer technologies. It is believed that innovative firms in the developed countries are hesitant to transfer their new and recent technologies even through market transaction for a number of reasons including the fear of losing their ownership advantages. A study involving the transfer of technology by U.S. based multinational firms to their overseas subsidiaries found that the mean age of the technologies transferred to overseas subsidiaries in developed countries was about 6 years (Mansfield and Romeo, 1980: pp. 738-9). This was significantly less than the mean age of the technologies transferred to overseas subsidiaries in developing countries whose average age was about 10 years⁹

⁹ Nonetheless, the difference is not surprising. "Because many newer technologies are inappropriate for developing countries, or are difficult and expensive to transfer there, we would expect the technology transferred to developing countries to be older than that transferred to developed countries (Mansfield and Romeo: 1980: p. 738)." It is well known that not all technologies developed in advanced countries can readily be exploited in developing countries, where society needs are different and infrastructure under which such technology would be exploited. Abramovitz (1994) refers to this process as 'lack of technological congruence'.

whereas the corresponding figure for outside licensing was 13 years. Although the validity of this argument may be questionable today amid the current speed of technical change and great degree of internationalized production, the mainstream literature increasingly supports the view that FDI is a better means of ensuring rapid technology transfer from abroad than it can be brought in the market.

Traditional approaches to growth and development have emphasised the need for technology transfer. From their perspective, international technology transfer and acquisition was a linear process involving technology from one point or region to another mainly in the form of capital goods from suppliers in the industrialised world. One early representation of this approach comes from trade theory and consists of product cycle models based on Posner (1961) and Vernon's (1966) theories' of economic development. According to the product cycle model, innovations were assumed to take place in the advanced industrialised countries located in the North, which were technically efficient and at the technology frontier. The model assumed that as developing countries (DCs) in the South had comparatively lower abilities to innovate than the advanced countries, the latter would enjoy preferential monopoly powers at the initial stage of the cycle in both production and export of new commodities. The higher wages in the advanced countries reflected the monopolistic rents associated with the monopolistic powers of the advanced countries, which eroded gradually as the imitation process in the low wage underdeveloped countries picked up. A remarkable feature of this model was that imitation in the DCs is gradual and takes some time, this time lag places the advanced countries at a comparative advantage in the production of new commodities and DCs in the production of old commodities (Krugman: 1979). This model infers that the continuous process of innovation by the advanced countries and imitation by the DCs helps to explain the continuity of international trade. One policy implication from the product cycle model was that a country needed to open up its domestic economy and to participate more in the international trade, allowing the inflow of capital goods and other commodities, which would bring in new techniques, skills and knowledge.

Although traditional trade theory improves our understanding of the dynamic gains from international trade, its emphasis on a quasi-permanent role for developing countries as recipients of technology transfer and as technological imitators is static and a historical. This notwithstanding, traditional international trade theory fails to treat technology as a tradable commodity in its own respect (Pack and Saggi, 1997: p. 92). This has recently been noted by several authors who contrast traditional trade theories and the internationalization of production as represented by FDI. Saggi (1999) though drawing a comparison to FDI, seemed to buttress the same point when he emphasised that:

"... what makes FDI especially important is that unlike trade in goods, where developing countries try to glean whatever information they can from the products and services imported or import capital goods that embody modern technology, FDI involves explicit trade in technology" (Saggi: 1999: p. 16).

Technology was therefore treated implicitly and viewed as something that could be easily copied, transferred or imitated using information and knowledge obtained from the embodied tradable commodities. As pointed above, this flowed from the traditional neo-classical perspective that reduced to the equivalent of capital goods: machinery and equipment that could be selected and chosen effortlessly, bought, transferred and imitated easily irrespective of the softness and tacit nature component embodied in the

technology¹⁰. An additional problem with traditional trade approaches is that they never, examined the nature of technology, the specific conditions under which various components of technology are transferred or the basic factors characterising the receiving firms, institutions, industries or economies at large. International trade in goods cannot therefore be taken to explain the process of international technology transfer.

The development of both endogenous growth theory and evolutionary economics has put the notion of a linear technology transfer process further into question (Nelson and Winter, 1982). External sources of technology need not be limited to machine suppliers from uniquely specified localities. Other firms vertically linked to a specific firm even in underdeveloped countries, could for instance be important sources of technology so, too, do suppliers and customers provide not just knowledge about product specifications but also a wide range of other technological elements. In such a case the countries wider national system of innovation becomes important.

Taking the case of late industrialisers as an example, specifically Japan, Korea and Taiwan, interactions among firms and between firms and their customers helped to diffuse knowledge and technology in most industries. Entrepreneurial effort by firms in these countries in the form of duplicative or innovative imitation, replicating and reverse engineering of products from the industrialised countries, enhanced technology transfer, its exploitation and diffusion. Movement of skilled personnel between firms and countries helped to strengthen technological know-how, technological learning as well as technology transfer. The relationship between government and business was also instrumental as was participation in the export market forcing firms to learn and increase their technological effort in order to compete effectively in the world market¹¹. A wide review on these issues is available [Amsden, (1989: 1994); Fransman, 1985; Wade, 1990; Chang, 1994; Rasiah, 1994; Lall, 1996; Hobday, 1995; Kim, (1988: 1997); Ernst, Mytelka and Ganiatsos, 1998]

The issue here is that just as the nature of technology is multi-faceted, the same holds for its source, multiple sources exist and the process of creating and transferring technology should be viewed as dynamic involving the interaction of various actors and the effort of entrepreneurs. Given the nature of technology; tacit, incomplete availability, imperfect understanding and uncertainty, interactions become very important if technology is to be acquired, absorbed and diffused to other firms in a wider organisational and industrial set-up. Effective absorption and diffusion of technology requires that the receiving end must have built the necessary capability but would still require conscious effort that can be quite rigorous sometimes even for undertaking simple imitations or duplicative innovation.

However, given that there is always some amount of technological capability in underdeveloped countries, technological generation does exist. This would imply the existence of still other technology sources. Such technology and knowledge could of

¹⁰ As Dahlman and Westphal (1982: p. 106) put it “ technology transfer is misleading, to the extent that it suggests technologies can in fact be transferred wholesale and in working order. Capital goods alone do not constitute a technology; they represent only that part of the technology which is embodied in the hardware.”

¹¹ Participation in export markets stimulated and supported strong and dynamic learning in two ways: *First* by introducing pressure to compete in international markets the entrepreneurs were made to pay attention to the world standards. *Secondly*, the exports involved mainly the contracts with advanced firms in the TRIAD who demanded high performance and provided assistance to achieve it (Westphal, Kim and Dahlman, 1985: pp. 137-50).

course be transferred among firms as they interact through formal and informal linkage networks either directly or indirectly. As would be expected these countries also have a measure of absorption capacity that would facilitate absorption of such knowledge and skills. Nonetheless it would be naive to expect that any country for instance the underdeveloped ones in SSA could transfer and absorb complex technologies and innovations developed elsewhere in the advanced countries automatically and instantaneously irrespective of whether they are embodied or dis-embodied in capital goods. A number of factors including the extent of linkages, of technological gap, of absorption capacity and of interactive learning create differences between technologically advanced countries and rest of the world. Generally therefore, a combination of many factors both to the transferring end and the receiving end, influence transfer of technology both at domestic and international level. These factors combined within an integrated system make the entire process of technology transfer non-linear.

As the above demonstrates, the conceptualisation of technology transfer has changed from a unique, linear and automatic process that is costless to one that is non-linear, and requires considerable conscious effort, investment in technological learning and apprenticeship. Given tacit nature of technology, its cumulateness, uncertainty and firm specific characteristics, its acquisition, transfer, diffusion and assimilation by firms will not be easy. Cost requirements and effort do indeed reflect the difficulties of taking up technology across different firms or national economies. As illustrated by other late industrialisers, recipients of foreign technology must have to devote effort and substantial resources in order to absorb imported technology [Katz, (1985: 1987); Mytelka, (1978: 1985); Dahlman, 1982; Kaplinsky, 1984; Pietrobelli, (2000); Lall (1999:2001)]. Appropriate human resources have to be put in place that facilitates interactions with suppliers to provide technical support. Such effort leads to opportunities for the generation and greater exploitation of technology [Rosenberg and Frischtak, 1985].

A number of factors were observed to be responsible for the non-linear process of technology transfer for instance age of technology, various sources of technology, levels of technological capability, interactions and technological learning. Increasing levels of international integration of innovation at the frontier through internationalisation of R&D activities pressured by globalisation effects and changes on international trade. It can be anticipated that the presence or absence of these factors will influence the technology transfer benefits, spillovers or external effects that occur. In the next section we will look in detail at the technology spillover literature.

2.3 Foreign Direct Investment and Technological Spillovers

This section focuses on foreign investment and the benefits that may accrue from it into a host country. Particular attention has centered on the role of foreign investment as a channel of technology transfer and on the spillovers of knowledge to other firms in the economy. Foreign investment in a host country has both direct and indirect effects. Direct effects take place when a multinational company sets up a subsidiary in a foreign country whereby it transfers some or part of its technology. Until recently, trade theorists have mainly been interested in the direct effects of foreign investment on factor rewards, employment, and capital flows, while those following industrial organisation approaches have put more emphasis on indirect effects or externalities.

Indirect effects comprise all those aspects resulting from the presence of subsidiaries of MNCs on the national economy that may increase the productive efficiency of domestic firms. Such benefits occur since it is not possible for subsidiaries to fully appropriate them ... “the MNC cannot capture all quasi-rents due to its productive activities or to the removal of distortions by the subsidiary’s competitive pressure” (Caves, 1974: p. 176). Caves referred to them as productivity spillovers and classified them into allocative efficiency, technical efficiency and technology transfers. *Allocative efficiency* occurred when MNCs introduce competition in the host country market by breaking existing monopolies while *technical efficiency* that come about when competitive pressure and demonstration effects by subsidiaries induce technical efficiency to domestic firms. Finally *technology transfer* due to the fact that MNCs may speed up their technology transfer and innovation processes, causing them to disseminate faster, than would have been the case, to locally owned firms in the host country: this points will be revisited in a later section.

According to Blomstrom and Kokko (1998: p. 248), spillovers can be classified into two broad categories – productive spillovers and market spillovers. *Product spillovers* come about when domestic firms are able to improve their productivity as a result of forward or backward linkages with subsidiaries, they may imitate subsidiaries’ technologies, or hire workers trained by subsidiaries. The increase in competition that occurs as a result of foreign entry may also be considered a benefit, in particular if it forces locally owned firms to introduce new technology and work harder. *Market spillovers* come about when as a result of MNCs export operations, they pave the way for locally owned firms to enter the same export markets, either because they create transport infrastructure or because they disseminate information about foreign markets that can be used by domestic firms. MNCs often possess strong competitive advantages in entering world markets, such as experience and knowledge of international marketing, established international distribution networks, and lobbying power in their home countries.

According to Griliches (1979), spillovers can be classified into two distinct categories – *rent spillovers* and *pure spillovers*. *Rent spillovers* could be associated to the exchange of goods. The work by Coe and Helpman (1995) provides a good evidence for the existence of *rent spillovers*. From their analysis they found existence of such spillovers linked to (bilateral) international trade flows among countries. According to Griliches, *pure spillovers* could be thought of arising purely from the process of knowledge generation – such as through R&D. Stated differently, *pure spillovers* occur when the innovator fails to scope full benefits from his innovation. Some of the innovator’s benefits spills over to other firms; sometimes including rival and competing firms, with a possibility of raising their existing stock of knowledge upon which new innovations could be based. The mechanism through which *pure spillovers* occur are diverse and include imitation and reverse engineering, labour mobility (such as R&D staff). Other mechanisms include exchange of information, skills, ideas and information in meetings as well as conferences, industrial espionage, etc. Romer (1990) is a typical example of an existing analysis that attempted to model *pure spillovers* of knowledge.

As various researchers and analysts in the spillover literature seem to suggest, activities of subsidiaries in a host country result in positive spillovers of different kinds affecting locally owned firms that may be vertically integrated with subsidiaries or in direct competition with them. Spillovers from foreign investment improve the allocation of resources among productive sectors in host countries. However, as noted in the spillover literature most of the spillover benefits have been observed in the context of developed

or advanced developing countries. Little about such benefits is actually known about FDI in context of underdeveloped countries. This does not mean that subsidiaries of MNCs do not exist in the underdeveloped countries. Actually there are many subsidiaries already existing in such countries either because of existing markets (windows of opportunities), raw materials, cheap labour and sometimes to tap on existing skill. As an example in Sub-Saharan Africa – Kenya in the Eastern Africa region has had many subsidiaries of various MNCs, which came into Kenya in the early years of her independence. Kenya served as an excellent regional manufacturing base to serve an existing regional market in the whole of Eastern Africa, part of Central and Great Lakes region in Africa and even countries included in the southern Africa. Availability of raw materials mainly agricultural and readily available cheap labour served as addition factors towards attracting subsidiaries to Kenya. Despite the fact that these subsidiaries are more technically efficient and thus more competitive, it would be expected that locally owned firms in Kenya drop out following existence of efficient subsidiaries. However though this does happen, many locally owned firms still survive the pressure of these subsidiaries and in fact continue their operation alongside these subsidiaries and in the same industries. This perhaps makes it an interesting case considering the competitive pressure usually presented by the subsidiaries, yet most domestic firms survive. It is fascinating therefore to look at the cases where they have survived to try and understand the changes, technological, that take place in the locally owned firms and how they undergo the process of undertaking these changes and the like. Of importance would be to find out whether spillovers from FDI have any impact in any of these processes.

Although subsidiaries therefore exist in the underdeveloped part of the world we have no idea as to how their spillovers contribute to the development of domestic technical efficiency. It would be ironical to argue strongly, as is done in the spillover literature that since the presence of FDI in the industrialised world results in positive benefits, the same would happen with certainty in the underdeveloped countries. Thus expecting that FDI would introduce competition, transfer complex technology that enhances productivity and marketing performance in locally owned firms automatically without paying attention to the cost incurred or even the tacit nature of technology involved is problematic given the wide variation of issues, conditions, instruments and institutional structures characterising the underdeveloped countries. Studies on FDI in underdeveloped economies might not always lead to findings similar to those in developed and advanced developing economies, moreover, studies conducted in the advanced countries depict wide variations in definition and conceptualisation of spillovers, as well as differences in methodological approaches employed to analyse the existence of spillovers and their effect. The result is that the literature often presents conflicting findings of spillover occurrence and spillover effects even among advanced countries.

2.3.1 Types of Technological Spillovers – Modes of Occurrence

Several case studies have shown that technological spillovers from the activities of MNCs to locally owned firms may occur through various modes/channels¹². Four main channels are identified in the literature. These include competition, human capital – labour turnover, linkages and demonstration effects.

¹² Reviews of such studies are Lall and Streeter (1977); Lall (1980); Blomstrom and Kokko (1997); Blomstrom, Kokko and Zejan (2000); Saggi (1999); Pack and Saggi (1997); Kokko (1994); Rasiah (1995); Rasiah and Gachino (2005); Tommaso (1998) and Lan (1996). Also various papers presented in Cantwell (1999) and in Moran, Graham and Blomstrom (2005).

MNCs possess specific proprietary assets, which enable them to compensate for the problems associated with operating in a different country's environment [Hymer, 1960; Caves, (1974: 1982); Dunning, (1973: 1993), Buckley and Casson, 1976; Cantwell, 1989; Lall, (1978: 1980); Rasiah, 1995; Narula, 1996]. These Ownership advantages are in the form of superior process and product technology, organisational skill, managerial practices and knowledge, global exposure to dynamics of intentional markets, superior network structures that accord MNCs an edge over the locally owned firms. Due to these attributes of MNCs, they exhibit oligopolistic characteristics, characterised by increased product differentiation, high R&D and advertising expenditure (UNCTAD, 1997: p. 140). Quite often, these MNCs will have come from oligopolies already operating in their home countries and would hence enter the domestic markets of host underdeveloped countries as very strong competitors to the indigenous firms. Their entry puts automatically competitive pressure on the domestic firms inducing them to enhance their capabilities through increased technological learning – *competition spillovers*. If the domestic enterprises are relatively small, weak, and technologically lagging far behind the MNCs, the MNCs might force these firms out of market attaining oligopolistic market power [Blomstrom: 1986; Wang and Blomstrom, 1992]. The importance of a country's sustained competitiveness is that it may force the MNCs to import or bring newer technologies from their parent companies in order to compete and keep their market shares and profit. Hence, spillovers due to competition are only substantial when the locally owned firms in a host country pose competition to the foreign firms. Blomstrom, Kokko and Zejan (1992) have shown that local competition was positively related to the technology import of foreign owned affiliates and thus the higher the competition, the higher the spillovers will be.

Since MNCs exploit state-of-the-art technologies requiring skill levels that are higher than those used by locally owned firms, they are more likely to offer training to their staff more than the locally owned firms. This amounts to human capital development whose results could be human capital spillovers in future. As opposed to the privately–locally owned firms, human capital investment is a priority for the MNCs (Patibandla and Petersen, 2002). At the same time employees of MNCs may acquire skills, tacit knowledge, attitudes and ideas just by doing routine work in a firm that conforms to international production standards – this however does not always follow. *Human capital spillovers* occur due to the mobility of workers or labour turn-over from MNC affiliates to domestic firms hence diffusing knowledge and skills. This channel of technology transfer is quite unique from the others in that it involves technology embodied in the workers as they move between firms, in this case from foreign firms to the locally owned firms or when employees of MNCs leave their jobs to form their own firms (Donnithome and Allen, 1957; Rasiah (1994: 1995)]. This kind of spillover is influenced to a great extent by the level of absorption capacity in the firms¹³. It should be noted however, that if MNCs decide to raise their wages and pay 'efficiency wages' to productive employees in their foreign affiliates, this can serve to some degree as a disincentive to worker mobility. This argument is supported in the literature by studies that found MNCs to offer higher salaries – efficiency wages – than locally owned firms do [Mazumdar, 1995; Aitken, Harrison and Lipsey, 1996; Velde and Morrissey, 2001; Lipsey and Sjöholm, 2001;

¹³ While labour turnover is likely to be an effective mode of technology transfer in NICs, it may not be the same in other developing regions including Africa. The NICs are characterised by a relatively high degree of absorption capacity, competitiveness, entrepreneurship, supportive policies and an enabling scientific infrastructure. When workers in NICs leave MNCs, they prefer to establish their own firms contrary to workers in other developing regions who would perhaps opt to join already established firms. The *rapidity* with which each mechanism impacts spillover diffusion is still unclear.

Patibandla and Petersen, 2002]. Since MNCs have resources and superior technology that enable them to compete successfully with domestic firms, sometimes through market distortion, MNCs would then have an incentive to limit technology diffusion to their local competitors through such mechanisms. Actually labour turn over spillovers, are difficult to determine empirically since as we would expect, data on mobility of the labour force is hardly kept – specifically on movement of workers between firms in an industry or country.

However, we do have evidence of labour turnover in some regions, Gerschenberg (1987) examined MNCs and the training and spread of managerial skills in Kenya. His survey included 72 Kenyan managers, where 28 were employed in subsidiaries of multinational firms, 19 were from joint ventures, 16 from locally owned firms and the remaining from publicly owned firms. He observed that MNCs offered more training of various sorts to their managers than private locally owned firms do (Gerschenberg, 1987: p. 934). About 16% of managers in about 91 jobs considered covered in the study had moved from MNCs to locally owned firms thus contributing to the diffusion of know-how. An example provided in Lin and Rasiah (2003) elaborated how the development of the information hardware industry in Taiwan relied extensively on the technology transferred from MNCs. From the onset, these MNCs were characterised by heavy technology transfer that was widely supported by a strong domestic institutional development. There was also increased employment of the locals in the MNCs. As a result, there was tremendous accumulation of human capital in the 1970s to the locals working in MNCs who acquired tacit and experiential knowledge. Over time, relocation of human embodied capital from MNCs to the locally owned firms helped stimulate the growth and development of domestic firms in the same industry. Examples cited in (Saggi: 1999, pp. 23-4) provided additional evidence of labour turnover spillovers. He cited an example where Korea's Daewoo supplied Desh (Bangladeshi firm to manufacture and export garments) with technology and credit. Eventually, 115 of the 130 initial workers left Desh to set up their own firms, or to join other newly established garment companies. The speed with which the former Desh workers transmitted their know-how to other factories demonstrated the role labour turnover could play in technology diffusion. A similar example is cited where in the mid 1980s, about fifty percent of all engineers and approximately sixty three percent of all skilled workers that left MNCs, left to join locally owned Taiwanese firms.

We now turn to linkages. Linkage spillovers occur through either upstream linkage or downstream linkage. The former takes place when MNCs establish linkages with local suppliers [Hirschman, 1958; Lall, 1980; Rasiah, 1995; Rodriguez-Claire, 1996; UNCTAD, 2001; Belderbos, Capannelli and Fukao, 2001; Smarzynska, 2003]. MNCs may help prospective suppliers to set up production facilities, provide technical assistance, provide information to raise the quality of suppliers' products or to facilitate innovations, provide training and help in management and organisation. Spillovers of this kind usually contribute to raise the productivity and efficiency of the local supplying firms. The downward stream is when MNCs establish links with customers. The benefits of such linkages arise for instance when a MNC producing machinery and equipment offers after sales services beyond the usual advice on how to use and maintain the purchased equipment. A third kind of linkage is between MNCs and their technology partners. These allow for the sharing of information and exchange of knowledge and ideas.

Demonstration effects occur when locally owned firms may adopt technologies introduced by foreign firms through imitation or reverse engineering. Due to the

ownership advantages of the MNCs, they are likely to bring new knowledge, management and marketing skills as well as new marketing channels to a host country where locally owned firms observe these innovations and imitate them adapting them to their needs – *demonstration spillovers*. It is correct to argue that, by exposing superior technologies to the locally owned firms, FDI increases the set of available technologies to the locally owned firms as far as they are geographically located in a common location – close proximity. When an export oriented MNCs commences operations in a host country the locally owned firms may be prompted to enter the exporting business. This is partly due to reduced uncertainty and cost of searching for new export markets and networks that the locally owned firm might enjoy as a result of the presence of MNCs. We can therefore argue that without FDI, it may be costly for domestic firms to acquire the information needed to adopt new technologies if they are not first introduced into the local economy by MNCs. While MNCs possess state-of-the-art skills in the management and organisation – and other forms of corporate governance – the level of such skills in LDCs firms is low and in dire need of upgrading. So, following the entry of MNCs into a host country, locally owned firm may copy their management and organisation skills. It has been noted that MNCs prefer to transfer management techniques rather than production techniques to locally owned firms since the former are not specific to a given business and thus are not critical core capabilities. One major characteristic of the spillovers through demonstration effects is that they take place unconsciously without active involvement of the MNCs. This factor coupled with the fact that demonstration effects are never recorded makes it rather difficult to analyse their effects empirically. It would be very difficult to control for other effects of FDI on market structure in such an investigation. The number of demonstration effect studies therefore, is limited to only a few case studies and in a few regions of the world. This limits our understanding of the importance of demonstration effect in stimulating the technical efficiency.

2.3.2 Technological Spillovers and Foreign Presence: A Critical Analysis of Issues

In this section we undertake a critical review of the spillover literature. Rather than review all the papers, we focus our attention to only important studies with a focus on developing countries. Analysis of these papers will allow us to critically examine and highlight the main arguments articulated in the spillover literature and subsequently offer our own criticism. A notable observation in the spillover literature is that the distribution of studies examining technological spillovers from MNCs and their effects on a host country are skewed to the developed economies and the NICs. Part of the reason for this could be lack of adequate statistical data in underdeveloped countries that hinders empirical verification of theoretical hypothesis on technological spillovers. Nevertheless, studies on technological spillovers in general have been inconclusive in terms of overall direction and magnitude of the spillovers. Some of these studies have found either positive or weakly positive spillover impacts of foreign presence on the productivity of locally owned firms. Several cases also exist that found no positive spillover impacts. Lack of conclusion in the spillover studies could be attributed to diverse methodologies used including measurement problems as well as firm, industry and country specificities.

Technological spillover occurrence can be determined by the interaction of economic-social and policy conditions, which include among others technological and market conditions as the main factors. The analysis undertaken below will focus mainly on technological and market conditions beginning with level of foreign presence in a host

country, technology gap between foreign and locally owned firms, trade orientation, equity participation with locally owned firms and absorption capacity in a host country. An analysis of endogeneity phenomena will also be undertaken in this section followed by emerging issues and conceptual framework to the study. In the context of technological capability development in indigenous firms, the review undertaken points to an existing caveat: evidence that the literature does not look critically at the impact of spillovers on innovation thus neglecting learning, capability building and innovation. Even then, only a handful of spillover literature exists that focus on the underdeveloped countries. In addition to the spillover literature, the conceptual framework defined will be based on the literature on technological innovations, NSI, which emphasises the importance of interactions, in knowledge generation, utilisation and diffusion. This will be overlapped with the literature on cluster and network dynamics both considered critical elements in interactive-knowledge flow, accumulation of tacit knowledge, learning and innovation.

2.3.2.1 Technological Spillovers: Foreign Presence and Productivity of Domestic Firms

A study of intra-industry spillovers by Caves (1974) is one of the earliest known on technological spillovers that attempted to test for certain potential benefits of FDI to a host country. According to Caves, investment by foreign firms resulted in various gains to host countries. For instance, host country governments, obtained tangible benefit in the form of corporate income tax collected from foreign firms. Host countries also benefits due to the effects of FDI on the value productivity of resources owned by the host economy. Gains to domestic firms in a host country depend on spillover gains that lead to productivity, such occurs in the course of subsidiaries' operations in the country.

Caves attempted to measure directly the impact of foreign presence on labour productivity in the Australian manufacturing sectors using the production function framework. His hypothesis was that a large presence of subsidiaries in an industry would in the long run induce a higher technical efficiency and speed up the transfer of technology to competing domestic firms. He therefore attempted to test the effect of multinational competitors on the technical efficiency of host country firms and the transfer of technology to them. A set back in his analysis was that of little statistical data available, limited to only 23 manufacturing industries covered. The main finding was that foreign presence in Australian manufacturing industry was characterised by positive technological spillovers that enhanced technical efficiency in the domestic firms raising their productivity.

Although this study had the expected results that spillovers existed due to the presence of foreign investment it can however be argued that the general conclusion of technical efficiency from such spillovers in a country may not always be justified. This can be challenged in a sense in that spillover benefits might have resulted following the disappearance of weaker firms leaving only the efficient domestic firms. Also in addition to data limitation that included a very short time span, the study uses data in a very aggregated format hence treating the industries, sectors and firms uniformly, which may not be the case. Industries, sectors and firms are characterised by high levels of heterogeneity with significant differences in technological capabilities and capacities to undertake technological learning and absorption. The technologies used by foreign firms in various industries also differ widely in terms of complexity, which imply that technology gap between foreign firms and locally owned firms ought to have been considered. The study failed as well to take into consideration the selectivity bias

problem, it could be true that foreign firms chose sectors which are dynamic, innovative and presumably operating in such sectors would be viewed profitable. Lastly but very important problem was that the study did not explicitly analyse the mechanism of spillover occurrence and diffusion to the locally owned firms. Learning and technological changes were treated as 'black box'. Thus the conclusion of technical efficiency is rather too general to warrant our making any deductions of how locally owned firms in a host country benefit in their technological development effort from the foreign firms.

Despite the shortcomings in Caves' (1974) study, several other studies have reported similar findings. We will only examine a few of such studies. A model by Koizumi and Kopecky (1977) found that when foreign investment is made in a host country, technical knowledge is transmitted in the form of externalities or 'spillovers'. Their model builds upon the standard model of long-term international capital movement, which investigates patterns of economic development in a country in the presence of free capital mobility. Their major critique of the standard model was that it failed to distinguish the role played by FDI in a country's development. Koizumi and Kopecky argued that direct investment possessed superior know-how and managerial expertise, which enabled the MNCs to reap profits upon investment in host countries. This is similar to the arguments by among others Hymer 1960; Caves (1974); Dunning (1973; 1993); Buckley and Casson (1976) and Lall (1980). Further, direct investment was likely to transfer intangible assets such as technical skills to the host country and that these new ideas could occur through discussions, observation and training and tend to diffuse throughout the country's economy. They argued that transmission of foreign technical knowledge could be viewed as spillovers or externalities (public goods) since MNCs could not fully appropriate returns from them.

One of the assumptions in their model was that capital owned by MNCs (K_f) could be taken as a proxy for the technical know-how transferred by the foreign firms to a host country – this was a questionable assumption. The total capital stock for the borrowing country becomes $K = K_f + K_n$ where (K_n) is the portion of capital owned by the domestic country residents. They introduced the foreign capital into a host country's aggregate production function of the form:

$$Q = \Psi\left(\frac{K_f}{L}\right).G(K_f + K_n, L) \quad (2.1)$$

Where Q represents output by all firms in the country; while L represents labour. The technological transfer function in this model is defined by $\Psi\left(\frac{K_f}{L}\right)$.

They further assumed that technological spillovers were directly proportional to the extent of foreign ownership of a country's capital stock, thus:

$$\frac{\partial \Psi}{\partial K_f} > 0 \quad (2.2)$$

Viewing spillovers as public goods meant that marginal social return (MSR) for both foreign capital and domestic capital would be different. This is easily observed by

differentiating the specification of the technological transfer function (2.1) above, to obtain the marginal products as follows:

$$MSR_n = \frac{\partial X}{\partial K_n} = \Psi G_K \quad (2.3)$$

$$MSR_f = \frac{\partial X}{\partial K_f} = \frac{\partial \Psi}{\partial K_f} G + \Psi G_K \quad (2.4)$$

Where MSR_n and MSR_f are the marginal social returns on national and foreign capital respectively.

The term $\frac{\partial \Psi}{\partial K_f} G$ represents effects produced by the transmission and dissemination of

foreign technical know-how in the host country. It is this component that makes foreign capital have a higher marginal social return than the capital owned by the residents, hence $MSR_f > MSR_n$. Because of the nature of technology (public good), it was difficult for foreigners to capture this component. The conclusion from this model was that when a foreign investment is made in a host country technical knowledge is transmitted in the form of externalities or 'spillovers'. A major shortcoming of this model begins with the assumption that the technological spillovers were proportional to the extent of foreign capital in a host country. This reduces technological spillovers to a mere transfer of capital. This would not be the case to the LDCs especially when the technology gap between the two countries is wide. The model did not take LDCs absorption capacity into consideration. This is important since technological spillovers do not occur costlessly, much effort is needed and consciousness.

Globerman (1979) investigated the spillover benefit to Canadian manufacturing industries employing the same methodology as in Caves (1974). His results indicated a positive relationship between labour productivity of domestic firms and the presence of foreign firms implying positive spillovers which were responsible for the increase in technical efficiency and productivity in locally owned firms. Similarly, Blomstrom and Pearson (1983) used industry level data to investigate whether technical efficiency of Mexican plants derived from spillover efficiency associated with FDI. Assuming that MNCs represented advanced technologies they questioned whether such technical knowledge in one way or another gets transferred to domestic plants owing to the mere presence of MNCs. Blomstrom and Pearson observed that spillover efficiency benefits occurred in a host country through various channels. Such channels include competition, training of labour and management, or investment in human capital, which may then become available to the economy in general. Another possible source of spillover efficiency benefits is that MNCs may speed up the transfer of technology to firms in backward countries. As a contrast to locally owned firms, a central activity of MNCs is technology transfer. This may stimulate domestic firms to hasten their access to a specific technology, either because they would not have been aware of the technology's existence, or because they would not have felt it profitable to try to obtain the technology in this manner (Blomstrom and Pearson, 1983: p. 494).

Contrary to the studies analysed some less optimistic, empirical firm level studies exist and based on total factor productivity which suggest that the effects of foreign presence

are not always beneficial to the locally owned firms. We will analyse some of these studies (recent developments) beginning with Haddad and Harrison (1993) whose study differed from others in two main aspects. First, the study employed a comprehensive empirical data set at the level of individual firm over several years. The data set came from an annual survey of all the manufacturing firms in Morocco. Secondly the study used detailed information on the level of quota and tariff protection to investigate whether lack of spillovers stemmed from a tendency of foreign firms to move towards protected sectors. Following the same line of thought as in Caves (1974) Globerman (1979) and Blomstrom and Pearson (1983), their hypothesis was that when knowledge or new technology embodied in foreign firms is transmitted to domestic firms, it would result in higher productivity levels and growth rates for domestically-owned firms in sectors with large foreign presence. They first examined the influence of foreign presence on the dispersion of productivity levels, then the influence of foreign presence on the growth of productivity for domestically owned firms and finally the effect of foreign presence on the technology gap and the level of protection.

The results of dispersion showed that the share of each firm's assets that are foreign owned had positive and statistically significant coefficient. This supported the idea that joint ventures would exhibit less deviation from best-practice productivity relative to domestic firms. The sector level analysis showed that smaller deviation from maximum productivity levels existed in sectors with large foreign presence evidence that productivity dispersion was smaller in sectors with many foreign firms. This could be explained to be due to greater competition induced by the foreign firms, causing firms that cannot approach the best-practice frontier to exit the industry. The effect of foreign presence on the rate of productivity growth showed that foreign investment in the sector level was negative and statistically significant. The hypothesis that foreign presence accelerated productivity growth in domestic firms was thus rejected. This would perhaps be due to distortions in the trade policy regime or due to the short time period analysed. A similar study using plant level data to investigate the effects of foreign investment in Uruguayan manufacturing industry had a similar conclusion. Kokko, Tansini and Zejan (1996) noted in their statistical estimations that the effects of foreign presence was not significantly different from zero, which implied that foreign presence did not have any substantial impact on local productivity, there were no signs of spillovers.

Despite the fact that this study utilizes a different technique from others 'dispersion on productivity', the basic principals of total factor productivity are still maintained and thus the study shares the same shortcomings as in the other studies discussed above: the difficulty in determining how the foreign firms contribute to the increase in locally owned firms' technical efficiency in an underdeveloped country. Though the study was quite innovative in the wide coverage of issues, the assumption of large foreign presence in a firm or sector and the coincidental large productivity do not reveal to us the mechanism in which technical efficiency come about. Large productivity could be due to specific sectors characteristic of heavy capital investment with large imports of capital or it could be that the foreign firms select such sectors due to some existing advantages (e.g. conducive business climate) that would allow high profit. A case study would perhaps have been an appropriate addition to the study to investigate whether imitation, interaction, labour turn over and technological learning do take place in the locally owned firms.

As a conclusion to this section we note that most of the studies adopted the production function technique whereby total factor productivity proxied by value added per

employee in the locally owned firms, was the dependent variable. The value added per employee is taken as a function of the corresponding share of foreign presence amongst other variables. As noted elsewhere productivity technique has a major draw back in that it assumes that adoption of technologies would 'automatically' lead to an improvement in technical efficiency followed by productivity in a firm or sector. The linear regression techniques employed in all these analyses provide correlation between variables, which should not be taken as causality. In depth analyses are necessary to understand mechanisms in which the indigenous firms learn and build their capabilities with reference to foreign firms. For instance does the technology gap (technology complexity) deter locally owned firms from absorbing, learning and copying foreign techniques? Given the tacit, imperfect understanding and uncertainty of technology we need also to understand how existing networks and linkages, local capacity building effort, interactions and co-operations among firms and institutions facilitate the technological spillover occurrence and their assimilation, to support innovation. Existence of foreign firms alone, single factor exponentiation, is not enough and neither magnitude of their presence nor capital should be taken to reflect the occurrence of spillover efficiency. This is one major caveat with the above approaches. It could be possible to demonstrate that technology imports of foreign firms may be larger in countries and industries with high level of human capacity, tough domestic competition, and where the host country imposes minimum formal requirements on foreign firms' operations. We add that though such transfers are necessary for spillovers to occur they should not be taken as sufficient in their own right.

As a general conclusion to this section, the 'single factor exponentiation' or paying attention to foreign presence alone can be challenged when considered alone in the analysis of spillover effect. This is a rather too narrow approach as it disregards all other factors and is thus likely to be problematic, as does the assumption of automaticity particularly when trying to understand the mechanism and process of spillover.

2.3.2.2 Technological Spillovers and Technology Gap

An examination of the literature on the impact of MNCs activities on the technological development of domestic firms reveals two divergent views on the relationship between technological spillovers and technology gap. One of the views argues strongly in support of a wide technology gap as a necessary condition for indigenous firms to achieve higher levels of technical efficiency by learning and imitating from foreign firms. On the contrary, the other view asserts that a wide technology gap constitutes a major obstacle to technological spillovers, by deterring the ability of the domestic firms to catch up with foreign firms. In this section, we will discuss the two views including their implications for the technological development of locally owned firms.

Among the proponents of a wide technology gap, as a necessary condition for domestic firms to catching up was Findlay (1978) who constructed a simple dynamic model of technology transfer through FDI from developed to the developing countries based on the Veblen and Gerschenkron¹⁴ catching-up hypothesis. His hypothesis was that:

¹⁴ Gerschenkron (1962) and Kuznets (1971) were particularly popular in the 1960s and 1970s for endorsing the so-called 'advantages of backwardness'. Their argument was that a technologically laggard country had a major advantage in that it would only be required to 'borrow' new technology from the leading edge countries at the technology frontier. This is however questionable from technological innovations school of thought in that much effort is required to fully master foreign techniques given the tacit and imperfect understanding nature of technology. More so, huge resources are required to train human capital, develop

“... the rate of technological progress in a relatively backward region is an increasing function of the gap between its own level of technology and that of the advanced region which improves at a constant rate, and the degree to which it is open to direct foreign investment, measured by the proportion of foreign capital operating in the backward region to domestic capital in that region” (Findlay: 1978: P. 2).

For Findlay, the wider the technology gap between the developed and developing country, the greater the pressure for change within the developing country. Hence, the growth rate will be faster as long as the disparity is not too wide to deter the learning process. Findlay assumed that spillovers could occur through personal contacts accomplished through MNCs and similar to the spread of a contagious disease.

The model categorized the world into two distinct regions, ‘advanced’ and ‘backward’, by assigning a technological efficiency index to each region. Taking $A(t)$ as an index of technology efficiency – such as the aggregate production function, in the developed country, he postulated that technological efficiency in the advanced countries increased at a constant rate (n) and according to the function:

$$A(t) = A_0 e^{nt} \quad (2.5)$$

Supposing $B(t)$ was the analogous level for the developing countries, the Veblen-Gerschenkron catching-up hypothesis can be put as:

$$\dot{B} = \frac{dB}{dt} = \lambda \{A_0 e^{nt} - B(t)\} \quad (2.6)$$

In this case, λ is a positive constant whose size depends on exogenous factors such as level of human capital, technological capability and other productivity determinants. We can interpret this to mean that at a given point in time, if MNCs from the advanced countries transfer and use their technology in the developing countries, then the bigger the technology gap between MNCs and the domestic firms, the higher the spillovers will be. These are the spillovers that will be responsible for the convergence between the two countries.

Findlay further based his argument on past work by Mansfield (1961) whose postulate compared well to the contagion theory. Mansfield showed that in a given industry an innovation was adapted at a rate, which was an increasing function of the proportion of firms within the industry that had already adopted the innovation. Similarly, Findlay hypothesized that, holding other things constant, the rate of change of technical efficiency in the developing country was an increasing function of the relative extent to which the activities of foreign firms with their superior technology pervade the local economy.

Considering $K_f(t)$ and $K_d(t)$ to represent the capital stocks and $A(t)$ and $B(t)$ the technical efficiency levels in the advanced and developing countries respectively it can be defined:

infrastructure, institutions and to further cultivate an innovative and entrepreneur culture in a broad national innovation system.

$$\chi \equiv \frac{B(t)}{A(t)} \quad (2.7)$$

and

$$\gamma = \frac{K_f(t)}{K_d(t)} \quad (2.8)$$

Combining the relative backwardness and contagion hypotheses, it can be postulated that:

$$\frac{\dot{B}}{B} = f(\chi, \gamma) \quad (2.9)$$

$$\text{With } \frac{df}{d\chi} < 0 \text{ and } \frac{df}{d\gamma} > 0 \quad (2.10)$$

The model shows that catching-up by locally owned firms is a function of technological gap and foreign presence i.e. for a given amount of foreign presence, the amount of spillover is larger the bigger the technology gap between the foreign and domestic firms. Similarly for a given technology gap, spillovers increase with the degree of foreign presence. Findlay's model compares to Abramovitz (1986) catching up model in some aspects. According to Abramovitz

“... Countries which are technologically backward have potentiality for generating growth more rapid than that of more advanced countries, provided their social capabilities are sufficiently developed to permit successful exploitation of technologies already employed by the technological leaders” (Abramovitz, 1986: p. 390).

While the two models focus mainly on technology gap, Findlay's model does not consider the social capability (absorptive capability) of the backward country. He emphasises that the degree of technological progress is dependent on the openness of the economy as measured by the level of foreign presence. Abramovitz on the other hand does not focus on foreign investment; his model is more concerned with “technology borrowing by followers”. Abramovitz' model however, underscores the importance of interactions via trade and rivalries, population movement, capital flow and flow of knowledge.

Findlay's postulate though interesting in its argument that a wide technology gap would create high pressure for catching-up process to take place, can however, be challenged on two grounds. First, is that a number of studies have indicated the importance of a certain threshold level of technological capability in a country in order to transfer and assimilate the spillovers (Lapan and Bardhan, 1973: p. 585). Lapan and Bardhan's simple model of technology choice by a developing country showed that an advanced technique would only be employed in a developing country if its efficiency was high and had a small capital intensity difference from a technique already in use in the developing country. Second, some of the technologies exploited by MNCs in LDCs may not be appropriate (less suitable) and hence spillovers may not arise. This argument compares to what

Abramovitz (1994) refers to as 'lack of technological congruence'. An example is when a complex technique from an advanced country is complicated hence creating obstacles that reduce the possibility of spillovers, imitation and technological learning in the domestic firms. Lapan and Bardhan (1973: p. 585) noted that technical advances and technologies applicable to the factor-proportions of capital-rich developed countries are hardly of any use in improving techniques of low capital intensity in less developed countries¹⁵. This is due to the large difference in technology gap.

Contrary to the above, a study by Cantwell (1989) found that technological spillovers were most important in industries where the technology gap was small and that a wide technology gap deterred the ability of the domestic firms to catch up with the foreign firms. Cantwell (1989) examined the responses of locally owned firms to the entry and presence of U.S. MNCs in the European markets in the period 1955-1975. He used share of trade manufacture and performed simple regression using observations on local exports and U.S. inward direct investments – capital in the manufacturing. He observed that the impact of these MNCs on the locally owned firms was not beneficial uniformly in all industries. Technological spillovers occurred mainly where locally owned firms were initially relatively strong enabling them to challenge the invading U.S. affiliates. Weaker locally owned firms had either been forced out of business, or confined to limited segments of the market that were neglected by the foreign MNCs. Haddad and Harrison (1993) had comparable results in the case of Morocco. An extension to their study, discussed above, categorized the sectors into high and low technology. The effect of FDI at the sectoral level was found to be more positive in low-tech sectors. The authors interpreted these results as indicative of the lack of absorptive capacity on the part of locally owned firms in the high-tech sector, where they may be further behind multinationals and unable to absorb foreign technology. Other studies that supported a relatively small technology gap for technological spillovers to take place include [Kokko, 1994; Kokko, Tansini and Zejan, 1996; Sjöholm, 1997].

The studies investigating the empirical relationship between technology gap and technological spillovers suggest that wide technology gap diminishes technological spillover. A long run implication for these results would be greater divergence and inequalities between economies. While a technology gap is necessary if the follower is to learn from a technological leader, it can be argued based on the findings from the studies discussed that a country lagging behind can only absorb knowledge from a technological leader if the initial gap is not too wide. The technological gap must not be below a certain threshold level. According to evolutionary economics, growth of knowledge is highly cumulative and path-dependent. Incremental stock of knowledge to a firm or industry depends on prior accumulated knowledge and technological learning is facilitated only if the stock of knowledge grows [Romer, (1986: 1990); Cohen and Levinthal, 1990; Benhabib and Spiegel, 1994]. This point emphasises the need for a technologically backward country to accumulate some knowledge at least above a certain threshold level. This point is extended briefly in the next section.

A small technology gap however, should not be viewed as sufficient for spillover to occur. As was discussed in the preceding section, a host of other heterogeneous factors

¹⁵ Lapan and Benhabib were suggesting that the technology gap in terms of capital intensity needed not be too wide. They cited transport technology as an example where improvements in modern jet aircraft technology do not particularly help raising the productivity of rick-shaw-pullers in the streets of Calcutta or Hong Kong.

influence the effects of foreign investment on domestic economy. They include organisation of knowledge communication between various research organisations or the linkages within the domestic systems of innovation, level and organisation of a country's human capital, technology imports, market conditions and government intervention. Before concluding this section we would like to mention that analysing the relationship between technology gap and technological spillovers in the context of underdeveloped countries would shed some light into the foreign investments contribution to technological learning and capability development of the domestic firms in a host country. For instance, if we assume that domestic firms in a given sector or industry are able to learn by imitation or copying techniques demonstrated to them by foreign firms, then we can assert that the existing technology gap permits technological spillovers and thus technological innovation occurrence.

2.3.2.3 Technological Spillovers and Foreign Equity Participation

With the increased perception that FDI transfers technology into a host country, most governments in the underdeveloped countries have in the last few decades tried to work out policies articulating modalities and frameworks within which MNCs can operate so as to integrate their activities with those of domestic firms. Some of the measures introduced encourage MNCs to transfer technology and/or to engage in equity partnership with locally owned firms, mostly in the form of joint ventures (JVs)¹⁶. It is anticipated that JVs may offer advantages to firms on both sides of the relationship. Usually, it is argued that doing business in underdeveloped countries is risky and at the same time developing country markets are becoming much more open to international competition. To meet these challenges, it is important to position the firms in such a way as to become more competitive. One way of doing so is to complement a firm's strength through strategic alliances such as JVs (Miller, Glen, Jaspersen and Karmokolias, 1996: pp. 4-6). Besides minimising costs, sharing management and financial risk, a host of several other aspects prompt firms to form JVs. They include lack of country familiarity, lack of relevant contacts within the government and elsewhere, existing facilities and more effective technology use (Gomes-Casseres, 1989; Blomstrom and Zejan, 1991).

This notwithstanding, empirical studies have demonstrated a mixed scenario while some find much evidence of positive spillovers from equity participation others report little or no evidence at all based on level of analysis, industry and country. We shall analyse only a few studies in this section. Aitken and Harrison (1999) used annual census data on over 4000 Venezuelan firms to measure the productivity effects of foreign ownership. The study found a positive relationship between foreign equity participation and plant performance. This implied that there were productivity gains, which could be attributed to foreign equity participation. Surprisingly, the results however, were the inverse of what was normally expected. Domestic firms in sectors with more foreign ownership were found to be significantly less productive than those in sectors with a smaller foreign presence. In other words, they found evidence of negative spillovers from FDI and suggested that such negative spillovers could result from a market stealing effect: foreign competition may have forced domestic firms to lower output and thereby forego economies of scale. Nevertheless, adding up the positive own-plant effect and the negative spillovers, on balance, the study found that the overall effect of FDI on productivity of the entire industry was positive though quite small.

¹⁶ Defined as " ... a common project between legally and commercially independent companies in which the parties jointly bear the responsibility for management and the financial risk (Miller, Glen, Jaspersen and Karmokolias, 1996: p. 2)"

Similar results were obtained for Indonesia where Blomstrom and Sjöholm (1999) conducted an empirical analysis based on Indonesian establishment data to determine whether the type of foreign ownership had any effect on productivity and the degree of spillovers. Their study primarily sought to answer the following questions: first whether establishments with minority (JVs) and majority ownership (wholly owned subsidiaries) differ in terms of their productivity levels? Second, whether the degree of technology spillovers varied with the extent of foreign ownership? Their analysis was based on the assumption that MNCs would prefer to have joint ventures with locally owned firms especially when local partners possessed better knowledge of local conditions. Local participation with foreign firms may reveal some of their proprietary knowledge, which would occur through various trainings in foreign firms or by gathering experience at work. These aspects are likely to influence technology diffusion thus facilitating spillovers. The results showed that foreign establishments had a comparatively high level of labour productivity and that intra-industry spillovers from foreign investment existed in the Indonesian manufacturing sector. Labour productivity in domestically owned establishments varied with the degree of foreign presence. However, the degree of ownership neither affected the labour productivity in foreign establishments nor the degree of spillovers.

In the Czech Republic, Djankov and Hoekman (1998) investigated the impact of foreign investment on the productivity performance of firms using information on Czech enterprises compiled from a survey and from a data base containing financial and ownership information in the Czech Republic. They estimated a production function using total factor productivity as a proxy for technology transfer. Their assumption was that adoption of new technologies would, with some lag in time, lead to an improvement in productivity. They found a negative spillover effect. Greater foreign participation in an industry had a statistically significant negative effect on the performance of firms without foreign linkage (pure firms). When they excluded JVs from the sample, restricting their attention to the impact of majority owned affiliates on all other firms in an industry, the negative effect lost statistical significance.

An explanation could be that JV firms invested significantly more in technology capacity than purely domestic firms did. Purely domestic firms might have lacked the ability therefore to absorb the technologies introduced by foreign firms. In support of this point their survey data showed that 18% of the firms without foreign partners, answered in the affirmative to a question on whether workers had *undergone any training* in the past two years. JVs and majority foreign equity firms had 47 and 60% respectively that answered positive. Another question investigating whether firms had *obtained any new technology*¹⁷ in the previous two years found that 70% of the majority foreign equity and 50 percent of the JVs had acquired some kind of technology. Only 35% of the locally owned firms without any foreign ownership linkages had acquired some new techniques.

From the above analysis we note that foreign establishments usually have a generally high level of labour productivity. Labour productivity in domestic firms varies with degree of foreign presence i.e. existence of a positive relationship between foreign equity participation and plant performance. Intra-industry spillovers from foreign investment exist – productivity gains, which could be attributed to foreign equity participation. It was also noted that greater participation in an industry had no effect on locally owned firms with no foreign linkages. In the context of the developed countries, as was

¹⁷ New technology was defined here as Machinery, equipment or related knowledge.

observed in the case study discussed above, equity partnership thus appears to be beneficial for locally owned firms. Nonetheless, a few questions still remain unanswered. The questions stem from the fact that the studies focus on productivity and use variables which measure capital intensity as much as they do productivity gains failing to indicate for instance any learning or innovation in a dynamic and continuous way. Investigating some of the questions through case studies may be very helpful. Such questions include; to what extent and under what conditions does equity participation lead to positive spillovers? Can these spillovers stimulate firms to launch a spirited technological effort, which would enhance their technical efficiency? To what extent can the same spillovers benefit a wider social and economic network? We appreciate the fact that benefits of equity participation may be negative and transitory in the short run in the case of underdeveloped countries, but a throbbing question remains as to whether positive effects are likely to be permanent to counter the short-run transitory negative effects in the long run.

We would argue that equity participation by MNCs may reveal some of the MNCs proprietary knowledge and expose various skills, which may in the long-run spillover to other firms and sectors. As noted, foreign firms exhibit a high level of productivity, this productivity advantage of foreign ownership might increase the stock of human capital if domestic workers absorb this advantage through training, learning-by-doing, learning-by-using and learning-by-performing. Over time, this advantage might eventually spillover through labour mobility, firm interactions, demonstration and so on to other firms and sectors of the economy. In this aspect, further work is needed to improve our understanding of the role and possible effects of equity partnership on technological spillovers. Such studies are badly needed in the context of underdeveloped countries where both empirical analyses and case studies are scarce. Results of studies conducted in other developed or advanced developing countries may not hold for underdeveloped countries and thus such studies cannot be generalised. While hypotheses and arguments may be justified, the methodologies and variables used in developed countries might bring a distorted image of how things are likely to be in underdeveloped countries.

2.3.2.4 Technological Spillovers and Absorption Capacity

Low levels of absorption capacity in the developing countries have been heavily cited in technological spillover literature as one of the main obstacles to the effective spillover occurrence from foreign firms to domestic firms in host countries. A sufficient level of absorption capacity is necessary to enable a firm to recognise the value of new external information and knowledge and to be able to assimilate and exploit it for various means including commercial purposes (Lapan and Bardhan 1973; Cohen and Levinthal: 1990, p 128; Benhabib and Spiegel, 1994)¹⁸. Many innovations exist outside the firm, which could be a source of knowledge spillovers that might bring new changes to firms' existing products, processes and organisational structures. These changes in turn could lead to improvements in allocative efficiency to a firm and sometimes the entire industry. While it is necessary for the firm to be able to adopt and assimilate these spillovers, a firm has to be able to utilise this knowledge, improve and adapt it to the prevailing conditions. The dynamic models that investigate effects of limited absorptive capacity in LDCs

¹⁸ The study by Findlay (1978) suggesting that the rate of technological externality from FDI is an increasing function of the technology gap between the 'backward' region and the 'advanced' region seems to contradict the importance of absorptive capacity. Similarly, Wang and Blomstrom (1992) model, which predicts a positive relationship between the degree of spillovers from FDI and the size of the technology gap between MNCs and domestic firms.

emphasise the significance of access to knowledge and human capacity to absorb this knowledge. Keller (1996) argues that before a regime change, for instance structural adjustments and liberalisation of trade, it is necessary to have accumulated adequate skills and at much a higher rate than before. With trade liberalisation in an economy, new technologies and goods are likely to flow in and the accumulated skill enables firms to absorb some of these knowledge and technologies (Keller, 1996: p. 202-3).

The main determinants of absorption capability are human capital, R&D activities, organisation of the R&D staff and organisation of knowledge communication between various research institutions and other supporting organisations¹⁹. Absorptive capacity is generated in several ways: *First*, firms that conduct in-house R&D are in a better position to evaluate and utilise external knowledge as opposed to the firms that do no R&D. In-house R&D makes a firm acquire and accumulate basic knowledge and skills. A positive relationship between imported technology and in-house R&D has been found to exist and both of them play a complementary role (Siddharthan, 1992: p. 267). However a recent study gives a confirmation of a substitution view (Basant and Fikkert, 1996: p. 195). Logically a firm that has been conducting in-house R&D is better placed to detect new external knowledge and its value than a firm which does not undertake any R&D. Thus when a firm invests in R&D we can assume that in the process it creates absorption capacity. *Second*, absorption capacity is gradually developed in a firm as it engages in its manufacturing activities and finally by taking the personnel for further technical training.

Borensztein, Gregorio and Lee (1995) examined empirically the role of FDI in the process of technology diffusion and economic growth in developing countries. Their empirical work stemmed from a model of endogenous growth, in which technological progress was a major determinant of long term growth rate in income. Technological progress took place through a process of capital deepening that involved introduction of new varieties of capital goods and advanced technology. According to the model, introduction of such technologies depended highly on the absorptive capability in a host country. The logic of the model was that foreign firms possess advanced knowledge and a higher productive efficiency, which allows them to introduce new capital goods into a developing country at lower cost. Application of these technologies would require a sufficient level of human capital in a host economy, in which case, below such levels the absorptive capability of host developing countries would be too limited to warrant any technology transfer and diffusion to take place. The study used data on FDI from International Financial Statistics and Balance of Payment Statistics²⁰.

The main results indicated that FDI had a positive overall effect on economic growth and that the magnitude of this effect depended on the stock of human capital available in the host country. High productivity of FDI held only when the host country had a minimum threshold stock of human capital. Interacting FDI with human capital showed that countries with low levels of human capital had a negative effect from FDI. The conclusion was that: Since MNCs possess advanced techniques, knowledge and skills, which enables them to introduce new capital goods, accumulation of absorptive capacity

¹⁹ See Review in Cohen and Levinthal (1990) and Lankhuizen (1996).

²⁰ Data on national accounts, such as growth rate of income, initial income and government came from Summers and Heston (1991). The data on human capital stock variable was obtained from Barro and Lee (1993) while data on other explanatory variables like domestic investment rate, foreign exchange, political instability and financial development were also taken from Barro and Lee (1994). Estimations were done using regressions.

is necessary before FDI can contribute to economic growth. Flow of advanced technology brought along by FDI can increase the growth rate of the host economy only by interacting with the countries absorptive capability – presence of a sufficient level of human capital in the host country. Lack of these limits the absorptive capability of a developing country.

2.3.2.5 Endogenous Spillovers: Competition, Demonstration and Interactions

In this section the focus is upon the endogenisation principle which takes into consideration the subsidiaries' effect and effort by locally owned firms together as equally important in the process of spillover occurrence. This would take place as both kinds of firms learn from each another in the cause of their interactions within an economy or as they engage in the process of dynamic competition. According to the spillover literature, the traditional approach seemed narrowly defined in focus: attention was only accorded to one side concentrating on subsidiary as the sole determinants of spillover occurrence. This grossly neglected the effort by the locally owned firms at any moment, while in actual fact, locally owned firms at least make an attempt to learn, imitate or copy some of the production or processing techniques demonstrated to them by the foreign firms. In a bid to understand the difference between the traditional approach to spillovers and the current endogenous approach, we shall present one of the early studies done by Caves (1974): where entry of foreign firms into a host country helped break existing monopolies leading to improvement in allocative efficiency. This will be followed by the discussion on endogenous process.

Caves (1974) study is regarded as one of the earliest empirical studies on spillovers that attempted to do an in-depth analysis on the effect of foreign investment on allocative efficiency in an industry. He argued that if foreign investment did occur, a horizontal kind of FDI was expected where subsidiaries of MNCs would take place in industries producing the same goods as the parent companies and that these parent companies were usually oligopolies that were characterised by high product differentiation and large scale. As a consequence of this, Caves argument was that the subsidiary, an established firm in "the same industry in a foreign market, enjoys advantages that render the barriers to entry, and potential monopoly rents, lower in such industries than they would be in its absence". Caves view was that allocative efficiency occurred when subsidiaries helped break existing monopolies and introduced competition in the local industries – this would be presumably expressed by the profit rates of locally owned firms being inversely related to the competitive pressure supplied by foreign firms. He therefore hypothesised that the *competitive pressure* would be proportional to the *share of an industry's sales* controlled by subsidiaries.

The results of Caves hypothesis that subsidiaries help break existing monopolies by introducing competition leading to improvement in allocative efficiency in domestic firms made fundamental contributions to the spillover literature and most other studies conducted afterwards on spillovers have either emulated his approach or attempted to verify his postulate. More recent studies done on FDI have attempted to endogenise spillovers by introducing learning, competition and interaction in their analysis. Among the early studies done on endogenous spillovers was that by Das (1987) and Wang and Blomstrom (1992). Das (1987) constructed a model where firms in a host country learn from the subsidiaries of the MNCs who transfer new technologies to their countries. The MNC is taken as the dominant firm (price leader) facing competition from the locally owned firms, viewed as a competitive fringe. She postulated that technological learning

by the locally owned firms increases their technical efficiency and that at any given point in time the rate of productivity growth in the locally owned firms was directly related to the output of the MNCs. In other words, the increase in technical efficiency by the locally owned firms was positively related to the scale of operation by the MNCs. This increase in technical efficiency reduces the average production cost for the locally owned firms. Given that locally owned firms are likely to learn from the MNCs, it reduces levels of MNC profits as well as market shares. To maintain their share of the market and ratio of profits, the MNCs bring in new technologies to counteract increased competition by the locally owned firms. The conclusions drawn from this model is that although a technology leakage may exist; MNCs may still find it profitable to transfer new technology and the more the technology is transferred the more the spillover increases. Similar to Findlay (1978) model, Das' model reflects the contagion kind of spillovers where relative activities of subsidiaries and their interactions with locally owned firms are key factors in determining the amount of spillovers to the latter.

The assumption that locally owned firms learns from the subsidiaries of MNCs and secondly that increase in technical efficiency by the locally owned firms would be positively related to the scale of operation by the MNCs makes Das model an interesting one in the perspective of underdeveloped countries. The model shows the limit to which one can count on spillovers from MNCs. Das model differs slightly from Wang and Blomstrom's (1992) model discussed below in that it is more practical in case of underdeveloped countries where small-scale industries are characterised by low capacities²¹ that do not facilitate immediate or automatic learning from the MNCs. Given that these firms' level of accumulated technological capability is low, it requires much effort before any effective learning can take place. If the complexities of a technique exploited are high, this would imply a wide technology gap that would affect interactions and learning process in the small scale industries.

Wang and Blomstrom (1992) used a similar argument as in Das (1987) but employed a deeper mechanism by endogenising technology transfer and investment in learning activities by both foreign and domestic firms. They constructed a model of interaction between MNCs and locally owned firms in a host country where *technology transfer through multinational firms emerged as an endogenised equilibrium phenomenon, resulting from the strategic interaction between foreign subsidiaries of MNCs and host country firms*. In their model, MNCs increased their transfer of high technology and new knowledge the more the locally owned firms invested and improved on their technological learning function. Wang and Blomstrom's model was based on a duopoly with differentiated goods where competition among firms was structured as a Cournot game in which each firm solves its individual dynamic optimization problems subject to the other firms' actions. The objective of the MNC would be to choose how much to invest in imports of new technology while locally owned firm's objective would be to decide how much to invest in learning to imitate MNC technology, given that both know the other party's decisions and/or intentions. The model will be discussed briefly beginning with definitions to the main variables considered:

- I_f : The resources devoted to the transfer activities (imports) by the MNC firm.
- C_f : The cost of transferring technology (importing) by the MNC firm.
- I_d : The domestic firm's investment in learning.

²¹ Capacity of various forms: Absorptive, technological, financial, human, institutional and so on.

C_d : The actual cost of learning (imitating) incurred by the domestic firms.

The main assumption of their model is that, there is no free copying of technology in the world. Searching for information, imitation and personnel training et cetera make learning costly and time consuming and thus determination of how much resource to devote to learning is an essential investment decision. Another assumption was that a wider technology gap gives MNC's products quality advantage that translates into higher profits because it can take out a higher price or capture a larger market share, whereas the profit of the locally owned firm is negatively related to the size of the technology gap. Also technology gap between the firms grows as new technology is imported, but diminishes as a result of the locally owned firm's learning efforts and finally that some spillovers proportional to the size of technology gap always take place irrespective of the locally owned firm's active learning efforts.

The utility function was specified as follows:

$$U(Y) = U(\sum_i G_i Y_i), \text{ Where } G_i(\cdot) = G_i(K_i), G'(K_i) > 0, i = f, d \quad (2.11)$$

Where Y is the industry output index, Y_i is an observable firm i 's output. G_i is the attractiveness of the i^{th} firm's product, which depends on qualities embodied in the product. It is assumed to be an increasing function of the firm's technology level, K_i .

Taking $G_i(K_i)$ to be represented by a power function $K_i^\alpha, \alpha > 0$. They assumed a utility function of the following logarithmic form:

$$U(Y) = \alpha \ln K_d + \ln(Y_d + k^\alpha Y_f) \quad (2.12)$$

Where $k = (\frac{K_f}{K_d})$ is the technology gap between the foreign and the domestic firms.

Demand for the goods is obtained by setting price equal to the partial derivative of the consumer's utility function as follows:

$$P_d(k, Y_d, Y_f) = (Y_d + k^\alpha Y_f)^{-1} \quad (2.13)$$

$$P_f(k, Y_f, Y_d) = k^\alpha (Y_d + k^\alpha Y_f)^{-1} \quad (2.14)$$

This implies that the prices faced by each firm depend on the quantities of both firms and the relative attractiveness of the product is determined by the technology differences between the two firms. This attractiveness is determined by the technology difference (gap) between the two firms and hence by the logic of their model, the bigger the technology gap the higher the price and quantity sold by the technically leading firm – MNC. According to their model, technological capability, K_f , is augmented by devoting resources to transfer activities.

$$\dot{K}_f = I_f K_f \quad (2.15)$$

Speed of technology transfer is proportional to the foreign firm's commitment to the transferring activity. The locally owned firm's technology level is assumed to be an

increasing function of its learning investment and diminishing returns occurs as the learning effort increases with time. They incorporated Findlay (1978) hypothesis, that the rate of technological progress in a relatively backward country is an increasing function of the technology gap between the two.

$$\dot{K}_d = \phi(I_d)kK_d \quad \phi' > 0, \phi'' < 0, \phi(0) = v > 0 \quad (2.16)$$

Combining equation (2.15) and (2.16), we obtain an equation that depicts the changes in the technological gap over time.

$$\dot{k} = [I_f - \phi(I_d)k]k \quad (2.17)$$

Equation (2.17) or the “*transfer-absorption process*”, demonstrates an interesting point, where the two firms play an equally active role in determining the size of the technology gap and thus the convergence spillovers. Given that the strategies of one firm influence the decision of the other, competition related spillovers are also generated.

(a) The objective of the foreign firm is to make a choice of I_f that maximises the discounted value of its profit stream V^f subject to the transfer-absorption process, considering the learning effect by the locally owned firms.

$$V^f = \int_0^\infty \ell^{-r} [R_f(k) - C_f(I_f)] d\ell \quad (2.18)$$

Where R_f represents profit and r is the discount rate, used by the foreign firms.

(b) The objective of the locally owned firms is to decide the amount of I_d which will also maximise their objective function.

$$V^d = \int_0^\infty \ell^{-\rho} [R_d(k) - \theta C_d(I_d)] d\ell \quad (2.19)$$

Where R_d represents profit and ρ is the discount rate used by the firms and $\theta(>0)$ represents efficiency of the domestic firm's learning investment. Finally, the two sets of problems are solved by intertemporal optimisation techniques, which employ the Hamiltonians procedure. One major difference between this model and those by Koizumi and Kopecky (1977) and Findlay (1978) is that, while their models were based on the convergence and contagion hypotheses, Wang and Blomstrom's model was based on endogenous competition between MNCs and the locally owned firms. Regarding contagion effect the model did not show any relationship that ties technological spillovers to penetration by the foreign firm on the host country. Nevertheless, the model had an interesting observation in that amount of spillovers were not determined by the degree of foreign presence alone as; the firms' own investment were also important.

Among the interesting findings of this model was its recognition of Teece's (1977) findings, that international technology transfer is costly, requires extra resources and effort, for instance learning in the firms. If learning by doing existed in the firms, the

technology transfer costs tended to diminish with the frequency of transfers. According to this model both foreign firms and locally owned firms devote resources to undertake technology transfer and to learn new technologies respectively. The more the resources are utilised by the locally owned firms, the more they improve their absorption capacity for the foreign technologies and the more they increase their potential for capturing the spillovers. As locally owned firms rise in their technology learning function, they gradually reduce the technology gap existing between them and MNCs. This induces competition in the industry prompting the subsidiaries of MNCs to import new and efficient technologies from their parent MNCs so that they can protect their market shares and profits. Assuming that locally owned firms will have developed adequate capabilities, when MNCs import new technology, locally owned firms would learn or imitate it once it leaks or gets demonstrated to them. This poses further increase in competition pressure to the MNCs and the cycle continues. Compared to the Das (1987) model, Wang and Blomstrom model is more limited to the firms whose technical level is already high. In underdeveloped countries it would be applicable to industries where firms have developed technological capability over time; then they can compete with subsidiaries in the cournot game being proposed in the model.

The endogenous principle based on Wang and Blomstrom (1992) has been applied in several empirical studies [Blomstrom, Kokko and Zejan, (1992: 1994); Kokko 1996]. Blomstrom, Kokko and Zejan (1992) used unpublished data from Mexican manufacturing industry to examine how rivalry in host country markets affects MNC technology transfer to their foreign affiliates. The results obtained supported the existence of positive correlation between local competition and the technology imports of foreign owned affiliates. According to their result it would then seem obvious to expect that when the foreign firms are faced with continuous competition they are more likely to continuously import their technology. In other words, the decision to transfer technology to their foreign affiliates is influenced by the performance of competing firms in the host economy. Contrasting results were obtained in a policy study by Kokko and Blomstrom (1995) who investigated the determinants of technology imports of USA majority owned foreign affiliates in 33 host countries using data from the USA department of commerce. The study examined whether policies increasing the level of competition in the host country were likely to erode the MNC affiliate's technological advantages and force them to import new technologies from their parent companies. Similar to the above study, technology imports of MNCs affiliates increased with the competitive pressure in the host countries. A recommendation from the study was that host country governments need to support local investment, competition, and education rather than embarking on measures to control and secure FDI inflows of technology to the affiliates of foreign MNCs.

Blomstrom, Kokko and Zejan (1994) extended their 1992 study by including labour skills in their investigation. They investigated whether market rivalry and availability of skilled labour could force MNCs to transfer more technology to their foreign operations. Similar to their previous study, the results obtained indicated a statistically significant relationship between technology importation by foreign affiliates and local competitor investment and output growth. The level of technology imports was positively correlated with the proxy for labour skills in the affiliates' industries. However, when the industries were classified into consumer goods, intermediate goods, and durables and capital goods, the effects of the competition proxies were particularly strong for consumer goods and intermediates. This seemed to suggest that MNCs are sensitive to the local environment when barriers to entry in the form of advanced technology or high capital requirements

are relatively low. Sjöholm (1997) arrived at similar conclusion after investigating how domestic competition affects spillovers from foreign investment in the Indonesian manufacturing industry. His results showed that spillovers from FDI had positive effects on productivity growth, which differed between different industries i.e. spillovers existed in industries with a high degree of competition.

While the hypothesis, arguments and findings of all these studies look plausible, they should however not be generalised to all categories of developing countries. Developing countries are not homogenous and differ in diverse ways. Besides social and cultural differences developing countries have wide disparities in income and development capabilities. The Asian – NICs which were until recently classified as developing countries like Korea, Singapore or Taiwan cannot be compared to countries in sub-Saharan Africa like say Zambia, Malawi, Tanzania or Kenya. While these countries are still highly poor, underdeveloped and lie at the bottom in the technological capability line up, the NICs have accumulated a sizeable amount of technological capability which enables them to acquire and master new technologies they adopt from advanced nations fast enough to challenge MNCs. The firms in these countries went through rigorous process of many trials and errors coupled with lots of uncertainties, factors that required high entrepreneurship spirit, innovation and willingness to learn.

Most of the NICs, from the outset relied on various mechanisms of international technology transfer for instance import of capital goods, licensing, FDI and so on to deepen their technology base. Some of these countries removed import barriers in certain industries and sectors for strategic purposes, mainly the import of capital goods and specific technologies that could bring in new knowledge or could serve as sources of new learning to the domestic firms. [For a detailed insight Asian experience see Fransman, 1985; Amsden, (1989: 1994); Chang, 1994; Lall, 1996; Kim, (1988: 1997)]. This enabled the firms to acquire capabilities to imitate, replicate and reverse engineer products from other industrialised countries. Participation in the export market forced these firms to learn and increase their technological effort in order to compete effectively in the world market²². As an example, these countries participation in the global commodity chain framework as exporters made them master the dynamics of the buyer-driven commodity chains. While some of the these countries were able to shift from a mere assembly of intermediate goods assembled elsewhere to a high value added exports that involved original equipment manufacture (OEM), still others like Japan went ahead to manufacture original brand names (OBM) and to design and market them internationally. This is attributed to the ability to establish linkages with the lead firms in the buyer driven chains, which serve as a source of technology and knowledge spillovers [Gereffi, (1994: 1999: pp. 38-40)].

Over the past four decades, NICs have transformed themselves from technologically backward and poor to relatively modern economies. In these countries many firms are now able to produce technologically complex products competing effectively with MNC rivals both in their countries and outside – Europe and US. The successful technological and industrial development in these countries can be attributed to the policy dynamics that were created and the policy instruments used with the right timing and sequencing, facilitating the technological learning process (Kim, 1997: pp. 1-60; Kim, 1988: p. 19-29;

²² Participation in export markets stimulated and supported strong and dynamic learning in two ways: *First* by introducing pressure to compete in international markets the entrepreneurs were made to pay attention to the world standards. *Secondly*, the exports involved mainly the contracts with advanced firms demanded high performance and provided assistance to achieve it (Westphal, Kim and Dahlman, 1985: pp. 137-50)

Amsden, 1989; Chang, 1994; Wade, 1990; Mytelka, 1998: pp. 2-6). Some of the key elements in the policies that helped to shape the incentive systems in successful NICs by promoting learning and technological capability building were: *First*, policies that promoted prior improvement of the human resources before launching the process of industrial development. Technological capability is embodied in people and hence it is essential to have a pool of well-trained personnel, such as managers, scientists and engineers. *Second*, given the low technological capability at the outset, these countries relied heavily on foreign imports of technology – capital goods and turnkey plants. A few of them restricted FDI and foreign licensing at the initial stages. This policy of restricting FDI and foreign licensing coupled with the improved level of human capacity and the entrepreneurial spirit of the people encouraged the learning process at the firm level. *Third*, policies that brought about appropriate sequencing of events in the technological development, for instance production capability was developed first before investment and innovation capabilities (Kim and Lee, 1987). *Fourth*, although these countries protected their infant industries, they strategically allowed competition so that pressure could be exerted on the firms to learn and acquire capabilities steadily in competition among firms. *Finally*, policies that supported investment in the necessary technology infrastructure mainly indigenous R&D.

This marks an important difference in terms of technology policies, although underdeveloped countries did have technology policies in place, they were however not very effective in promoting technology effort to develop capabilities domestically. Examples of such circumstances can be traced, where although technology was transferred by various means; technological effort to develop capabilities domestically failed to exist, a factor that limited the ability of locally owned firms to remain competitive over time. A study by Mytelka based on technology licensing in the Andean group found that technology licensing resulted in continued reliance on foreign technology, which she referred to as a *"technology dependency syndrome"* (Mytelka, 1978: p. 449). This resulted from the loss of opportunities for various forms of technological learning to take place in the locally owned firms. This supported the arguments made by the proponents of 'new-marxists dependency theories of economic development' [Baran, (1957: 1975); Amin, (1973: 1976: 1977); Frank, (1973: 1978)]. This phenomenon reduced domestic technological capacity building and weakened the competitiveness of these firms. Technology dependence came about due to the preference accorded to the foreign technology and skills by the entrepreneurs in those countries. In addition to being capital intensive and sometimes inappropriate, these technologies lacked social optimality despite the fact that they may have been rational in the view of private enterprises (Cooper, 1973: pp. 6-13). In the case of textile industry in Cote d'Ivoire and Kenya, firms were protected, relied on a capital-intensive mode of production in an atmosphere of minimum domestic competition and technological apprenticeship this led to dependence on expatriate technical personnel, and to some extent, on imported inputs (Mytelka, 1985: p. 117).

Turning to our point, and in light of the examples cited, it is possible to conclude that in NICs domestic competition would force MNCs to import newer vintage of technologies in order to contain the competition pressure while in weak underdeveloped countries, this did not occur. That is why we argue that this study would be applicable only in advanced developed countries. This should not be construed to mean that underdeveloped countries lack sectors and industries with similar characteristics to those in advanced developed countries. Though examples of capabilities exist in some countries (furniture, textile and clothing industries in Kenya and Biotechnology in Cuba)

their competence may not be at par with NICs and the supportive environment – other firms, policies and so on is not strong. We would argue that competition posed by such firms is minimal. It is thus more relevant to inquire into the competition affects of MNCs and the interactions and technological effort of locally owned firms in the underdeveloped countries. That is, to what extent do locally owned firms embark on use of existing technological knowledge together with other resources to assimilate or adapt existing technology or to create new technology?

A better example of an empirical study based on the endogenous principle is that by Kokko (1996) who determined the effect of competition in Mexican manufacturing industry by endogenising both the activities of foreign and locally owned firms. Contrary to the earlier hypothesis that productivity spillovers are strictly proportional to foreign presence, Kokko's argument was that spillovers from competition were not determined by foreign presence alone; the interactions between foreign and locally owned firms played an important role. He argued that markets in which foreign firms stimulated competition and interactions were high, promoted spillovers as opposed to situations where foreign firms dominate and with little or no competition with the locally owned firms. His two propositions were that productivities of foreign and locally owned firms were *simultaneously* – jointly determined because of competition and that competition had an independent effect on the productivity of locally owned firms, even after accounting for the demonstration and contagion spillovers that are related to foreign presence.

Given the argument for joint determination due to interactions, Kokko used simultaneous system of equations to capture contagion-type spillovers related to foreign presence as well as spillovers that are caused by competition. The endogenous test showed positive results only when the industries characterised by enclaves were excluded. This finding compared to Kokko (1994) results where industries characterised by large foreign shares and large differences in labour productivity between foreign affiliates and locally owned firms formed enclaves that crowded out locally owned firms. Interestingly, the results of the study supported both the hypotheses only when the sub-sample considered excluded enclaves – believed to be isolated preserves of foreign firms operations only. This study had a rather unique conclusion in that while past studies concluded that externalities were proportional to foreign presence this study concludes that spillovers from competition are not determined by foreign presence alone, but rather by simultaneous interactions between foreign and locally owned firms.

One policy conclusion from this study was the support it gives to the need for local technological capability development in host developing countries. Such countries should support measures that stimulate competition between foreign and locally owned firms. While the findings and the policies from this study may be valid and interesting, we find them rather ambitious for many of the poor underdeveloped countries with fragile economies, weakly performing sectors with weakly enforced policies²³ that failed to affect decisions to invest in capacity building. Most industries in these countries are technologically backward still locked into outdated traditional processing techniques in comparison to techniques used by MNCs. The firms in these industries are naturally

²³ Such policies include; fiscal policies, policies related to payments for land, electricity and water (e.g. creation of industrial zones). Others include banking policies that affect lending policies and interest rates, educational policies that support vocational schools and training programs for workers in factories, research policies that provide scientific and engineering support to local industry, business support service development etc.

static characterised by unskilled labour, lack of strong entrepreneurship culture, marketing and managerial skills. Following structural adjustments and globalisation pressure many underdeveloped countries embarked on privatisation and liberalisation measures some of them as early as 1980s. This led to the influx of many MNCs into most of these countries and surprisingly many countries like in sub-Sahara Africa and Latin America, two decades down the road, their domestic firms still cannot compete with MNCs.

As in the immediate studies above, it would be overly ambitious to expect that firms in underdeveloped countries would pose competition in the short-run into foreign firms endowed with high skill in international production and marketing. Even in the case of NICs, domestic firms did not move instantaneously to international production levels. In order to arrive at sound policy prescriptions for underdeveloped countries, we propose that studies on spillovers should first seek to address the following questions: What kind and/or nature of spillovers exist in the industries and what determines their occurrence? Whether interactions between firms exist, if so which industries and what is the nature of these interactions? Are the interactions induced and/or enhanced by MNCs? Do spillovers and interactions stimulate learning in the locally owned firms? What about adaptations and minor changes (innovation) to imported technologies got from foreign firms? Kokko's productivity approach takes a high aggregate level of analysis and it is not quite clear how interactions take place, their contents and how they induce learning and innovation in locally owned firms. Kokko's mechanism as in other productivity studies clearly depicts a missing link in the development of technical efficiency in the underdeveloped countries. An in-depth study, in the form of a case study, would be ideal for underdeveloped countries if we are to understand how spillovers lead to increase in technical efficiency and thus productivity in host country firms.

Our final study on endogenous effects analyses briefly a demonstration study by Aitken, Hanson and Harrison (1997) who used logit specification to investigate the role of foreign investment in enhancing export behaviour of the locally owned firms in a host country – whether MNCs act as export catalysts. The main thesis was that MNCs might produce spillovers that enhance export prospects of domestic firms. When some of the firms are already exporters they tend to reduce the entry barriers and costs for other firms willing to penetrate the foreign market. This could occur through demonstration, learning by doing and buyer-supply linkages both domestically and internationally – MNCs link domestic firms to foreign buyers.

“...While MNCs may internalize some of the benefits of their activities through subcontracting or licensing arrangements, other effects, such as those related to demonstration or expanded cross-border trade, are more difficult to internalize, and may spill over onto neighbouring firms (Aitken, Hanson and Harrison, 1997: p. 4).”

The study utilised annual data on Mexican manufacturing plants for the period 1986-1990 supplemented with data from the 1986 and 1990 Mexico Industrial Census. The study was motivated by a model in which case the probability of exporting was a function of domestic and foreign output prices, factor prices and geographic concentration measures. They found that locating near MNCs exporters raises the chance of exporting for an individual Mexican manufacturing firm. They concluded that foreign owned firms acted as conduits through which domestic firms could distribute their goods. To this end foreign investors could directly or indirectly provide information and distribution services, their activities enhancing export prospects of locally owned

firms. Case studies in other regions support the combined effects of demonstration and competition from MNCs on locally owned firms. In a study investigating the effect of FDI in the Kenyan soap industry, it was reported that entry of MNCs introduced mechanised production and packaging techniques, that made it difficult for the locally owned firms unable sell their handmade soap in the urban markets. In order to retain their niche market, they were forced to introduce mechanised techniques to stay in business. Similarly, entry by MNCs in the Kenyan footwear industry led to increased competition and changes in the production technique (Langdon, 1981).

Benefits accruing from demonstration effects may not be enjoyed only by the locally owned firms in a country but could be extended to a wider social and economic domain. Unfortunately, on the social side when locally owned firms are adjusting to the demonstrated practices, they result in massive cuts in employment and reduction of unproductive departments. This amounts to reduced income to the many employees who are relieved as a result of the ensuing organisational changes and rationalisation process. Given that firms in the underdeveloped countries rarely have the experience, financial resources, and human capacities needed to develop new industrial technologies the number of small scale firms also reduces leaving only those which are capable of meeting the demands necessitated by the demonstration effects.

Assuming that certain technologies brought into a country by MNCs are targeted to engender growth, employment, local linkages or to engage in further innovation in developing countries attempts to copy and imitate such technologies are important. Since small scale firms in underdeveloped countries do not perform R&D their learning by watching from demonstrated techniques, learning by doing and by using rather than producing are often more relevant and important than basic research. This enables them to improve on their assimilation capability, to adapt technology to local conditions and to interact with other firms – vertical linkages. We conclude this section by arguing that demonstration effects may act as a trigger for the various types of learning processes in the firms such as reverse engineering and imitative research and development. This we note will enable firms to improve on their in-house technological capability and subsequently their absorptive capacity, which will keep them abreast of the latest external technological developments and facilitate their further ability to learn and innovate.

2.3.2.6 Technological Spillovers and Government Policies: Does the Level of Protection Matter?

A few studies have been undertaken that attempt to determine the impact of protective trade policies on the productive spillovers from the presence of MNCs in a host country. The trade policies involve protective instruments like quotas, tariffs and effective protective rates. The study by Blomstrom and Pearson (1983) found out that there existed some correlation between effective rate of protection (ERP) and foreign presence, however, ERP did not have a direct influence on the productivity of domestic firms proxied by value-added per employee in domestic plants. Haddad and Harrison (1993) used tariffs and quotas to classify industry into low and high protection levels. This did not support any technology spillovers. They found negative and insignificant relationship between the presence of trade barriers and the productivity of firms in Morocco. Similarly Sjöholm (1997) found no effect from the ERP on the degree of spillovers in Indonesia.

2.4 Emerging Issues and Alternative Theoretical Framework

In this section we endeavour to develop an alternative framework, which will guide the remaining part of the study. We will extract elements of technological innovations with a focus on learning and capability building. A systemic approach taking network cohesion as an important factor for knowledge generation, exploitation and diffusion to a wider national system of innovation is considered to be extremely useful. Before the proposed alternative framework is presented, a brief discussion of the emerging issues from the spillover literature analysed is presented.

2.4.1 A Brief Summary of Emerging Issues

The foregoing literature review on technological spillovers has demonstrated wide differences among authors regarding the conceptualisation of spillovers, methodologies for determining the effect of spillovers and in the findings of their studies²⁴. Since the main focus in this thesis is on the occurrence of spillovers in locally owned firms, this section will concentrate on a number of weaknesses that characterised the spillover literature with regard to spillover effect on technological learning, capability building and innovation in locally owned firms. Three of these are of particular importance. First is a tendency towards *single factor exponentiation* where a single factor was considered to be the only major factor in determining occurrence and effect of spillovers in a host country. Here we are referring to some of the early studies that focussed primarily on one factor such as foreign presence or equity participation.

Let us look at this point in more detail. Much of the early literature on spillovers held that foreign presence in a host country would in a way; automatically generate productivity spillovers, which would enhance the efficiency of locally owned firms [Caves, 1974; Koizumi and Kopecky, 1977; Findlay, 1978; Globerman, 1979; Blomstrom and Persson, 1983; Blomstrom, Kokko and Zejan, 2000]. Total factor productivity was examined as a linear function of foreign participation and most of the empirical analyses were therefore based on such a framework. Regardless of this simplistic treatment in the traditional hypothesis however, spillover studies demonstrated mixed results, some of which supported the existence of efficiency spillovers but primarily in the developed countries. All such studies, moreover failed to provide a rigorous study of the mechanisms through which spillovers brought about inevitable technological changes, in terms of skills, knowledge and technological learning.

As was noted in the literature, most studies thus limited their scope of analysis to a high aggregate level that concentrated narrowly on productivity performance only. Nevertheless, the existence of such benefits in developed countries can be challenged since in most cases spillover benefits accrued simply because they were using data from developed countries where technology gaps were relatively small and were likely to result in spillovers unlike in cases where large technology gaps existed like in the underdeveloped countries. Another reason could be that local firms and the local system of innovation in such countries are relatively strong and thus have accumulated the necessary innovative and absorptive capacity needed to assimilate spillovers from foreign investment. At the same time, seemingly faulty methodologies, followed in most studies conducted in such countries resulted in spillover benefits because of their failure to measure the distribution of productivity and social gains within the entire industries or

²⁴ Methodological (Gorge and Strobl, 2002:2003) and country characteristics (Lipsey and Sjöholm, 2004)

economy-wide networks. In most cases when a foreign investment is undertaken there are chances that the less capable domestic firms drop out or get replaced by joint ventures. Logically then if technological spillover is measured by aggregate gains in productivity that include both locally owned firms and foreign firms, it does not make much sense to talk of spillovers to locally owned firms as the literature implicitly does. These points to another debate that is still very much open for further research mainly in the underdeveloped countries.

The second weakness observed in the spillover literature is that of *automaticity* or *exogeneity* where spillovers and their effect were narrowly thought to occur automatically, making the mechanism and process of spillovers quasi-inevitable. The assumption of automaticity ignored the entire process of endogenous technological change placing technological learning, mechanism and process of spillover occurrence to the background. This weakness is implied in almost all the early and recent studies conducted based on spillover.

The third problem relates to the *narrow conceptualisation of spillovers*. Foreign firms were the only one taken into consideration while analysing spillovers in these studies disregarding the role and effort of locally owned firms and other supportive factors in the local systems of innovation in a host country. No attention seemed to have been paid to the supportive and systemic infrastructure in which firms are embedded. Firms at times could be situated in localities with varying or no infrastructural or institutional support systems. The spillover literature thus lacks a rigorous articulation of the mechanism of how spillover effects occur particularly in so far as their role in enhancing technological learning and innovation that essentially leads to productivity increase in locally owned firms is concerned.

Regarding the last two weaknesses, we observed in the spillover literature that a narrow, linear and automatic conceptualisation of spillovers was not only restricted to cases where the approach focussed primarily on foreign presence. A similar problem was evident in most other approaches, which concentrated on other factors like technology gap, equity participation and so on. These approaches, which also envisaged linear relationship between foreign investment and technological development of locally owned firms in host countries, failed to recognise that technological spillover occurrence and their effect resulted from a combination of several factors, especially when tacit knowledge is involved. Contrary to the proponents of a linear relationship, those working from an endogenous and evolutionary principle argue that restricting the concept of spillovers to mean that a specific or individual unit originally produces all knowledge misses factors critical to what has come to be referred to as a learning economy. These are networking, co-operation and learning-by-interacting – important elements that characterise successful technology capability building and innovation strategies (Lundvall and Borras, 1997). The learning process is socially embedded and organisational form and institutional set-ups are crucial to the outcome of interactions as emphasised in the national system of innovation.

In the spillover literature reviewed, very few studies acknowledged that spillovers, do not result automatically from foreign presence but rather from dynamic interactions among domestic firms, foreign firms and government policies [see some of the studies under *endogenous spillovers*; Das, 1987; Wang and Blomstrom, 1992; Kokko, (1992: 1994)]. However, in cases where endogenous growth principles were employed, the approach proceeded more or less in an aggregate manner, using simultaneous equations solved

empirically at an aggregate level, to depict firm interactions [see Kokko, (1992: 1994)]. As we have argued earlier, solving quantitatively a set of selected simultaneous equations can effectively capture the mechanism and dynamics involved in the spillover process or its effects. The characteristics of spillovers are often unnoticeable, uncertain and sometimes complex, meaning that their effect can only be traced through a more complex and integrated system. Hence much effort must be put in place to understand the technological changes as a result of spillover occurrence as well as learning and capability building that might arise.

In technically underdeveloped countries, spillover estimation using quantitative data is not usually available and even if it does exist, limiting oneself to an aggregate level study would be misleading due to its inaccuracy and the wide gap between local and foreign firms. One would have to get behind the aggregates to unearth the reality of spillovers by conducting systematic case studies at an enterprise level taking into consideration multiple issues from multivariate dimensions. For instance, this would have to involve among other things the size and age of domestic firms in the sector, their capacity to absorb new technology and to undertake dynamic changes. It would also have to consider the gap between their technology level (and the supporting structures in the economy) and the technological complexity of the technology brought about by a MNC subsidiary. It would have to consider the spatial distribution of firms, their production activities, whether they are located in an export-processing zone or in an industrial district and if so how the nature of their linkages influences spillover occurrence. An understanding of firm's prevailing trade orientation and labour market conditions would also be useful in the analysis. Testing for a specific set of conditions as was done in most studies does not allow us to see how these conditions interact to make learning and innovation possible in smaller domestic firms that sometimes do not even have access to the finance or the basic technology and management skills needed to change.

Based on the above, more empirical and theoretical work needs to be done taking into consideration an alternative approach. An approach that would enable us to assess what the influence of interactions, technological learning and capability development is in the occurrence of technological spillovers in the context of countries whose absorption capacity is particularly low. This will require a deeper knowledge of the role and importance of the local support system in the spillover process. It would also require a deeper understanding of the network dynamics and corroborative linkages that exist in the industry and/or economy wide systems. The role of supportive infrastructure and institutions would have to be examined. The role of social capital, which entails social trust, norms and networks of civic engagement would also have to be taken into consideration. We can regard social capital here as a set of horizontal associations between people, consisting of social networks and associated norms that have an effect on community productivity and well being. They facilitate co-ordination and co-operation and thus increase productivity by reducing the transactions costs of doing business.

In conclusion therefore, we believe that in the context of vast development in the endogenous, technological change and evolutionary literature, traditional linear argument is definitely flawed if taken to explain the occurrence of technological spillover from foreign firms to the domestic firms. This simplistic hypothesis tends to reduce technological spillovers to the presence of foreign firms or even foreign capital, making us fail to understand the actual effect of spillovers and real mechanism of how they occur. The process can be better understood from the lenses of evolutionary and

institutionalist view, which views firms not as isolated, static and pure economic agents, but rather as members of changing economic and social-institutional networks. In the next section we suggest an alternative framework, which will guide the current study.

2.4.2 Spillover Occurrence: Towards an Alternative Theoretical Framework

Given the problems and weaknesses identified above with most studies conducted earlier, in this section we shall formulate an alternative theoretical framework, which we propose to use in examining the occurrence and influence of MNCs spillovers on locally owned enterprises. It is now clear that the occurrence and influence of MNCs spillovers on locally owned enterprises cannot be properly explained using simple linear aggregate level analysis particularly in the case of non-pecuniary technological spillovers. Unlike pecuniary spillovers, non-pecuniary technological spillovers are exceptionally difficult to deduce from aggregate macro economic data [see Hirschman 1958; Rasiah, 1994]²⁵. Such spillovers include knowledge flows that are invisible, imperfectly understood, determined by multiple factors, and difficult to track and as such difficult to investigate. This is the more reason why a high aggregate analytical level fails to capture and explain effects of many other factors such as influence of the government policies and a variety of social-institutional factors such as cooperation, coordination and trust among entrepreneurs. Many other aspects are neglected including importance of networks and linkages to support structures such as productive centres, financial institutions, research and academic institutions; all of which are important factors to consider when investigating spillovers. Transaction costs also become important for the promotion and further development of networks and linkages through contractual enforcement. It is garmane to argue here that only firm level analysis is capable of offering a well-grounded understanding of relationship among firms, including MNC influences on locally owned firms. This thesis shall therefore adopt a firm-level study procedure to examine the mechanism of spillover occurrence and their influence on local enterprises in the Kenyan industry. In this perspective, we present the critical concepts that will be used to guide this study.

2.4.2.1 Cluster and Network Dynamics

The theoretical framework we propose here is founded under a broad analytical framework, which we will refer to as cluster and network dynamics. This framework emanates to a large extent from the industrial district concept, which was pioneered in the nineteenth century by Alfred Marshall 1890. Marshall posited that an economy stood to gain, when enterprises within a particular industry clustered in close proximity to each other. As a consequence of this, individual firms tended to specialise in certain specific levels of production processes that led to greater division of labour and *collective efficiency*. Existence of a pool of specialised knowledge in the cluster, reinforced through a common set of culture and social values created an industrial atmosphere for driving differentiation and division of labour (Young, 1928: 1994).

The framework on cluster and network dynamics has benefited from a multidisciplinary niche of approaches in social sciences. The framework combines a wide range of elements ranging from industrial organisation to social capital. Here we only discuss a few of these starting with transactions costs and institutional economics founded in the

²⁵ For extra details on pecuniary and technological external economies emerging from manufacturing growth see Scitovsky (1964) and Rosentein-Rodan (1964).

industrial organisation theory with pioneering works by Coase (1937), Chandler (1961: 1977) and Williamson (1975: 1979: 1985) among others. According to Chandler (1961: 1977) the evolution and development of modern corporations depends on what he refers to as the visible hand of the hierarchy, which differs substantially from the invisible hand of the market in terms of resource allocation. His argument is that the visible hand of hierarchical coordination and control carried out internally through direction out-competes the invisible hand of market coordination. Chandler argues in favour of being big and mainly vertically integrated as one condition for a successful performance; by making it possible to stimulate efficient throughput, innovation and development capabilities. However this notion of vertical integration has been criticised for its failure to explain some observed phenomena e.g. growth or decline of most industries²⁶. In the face of current international competition, there is increased pressure of rapidly changing product designs and technologies, companies including big corporations (including MNCs) have resulted heavily on outsourcing/selling various components to other firms including (small and medium enterprises). Such companies are left performing only key aspects of the production like initial design, final assembly and final testing. This implies that in an environment that demands rapid new product introductions and continual technological change, no single firm can complete the design and production of most products on their own. That way, firms then gain flexibility to introduce increasingly sophisticated products faster by relying on networks of suppliers.

The transaction cost theory by Coase's (1937) and later by William's (1979: 1985) emphasises that; markets and hierarchies play important roles in coordinating production. According to the transaction theory, the choice between long-term contracts and a standard market transaction for the exchange of goods will depend on the costs and benefits of the former relative to the latter. Put simply, a firm decides to contract when it gets to a point where the costs of organising an extra transaction within the firm are equal to the costs involved in carrying out the transaction in the open market, or, to the costs of organising by another entrepreneur. If the market for intermediate goods is prone to failure, because of small number problems, asymmetric information, asset specificity, uncertainty and irreversible commitment, then incentives for opportunistic behaviour can be reduced by internalising or partially internalising the transaction. Thus transaction cost theory becomes important in explaining inter-firm relationships. However, when such contractual relationships emerge among firms, cooperation and market forces are necessary to facilitate production coordination (see Richardson, 1972: 883-96). Richardson viewed an industry as a system of dense and integrated activities. Such activities included discovery and estimation of future wants, research and development, execution and co-ordination of processes of physical transformation and marketing of goods. These activities had to be carried out by firms with appropriate capabilities (capabilities here refer to several things like knowledge, experience and skills)²⁷. This seemed to extend Smith's specialisation principle where enterprises specialise in activities that use a particular capability and collaborate with other enterprises that specialise in complementary activities and thus stimulating networking activities as a means of production co-ordination that can stimulate resource creation of firms.

²⁶ As noted in Best, 1990 Chandler's analysis, as applied to Britain by Elbaum and Lazonick, does provide a compelling account of the decline of British industry, but it does not explain the decline of American industry, the rise of Japanese industry, or the international success of groups of small firms in Germany, Italy, and elsewhere that have been dominated by hierarchical organisation.

²⁷ Richardson (1972) seemed to be extending an earlier idea by Edith Penrose (1995). According to Penrose the growth of the firm depended on resources and productive services, which Richardson refers to as activities and capabilities.

The above process of stimulated networks of interdependent producers increases the opportunity to innovate in the firms by encouraging specialisation based on a combination of existing internal technological capabilities and external knowledge, experience and skills in the form of externalities. These externalities are from the existing institutions and other firms e.g. competitors or subcontractors in the existing network of linkages and collaborations. However, being innovative can increase the probability of spillover occurrence into a firm as this depends on the absorptive capacity of a firm, which tends to increase with the degree of innovativeness in the firm. This is the reason why we combine industrial technological innovation with the cluster and network framework in our spillover analysis. Industrial technological innovation do not take place as a result of individual firms lone technological effort, if this happens it's only to a limited extent. Many innovations²⁸ and their causes exist outside individual firms and it is justified to argue that a very tiny fraction of innovations at a given point in time do take place in firms compared to external innovations. As will be discussed in the next section, technological innovations can therefore be visualised in an embedded systemic perspective where networks in the form of technology linkages and other collaborations could often influence their occurrence.

The framework on clusters and network dynamics attempts to go beyond transaction cost framework, which placed markets and hierarchies as the prime coordinators of production. The literature on clusters and network dynamic posits that while transaction cost framework is useful in explaining inter firm collaborations the importance of "social capital" e.g. trust-based relationship, which is sometimes nurtured with proximity, is hardly given attention. The main critique here is that, though the contractual relationships bind suppliers/purchaser and trainers to firms, firms have to build trust relationships to obtain commitment and loyalty [Brusco, 1982; Brusco and Sabel, 1981; Piore and Sabel, 1984; Rasiah, (1995: 2001); Nadvi, 1999; Wolfe, 2000]. This is to say that trust arises to overcome problems of reliability, information access and uncertainty hence helping to strengthen long-term efficiency. Trust therefore plays an important complementary role, in shaping the inter-firm networks that arise in the process of overcoming coordination problems that emanate from imperfect market. This is to mean that given this role played by trust in augmenting outsourcing relationships, it should then be included as part of transaction costs framework. Several works exist which show the influence of cooperation and market forces in the growth of collaborative relationships. Such relationships between agents within clusters and networks, through the sharing of vital information, resources, skill, knowledge and technical expertise, and other forms of joint action reduce transaction costs and further enhance competitiveness as well as accelerate learning and technical innovation [See Brusco and Sabel, 1981; Brusco, 1982; Piore and Sabel, 1984; Best, (1990: 2001); Saxenian, 1991; Rasiah, 1995]. In the current study, the cluster and network dynamics framework will be further expanded by combining it with the literature on technological innovation which has led to the development of national systems of innovation. The national system of innovation is important and particularly relevant to this study because of its classic development, which recognises technological learning and innovation as a non-linear, dynamic and

²⁸ Schumpeter acknowledged this point when he wrote: "capitalist economy is not and cannot be stationary. Nor is it merely expanding in a steady manner. It is incessantly being revolutionalised from within by new enterprises, i.e. by the intrusion of new commodities or new methods of production or new commercial opportunities into the industrial structure as it exists at any moment. Any existing structures and all the conditions of doing business are always in a process of change (Schumpeter, 1943: pp. 31-2)".

interactive process. This illuminates a central theme in this thesis that dynamic interactions between MNCs and local enterprises are necessary as mechanisms through which technological innovations and spillovers can take place.

2.4.2.2 Technological Innovation: National System of Innovation and Evolutionary Perspectives

The national system of innovation emphasises the ways in which technology, social-economic agents, organisations, institutions and policies interact with each other for the sole purpose of fostering knowledge, learning, capability building and innovation. It is thus characterised by agents engaged in formal government and education institutions, network of physical, scientific, economic and technology infrastructure. The flow of technological information, knowledge and skills within the NSI is regarded as the most important thing for the purpose of technological learning and capability building in the local, national and global context. The literature on technological capability accumulation has offered substantial insight on various learning aspects as well as stylised facts on a national systemic learning economy where changes, internal transformations and restructuring are important for the success of firms and industries. NSI emphasises that flow of knowledge and information is dynamic and non-linear. As a result, national system of innovation framework reiterates the significance of interactions among agents to facilitate flow of skills, information and knowledge to stimulate or enhance learning, capability building and innovation. The national systems of innovation views technological learning as a product of multiple iterations of trial and error: learning by doing learning by using and learning by interacting in knowledge accumulation. As will be discussed below these attributes of involving all actors dynamically and interactively for social-economic benefit, led to the formulation of the national systems of innovation [Freeman, (1987: 1995); Lundvall, (1988: 1992: 2000); Nelson and Rosenberg, 1993; Edquist, 1997; Nelson, 1993; Mytelka, (2000: 2004)]. The NSI has largely been motivated by evolutionary economics theory expounded by Nelson and Winter (1982), Rosenberg (1982) and Freeman (1982) among others. According to Lundvall (1992):

“A system of innovation is constituted by elements and relationships which interact in the production, diffusion and use of new, and economically useful, knowledge and ... a national system encompasses elements and relationships, either located within or rooted inside the borders of a nation state.” “The broad definition includes all parts and aspects of the economic structure and the institutional set-up affecting learning as well as searching and exploring ... the production system, the marketing system and system of finance (Lundvall, 1992: p. 2 & 12).

Another definition views economy's NSI as:

“The network of agents and set of policies that affect the introduction of technology that is new to the economy. Since in the vast majority of developing countries technology is imported, the innovation system is defined very broadly to include policies towards FDI, arm's-length technology transfer, intellectual property rights, and importation of capital goods (Dahlman and Nelson, 1995: p. 90).

It can therefore be noted that specific features exist which differentiate an innovation system from earlier general equilibrium models of economic systems. In a local production system, it is easy to conceptualise the systemic nature of innovation simply by imagining a scenario portrayed by various actors in a complex, dimensionless system that comprises numerous uncertain events, which depict an evolutionary process. Just think

of many continuous changes due to firms' competition emanating from diverse and continuously changing customers' preferences and tastes. The changes due to new findings emanating from research and technical institutes. The marketing and other contractual changes due to the rapid and erratic changes in the global market coupled with intensive process and product changes. The changes due to social, economic and political factors. Recognition of complex systemic perspective of innovation suggests that sources of learning and innovations to the firms are multiple, unpredictable and uncertain, involving many users and producers of innovation to the extent that mapping them out at a particular point would be extremely strenuous²⁹.

Models that depict innovation as a smooth, well-behaved linear process badly misspecify the nature and direction of the causal factors at work. Innovation is complex, uncertain, somewhat disorderly, and subject to changes of many sorts. Innovation is also difficult to measure and demands close coordination of adequate technical knowledge and excellent market judgement in order to satisfy economic, technological, and other types of constraints – all simultaneously. The process of innovation must be viewed as a series of changes in a complete system not only of hardware, but also of market environment, production facilities and knowledge, and the social contexts of the innovation organisation (Kline and Rosenberg, 1989: p. 275).

It is important to emphasise that from the foregoing definitions as does the vast literature on NSI places interaction among agents at the heart of national system of innovation approach. Interactions among agents are important for the purpose of production, diffusion and use of new and economically useful knowledge, which is extremely essential in bringing new products, new processes and new forms of organisation into economic use³⁰. As indicated above, agents in support of this process include institutions and organisations such as industry and business associations, R&D, innovation and productivity centres and technological and financing infrastructure support. Care should be taken since institutions need to be distinguished from organisations. Organisations comprise universities, public sector research bodies, science councils and firms, that are the traditional focus of science and technology studies while institutions can be viewed as "sets of common habits, routines, established practices, rules or laws that regulate the relations and interactions between individuals and groups" (Edquist, 1997). According to Johnson (1992) institutions are seen as informal and formal norms and rules regulating how people interact.

The concept of NSI fits most analysis dealing with technological changes, learning and innovation in developing countries, where technological change and learning does not have to emanate from formal R&D institutions. Contrary to this argument, the science-push school of thought, tended to reduce innovation into a well-defined sequence of activities that suggests a unidirectional flow of causation, from fundamental discoveries in science leading eventually to technological inventions, innovations, and the diffusion of new products and production techniques. This model, traditional linear model, referred elsewhere by David as "Simplest Linear Model – SLIM" influenced economic thinking and policy analysis to a wide extent for a long time (David, 1992)³¹. The science push model and its attributes were however misleading. Its postulate was that

²⁹ Kline and Rosenberg (1989) offer a very illuminating discussion on this.

³⁰ It should however be emphasised that the having potential agents co-located within a geographical location does not necessarily mean they interact.

³¹ Stated more explicitly, "a linear process was presumed to begin in a scientific laboratory, possibly in a basic scientific discovery, and then go through stages: applied research, experimental development, initial commercial application, improvement, and so on" (Cooper, 1980).

innovations required specialised scientific and technological skill. This tended to reduce innovation to a preserve of serious scientific research whose source could only be R&D laboratories. This was wrong as many innovations do not necessarily require basic research not even applied research, but just occur in the process or as end results of many trials and errors. In addition, innovations needed not only occur in any extraordinary laboratories, this was a narrow scope of visualisation accorded to innovation as innovations took place everywhere and at all times even on the shop floors. One need not limit himself to the scientific R&D laboratories looking for innovations, local artisans and craftsmen in the least of the developing countries do have their own innovations as does the support and maintenance engineers in production processes or even local traders and merchants. These arguments were well articulated by Freeman (1987) in his view of NSI as "...the network of institutions in the public and private sectors, whose activities and interactions initiate, import, modify and diffuse new technologies³²". The foregoing discussion provides a candid illustration that in trying to understand industrial technological dynamism in underdeveloped countries like those in sub Saharan Africa, there is much out there to observe in addition to the acquisition of externally sourced knowledge and innovations.

2.4.2.3 Spillover Occurrence and Host Country's Technological Innovation Development: Stimulating Technological Learning and Capability Building

Contrary to the traditional technique, production function, where spillovers were conceptualised in terms of productivity gains, we propose to conceptualise spillovers in terms of learning and technological capability building. Looking at spillovers through productivity techniques largely neglects capability building process treating it as a 'black box'. We will argue strongly that firm's productivity and performance largely depends on the accumulated technological capabilities over time where constant technological learning leads to a dynamic process of technological accumulation and eventually technological capability building. This would then support technological innovations as articulated in the NSI framework. We shall therefore assume that foreign presence through knowledge spillovers and other factors are likely to lead to technological learning and capability building in domestic firms either by providing raw materials, resources or specified stimuli which results in various technological changes in the firms. This process is likely to trigger learning and stimulate technological capability building at the firm level. As we argued elsewhere, this should be treated with a caution and should not be taken to imply that spillovers are the only determinants of capability building in firms. A whole variety of other factors are involved ranging from incentive framework (determines the demand side of capability building); supply factors (access to skills, finance and information) to institutional factors (this serves as the rules of the game). Rather, the task in this study is to investigate what capabilities are likely to be built in the locally owned firms due to foreign presence and spillover occurrence. By taking into considerations technological changes and various form of technological learning taking place as a result of foreign presence and spillovers we shall develop a measure for spillovers – technological spillover index (SPI). Construction of this index is discussed in the next section.

Before concluding this section, we look albeit briefly at various technological capabilities in a firm. Firm level technological capabilities can be categorised in many ways. Due to

³² According to Metcalfe (1995), the NSI denotes a system of interconnected institutions involved in the creation, storage and transfer of skills and knowledge.

the magnitude and scope of this study, we shall only focus on production capability and then identify the associated learning and technological changes. Our classification on technological capability will be drawn from Lall (1987: 1990: 1992), Bell and Pavitt, (1992: 1993); Wangwe (1995), Ernst, Mytelka and Ganiatsos (1998), Dahlman, Ross-Larson and Westphal (1987). Useful categorisation of technological capabilities considers the functions they perform and the degree of complexity as the two classificatory principles. Thus it is possible to single out investment, production, major innovation, minor innovation, linkage, organisation and marketing capabilities. Developing countries at the early stages of their development spend much effort on the development of basic pre-investment, production and basic innovation involving minor changes, adaptation and incremental innovation. Linkage capability has also become increasingly important particularly due to the learning aspects involved when firms are involved in forward and backward linkages with other firms through subcontracting and others.

Figure 2.1: A Framework Model for Spillover Analysis: Determinants, Mechanism and Effect on Technological Learning and Capability Building

2.5 Analytical Framework for Measuring Spillovers Based on Technological Changes, Learning and Capability Building

In a developing country like Kenya, occurrence of technological spillovers from foreign investment is likely to place domestic enterprises on a learning function thus increasing their likelihood to learn and accumulate experiential tacit knowledge and thus build certain technological capabilities that would in turn enable them innovate. For these reasons and contrary to earlier spillovers studies, spillovers are conceptualised broadly in the form of learning and technological capability building. Using conceptual Figure 2.1, we outline the procedure of how spillover occurrence might induce firms to learn and accumulate technological capability. The chart is elaborate; it includes determinants of spillover occurrence traced within the structure-conduct-framework of industrial organisation. This is discussed in more details in a section below.

The analytical framework includes four channels of spillover occurrence identified from the spillover literature examined – they include competition, linkage, labour mobility and demonstration effects. Technological spillovers taking place through each of these channels are further conceptualised in terms of learning and dynamic technological changes taking place in a firm. This thesis argues that firms are likely to respond to external stimuli, skills, knowledge or technology transferred by implementing dynamic technological changes. Such technological changes include modifications, improvements and extensions meant to improve efficiency and increase firm productivity. According to the literature on technological innovations (which emphasises interactive learning, capability building and innovation), the process of undertaking technological change is fully embraced as an important procedure in the process of technological capability accumulation. This arguments have been postulated by the proponents of technological change and innovation [Stoneman, (1983: 1995); Metcalfe, 1989; Rosenberg, 1982; Nelson and Winter, 1982; Freeman and Soete, 1997]. This process of undertaking technological changes provides learning in firms, learning by doing, by watching or by experimenting; results in explicit, experience and experiential knowledge accumulation. This helps increase firms' endowment of technical and tacit knowledge, skill base and capability and subsequently their ability to innovate [For more details see Bell, Scott-Kemmis and Satyarakwit, 1982; Fransman, 1984; Kim, (1997: 1999)]. In support of the same argument, a study by Mytelka (1985: p. 82-3) presented an illuminating discussion on how changes in consumption, production, organisational and marketing could promote technological capability within the firm. The direct implication of the current discussion is that occurrence of technological spillovers could indeed stimulate allocative, technical and technology transfer into the firms.

For each of the spillover occurrence channel considered, we identified five kinds of technological changes associated with production capability building. Before we proceed, it is imperative to indicate at this point that this study focuses on only one form of technological capability – production capability, since it is not possible to consider exhaustively all kinds of technological capabilities here due to time and resource constraints. Under production capability the following technological changes are considered to proxy spillover occurrence; production changes, process changes, industrial engineering, new marketing strategies, management and organisation changes. The degree to which each technological change takes place would be determined subjectively in the firms, by the respondents (production manager/engineer), on a continuous gradual ordinal scale ranging from a minimum score of 0 to a maximum score of 5. In this scale, score 0 represents “*nothing happening*” while score 5 represents “*very much*”. On the basis of this scale a spillover index is computed. This index is then

used in the quantitative determination of spillover occurrence and the subsequent hypotheses. It should however be acknowledged that the index inevitably suffers from drawbacks especially due to the fact it was largely based on firms' own subjective assessment which could distort the index. As an attempt to minimise excessive distortions, we had to rely mainly on the production managers as they were more acquainted with technological issues at the firm level.

We provide one example based on competition mode of spillover occurrence just for demonstration purposes. Due to competition pressure from competing firms, an enterprise is bound to react by implementing multiple technological changes ranging from production to organisational (see Table 2.1). These changes can be broadly classified under five components of technological changes involving production capability mentioned in a paragraph above. Two other important technical changes that could result in accumulation of complementary capabilities have also been included – they include changes in marketing, organisation and management. For each of these technological changes, a firm would have to choose subjectively what they perceived the degree of technological change was due to competition on the basis of the scale provided. For instance, consider the first case depicted in the second row of Table 2.1, a score between 0 and 5 would be chosen for changes in products due to competition pressure.

As an example, technological changes in products would include development of completely new products or improvement of old products. Assuming a particular firm introduced new products in response to intense competition pressure and that this particular firm rates this change as "a score of 4" on the score range provided. The awarded score, "a score of 4", becomes our Pd_c as shown in Table 2.1. It is noteworthy to mention that the most important thing for the respondents was their ability to identify who their competitors were and to classify them in to locally owned or foreign firms. Without this bit of information it would be very hard to differentiate the effect of foreign firms from that of the locally owned firms. To control for this problem, the respondents were asked during the survey to write the names of their competing firms, firms they were linked to, firms they copied or imitated certain products from and finally firms they got technical or non-technical workers from. The names provided were then counterchecked with the investment promotion council and the registrar of companies in the Ministry of Trade and Industry to determine their actual ownership status.

Table 2.1: Reaction to Competition Pressure Ranked by Order of Importance

Reaction to Competitive Pressure	Ranking by Importance
Improving our products, develop new ones or copy/imitate their products	0 1 2 3 4 5
Improve processing techniques, raw material and quality control, upgrade our technology & equipment to save energy or raise productivity etc.	0 1 2 3 4 5
Repair and Maintenance of physical capital, inventory control etc.	0 1 2 3 4 5
Improve and strengthen our marketing department by new ideas skills and knowledge in domestic or foreign markets (exporting) etc.	0 1 2 3 4 5
Undertake organisational changes for better management and implementation of production & other routine activities that enhance the firm's efficiency.	0 1 2 3 4 5
Others (<i>please specify</i>).	0 1 2 3 4 5

Source: Author 2003/2004

Similarly, using the scores for all other four cases, technological changes, a technological spillover index (SPO INDEX) was developed. The idea of employing an index to evaluate firm level processes and activities is now widely embraced particularly when dealing with technological capabilities in developing countries. This can be traced to the works of Westphal, Kritayakirana, Petchsuwan, Sutabutr and Yuthavong (1990); Lall (1992: 1994: 1996: 1999); Bell and Pavitt (1992: 1993); Lall, Barba-Navaretti, Teitel and Wignaraja (1994); Ernst, Ganiatsos and Mytelka (1998); Wignaraja and Ikiara, (1999); Wignaraja (2001) and Rasiah (2002: 2003). However the present spillover index, is different and attempts to quantify firm level technological behaviour with particular emphasis on qualitative information from survey interviews and then uses limited dependent econometric techniques for spillover analysis. On the basis of the five scores awarded; Pd_c , Pr_c , Rm_c , Ms_c and Mo_c an average, C , is then computed as shown at the bottom of the competition column, see Table 2.2. This process is repeated for all the other spillover channels, for linkage the average is L , mobility is M and demonstration is D . Eventually, our complex spillover index, SPO INDEX, is computed as an average of all the four spillover channels, as shown by the following expression:

$$SPO \text{ INDEX} = \text{Composite Average}(C, L, M, D) \quad 2.20$$

Table 2.2: Computation of Spillover Index, SPO INDEX

Spillover Conceptualisation	Competition	Linkage	Labour Mobility	Demonstration	Average Score
	(c)	(l)	(m)	(d)	
Product Changes (Pd)	Pd_c	Pd_l	Pd_m	Pd_d	PD
Process Changes (Pr)	Pr_c	Pr_l	Pr_m	Pr_d	PR
Repair & Maintenance (Rm)	Rm_c	Rm_l	Rm_m	Rm_d	RM
Marketing Strategy (Ms)	Ms_c	Ms_l	Ms_m	Ms_d	MS
Management & Organisation (Mo)	Mo_c	Mo_l	Mo_m	Mo_d	MO
Average Score	C	L	M	D	SPO INDEX

Source: Author 2003/2004

Similarly, the SPO INDEX can be computed by column average. A score for product change under each mode of spillover occurrence would be taken and averaged to give **PD**; the row average in Table 2.2. This is done for the four other rows – **Pr**, **Rm**, **Ms** and **Mo**. In the end, the average for the last column is computed as follows:

$$SPO \text{ INDEX}_{firm} = \text{Composite Average}(PD, PR, RM, MS, MO) \quad 2.21$$

The two procedures; average by column or average by row yield the same results, a complex spillover index, SPO INDEX, which would serve as a proxy for spillover occurrence in the Kenyan manufacturing industry. The average spillover occurrence for the industry would be obtained by computing the average for all the firms. The SPO

INDEX will range on Likert scale in the interval 0 to 5. This would be in an ordered framework as follows:

<i>SPO</i>	<i>INDEX</i> = 0,	1,	2.....5	2.22
Where	<div> <div>SPO INDEX = 0 represents "<i>None</i>" occurrence of spillovers</div> <div>SPO INDEX = 1 represents "<i>Least</i>" spillover occurrence</div> <div>SPO INDEX = 2 represents "<i>Low</i>" spillover occurrence</div> <div>SPO INDEX = 3 represents "<i>Average</i>" spillover occurrence</div> <div>SPO INDEX = 4 represents "<i>High</i>" spillover occurrence</div> <div>SPO INDEX = 5 represents "<i>Highest</i>" spillover occurrence</div> </div>			

This index will be used in spillover occurrence determination using multinomial ordered logit analysis discussed extensively in Chapter 5.

2.6 Formulation of Study Propositions

Following from the above discussions, alternative framework offered, and guided by the analytical framework established we formulated the following propositions to help us examine technological spillovers in the context of Kenyan manufacturing industry. Note that specific objectives remained as stated in Chapter 1.

2.6.1 Presence of Multinationals and Spillover Stimulation

This section begins by revisiting one weakness notable in the earlier literature. It was noted that spillover process remained largely a narrowly conceived concept; the definition of technological spillovers in the literature also remained virtually static. Spillovers were largely associated with increases in the productivity efficiency of domestic firms. Contrarily, this thesis conceptualises spillovers in terms of learning and technological capability building in firms. This thesis will therefore regard technological spillovers as skills, knowledge and technology that serve to stimulate dynamic technological changes in firms triggering the learning process and accumulation of technological capability. A process that later spurs technological innovations. This has a strong implication in that based on the vast knowledge, capital and technology resources possessed by MNCs; they can play an active role in restructuring industries in a developing country. From the perspective of the above discussion, the first main proposition in this study is set as follows:

***Proposition 1:** The presence of MNCs stimulates technological spillovers to locally owned manufacturing enterprises in Kenya.*

2.6.2 The Determinants of Spillover Occurrence

So far one thing about technological spillovers is clear that due to their complexity, it is not possible to disentangle pecuniary spillovers from non-pecuniary technological spillovers for a proper quantitative analysis. It is also clear that non-pecuniary spillovers mainly occur to firms in form of skills, knowledge or in form of stimuli (e.g. competition pressure) which induces firms to continuously introduce dynamic technological changes in their production processes, products, their routine work and to their organisational procedures. All these dynamic changes have extensive implications for technological learning and capability building in firms.

Since the process and impact of technological spillovers can be largely visualised as a function of individual firm's resource endowment and interactions with socio-economic agents, in this study it is assumed that spillover occurrence is determined by a number of factors encapsulated in the structure-conduct-performance framework, Figure 2.2. This framework is founded in the theory of industrial organisation [Bain, 1968; Scherer, (1973: 1980)]. According to this framework various elements of market structure determine firm conduct, and that structure and conduct together interacted determine market performance. The major elements of structure include organisational structure of firms; whether they are vertically or horizontally integrated. Firm orientation; whether they operate to serve domestic market or external market (export oriented). Others include buyer and seller sizes, product differentiation, and entry and exit conditions. The major elements of conduct were human capital development strategy, product development strategy, co-ordination with other firms and existing supporting institutions. Although R&D is also identified in this category, very few firms in Kenya undertake it. Lastly, performance includes firm revenue in terms of output sales and value added, market share, unit cost of production, total factor productivity or partial productivity levels as in case of labour and capital productivity.

Figure 2.2: Industrial Organisation Framework

An institutional environment is incorporated into this framework since its influence on firms' structure and conduct might in turn have an influence on firm performance, all of which again affect each other interactively and dynamically. This is inspired by the works of institutional economists [Williamson, 1985; Richardson, (1960: 1972); North, 1992]. In the words of Douglas North (1992), "... institutions and the way they evolve shape economic performance." Under the institutional environment several factors are identifiable which might directly or indirectly impinge on firms' performance. They include basic infrastructure, labour force characteristics, prevailing government policies and political climate, degree of accountability and transparency level, ethnicity background and cultural practices, existing market structure of competing firms, firm ownership structure, trade orientation, inter-firm and institutional links etc.

Similarly, from the debate alluded to above on technological innovations, many factors socio-economic, technological including multiple agents and their interactions are

involved in the spillover occurrence. This called for a systemic approach while designing the analytical framework. It was assumed that; determinants of spillover occurrence, their mode of occurrence and impact on firms' activities leading to technological learning and capability building could also be traced and identified within the national system of innovation. However, this does not mean mapping the entire Kenyan NSI, the main assumption is that knowledge flow, firms and their interactions are embedded within the Kenyan NSI. In this context, the analysis to be undertaken in this study views the NSI from the lenses of a firm and partly of support institutions – e.g. Kenya's industrial support institutions.

On the basis of the above, and following from the insight garnered from the spillover literature analysed, alternative theoretical framework offered and based on analytical framework designed above, the determinants of spillover occurrence in Kenya can be outlined in a broad proposition as follows:

Proposition 2:*In a technically underdeveloped country like Kenya, the occurrence of spillovers into the Indigenous enterprises will not only depend on the presence of MNCs, but also on absorptive capacity (technological gap), presence of support structures and institutions (e.g. institutions offering finance for learning and innovation), presence of interactions and trade orientation. Others will include firm size, age, ownership structure, performance and competitiveness, labour market conditions, strategy of a firm and industry structure).*

From this broad proposition we subsequently formulate testable propositions as follows:

2.6.2.1 Absorptive Capacity

In the literature analysed, one of the recurring arguments was that; for spillovers to occur to the locally owned firms, there must be high absorptive capacity [Cohen and Levinthal, 1990; Grossman and Helpman, 1991; Benhabib and Spiegel, 1994; Keller, 1996; Borensztein, Gregorio and Lee, 1995]. Knowledge spillovers depend on the ability and effort of the recipient parts to exploit new knowledge and technology as knowledge does not diffuse effortlessly. R&D although hardly conducted by domestic firms become important in keeping pace with and absorbing the knowledge spillovers. A firm with a strong R&D base would therefore be efficient in the diffusion of spillovers. Some of the spillover literature also argue that the technological gap should be small [Cantwell, 1989; Kokko, (1994: 1996). A different version of the literature also argues that a large technological gap³³ acts as a stimulus to innovation and spillover [Findlay, 1978; Abramovitz, 1986]. However, this is unlikely in underdeveloped countries since the absorption capacity is too low to permit such leaps. The supporting national system of innovation in which firms are embedded is rather weak.

In a technically underdeveloped country like Kenya, it is assumed that absorption capacity is important if spillovers are to occur. A firm's internal absorption capacity can be viewed as accumulated technological knowledge over time sometimes reflected by age of a firm. However, most firms in developing countries, like Kenya, might not be in a position to accumulate knowledge due to lack of resources and knowledge cannot

³³ Kokko (1994), Kokko, Tansini and Zejan (1996) and Sjöholm, (1997) define technology gap in the following ways: First, in terms of different industries capital intensities. Second, in terms of the difference in labour productivity and finally, in terms of the amount of patent fees in different industries. The later is obviously out of question in the context of underdeveloped countries since patents are hardly considered important there.

therefore be taken as a simple function of firm age. In the same vein, R&D measures might not be very applicable as most firms hardly do it for lack of either human or technical resources. We shall therefore resort to other indicators like share of technical personnel and the existing level of capital investment. It will be assumed that the absorptive capacity depends on the level of technological knowledge in human resources and physical capital investment. Both are important for the complementary role in which they play to each other. Technical personnel can be measured in terms of share of engineers, scientists and support technicians in the total employment of the firm while physical capital can be taken as the capital investment by the firm. Using capital investment a technology gap variable between domestic and foreign firms will be derived.

Proposition 2a: *When absorption capacity in local firms is weak due to a wide technological gap between their technological base and that of the MNC subsidiaries in their industry or sector, then technological spillovers are unlikely to occur.*

2.6.2.2 *Systemic Infrastructural and Institutional Support Structure*

One of the arguments that emerged was that it was important to reconceptualise spillover process in a broader context. Following from our synthesis, critiques and discussions above, occurrence and impact of technological spillovers is not an automatic process and cannot therefore be examined just using a handful of a few selected factors employing a narrowly conceived framework. This is especially so given the, dynamic, uncertain and tacit nature of technology and knowledge. This thesis views the spillover occurrence process as an extremely dynamic process influenced to a very large extent by a multivariate of instruments amid other determining factors. Such factors could be internal or exogenous to the firm and sometimes to the country – implication that they are beyond the control of the firm as well as the country. This aspect prompted this thesis to adopt a complex and systemic approach guided by the literature on technological innovations – in particular the NSI, which largely overlaps with the literature on cluster and network dynamics in the industrial organisation. The two literature strands stresses the importance of knowledge generation, its exploitation in firm's production, its utilisation for learning to learn and to innovate, and further its diffusion through a dynamic and interactive process. As the literature emphasises, systemic interactions among agents arise from networks and linkages created in the form of sub-contracting relationships or supplier-client linkages that serve to demonstrate technological innovations or serve as stimuli for learning and innovation³⁴.

Also emphasised in the same literature is the importance of infrastructural and institutional support structures. Examples include institutions like productivity centres, technology transfer bodies, training programmes and investment promotion councils. Similarly, institutions such as those providing financing play a very active role towards facilitation of innovation based on knowledge acquired in the spillover process. The role of these institutions as intermediary organisations that coordinate demand-supply relations between firms, government, and institutions has been articulated (Rasiah, 2001; Doner, 2001; Aoki, 2001). They play an important role in strengthening network cohesion. Even those that enforce contractual arrangements play an important role – since as Williamson (1985) demonstrated lack of commitment through long-term contracts leads to under-investment in relationship-specific assets. Viewed in the

³⁴ These attributes of involving all actors dynamically and interactively for the sole purpose of social benefit to a wide economic standpoint, led to the formation of NSI built upon works of Freeman (1987: 1995), Lundvall (1988: 1992: 2000) and Nelson and Rosenberg (1993).

systemic lenses, both infrastructural and institutional capacity to function effectively depends on systemic relationships established over time. To a large extent, systemic and network cohesion is often facilitated by infrastructural and institutional structure created to coordinate between government policy-making organ, implementation body and firms. If infrastructural and institutional structures play an effective role, then the risk of government failure is minimised.

We will therefore argue by analogy that where support structure is present, it would be more likely that local firms would be able to absorb spillovers from MNC firms. However, testing a proposition based on existence of strong support structure such as financing for innovation at an aggregate level is a difficult thing to do, since data on which firms utilise what kind of support structures is hardly documented in poor developing countries. Such a proposition can only be tested using firm level data collected by a survey methodology. Infrastructural and institutional structures will be taken as present if a firm claims to have received support of some kind (such as technical, financial etc) from the existing technical and financial institutions in the Kenyan industry.

Proposition 2b: *The presence of strong support structure (e.g. basic infrastructure and supportive institutions) in an industry including financing for learning and innovation increases the probability of technological spillovers.*

2.6.2.3 Systemic Embeddedness: Importance of Firm Interactions

The conceptual framework developed in this thesis regarded the spillover process as an extremely interactive and dynamic, one that is influenced by a multitude of socio-economic agents as well as existing policies that operated in a systemic manner. A strong network cohesion that supported generation and diffusion of knowledge was emphasised. This is articulated in the network dynamics and NSI literature, which singles out dynamic and interactive involvement of agents as important [Freeman, (1987: 1995); Lundvall, (1988: 1992: 2000); Nelson and Rosenberg, 1993; Mytelka (2000)]. The literature regards interactions as important means through which interactive learning, information and technology can be exchanged or exploited jointly for the purpose of productive activities. This implies that interactions among firms, institutions, and government and business associations are likely to stimulate the process of spillover occurrence. Firms embedded in such systems would thus benefit exploitation of spillovers of knowledge, accumulation of capability through learning from demonstration effects. In light of this discussion, we hypothesise that firm systemic interactions in Kenyan manufacturing industry are important for spillover to occur. As the literature emphasises, systemic interactions among agents arise from networks and linkages created – with common ones being vertical and horizontal linkages. Other forms of networks and linkages include informal contracts, membership in formal and informal associations and collaborations. Mytelka and Fulvia (2000), Saxenian (1991), Best (2001) and Rasiah (2003) offered detailed discussions on the importance of clustering and networking in promoting new product development, spurring diffusion of new technologies by facilitating information exchange and joint problem solving between firms in an industry and sometimes in different industries.

Proposition 2c: *The presence of interactions between locally owned firms and MNCs increases the probability of technological spillovers.*

2.6.2.4 Firm Size–Scale Factor

There exists a long debate in industrial organisation on importance of size on firms' competitiveness and now on spillover occurrence. Studies conducted argue that firms achieve competitiveness once they attain a certain minimum efficiency scale (MES). MES is the lowest level of output where the minimum average cost (MAC) is required to exhaust scale economies in manufacturing [Scherer, (1973: 1980: 1991); Pratten, 1971]. MES tends to vary with industries. Large and heavy industries, such as steel and metal industry, manufacturing things like trains and locomotion, aeroplanes, automobiles or ship building are characterised by high scale economies. In such cases a high MSE unit production is required if low unit costs are to be achieved.

To a large extent, big firms may be at an advantageous position in terms of spillover occurrence primarily on account of their ability to mobilise productive resources and other services³⁵ that are either external or internal to a firm. As an example, there might exist some kind of market segmentation that favours large firms in that only firms above a certain size are able to have access to certain skills, information and credit facilities needed to be competent. Due to their large size, large firms can have more specialised manpower obtained from sustained training while on-the-job or externally including abroad. Large firms often have formal information gathering systems, spend much time and resources to identify and use important external sources of scientific and technological expertise. Large firms usually have more networks with individuals and institutions that provide training, technical information and technical services, which are important inputs in the technological capability acquisition process. The networks enable exchange and diffusion of useful information, skill and technologies. When it comes to financing for capability development, capital market imperfections confer an advantage on large firms in securing finance for technological activities. Availability of capital means more resources to engage in systemic research, labour training and a greater need for structured information gathering. It could also be due to sectoral distribution of activities that due to economies of specialisation only large firms could reach efficient levels of technological capability. In a study of enterprise development in Kenya's manufacturing industry based on probit analysis it was observed that the probability of an enterprise to attain a searching level in acquisition of foreign technology was influenced by firms' specific characteristics which included *firm size* (Department of Economics 1994).

To the contrary, not all industries require high MSE unit production. In many cases scope rather than scale is important. For instance, in industries dealing with plastic components or small-batch machine tools, it is scope that is important but not the scale (Piore and Sabel, 1984; Rasiah, 1995). It should also be emphasised that information technology has continued to play a contributory role in making small size very efficient following the increased decomposition and dispersal of production. Several empirical studies now exist which dispel arguments supporting the significance of large size in efficiency and innovative activities [Audretsch and Zoltan, 1991; Audretsch, (1995:2002)]. Nonetheless, when small firms make no effort to improve their technological capabilities due to over reliance on labour intensive technologies, the result is weak absorptive capacity, low spillover occurrence, reduced learning and innovation. This point is further supported by the fact that small firms are sometimes characterised by low levels of output sales, which might be inadequate to spread over the costs of learning and capability building e.g. research and development. Small firms often lack time or

³⁵ This is a result of economies of scale that are most often associated with the scale or out of establishment or with the size of firms.

resources to identify and use important external sources of scientific and technological expertise. In light of the above controversy over the influence of firm size in economic performance and the arguments purported by the proponents of industrial organisation over differences in MSE in different industries, we propose size will have a neutral impact in determining spillover occurrence. The influence of size can be determined by considering employment level in the firm. The value of output can be taken as an alternative measure of size, however, information about employment is more preferred as it is readily available and is often considered by firm officials (managers) to be less confidential.

Proposition 2d: *Occurrence of spillovers may or may not increase with firm size; spillovers occurrence may be more in small firms as well.*

2.6.2.5 Firm Ownership Structure: Ethnic Origin of Owners and Foreign Equity Participation

(a) Ethnic Origin of Owners

Firms in the Kenyan manufacturing industry can be broadly classified into three categories on the basis of ethnic originality of the firms' owners. The first category of firms belongs to firms of Africans of Kenyan origin, the second one is that of firms owned by Kenyan Asians and finally firms owned by people from all other nationalities. Firms owned by the Kenyans of African origin are the majority and easily distinguishable, as they have greatly remained SMEs in nature. The Asian firms are large and involve heavy manufacturing particularly in engineering works and textile. Firms owned by people from other nationalities are equally large and more dynamic than perhaps all other categories; such include Europeans, USA, and Middle East. This category of firms has also made heavy capital investment surpassing that of Kenyan Asians and is a large employer.

We note that compared to the other two categories, the local African firms have been disadvantaged. They have invested in less physical capital, employ less skilled people, hardly perform R&D and thus their technological capability and absorption capacity has largely remained rather weak. This is surprising since these kinds of firms received enormous support and protection at the early days of Kenya's industrialisation after her independence in 1963. As will be shown in Chapter 3, in the initial days of Kenya's industrialisation most of the industries were protected and foreigners were not allowed to make investment in certain industries. The government launched a strong campaign to support and promote entrepreneurship owned and managed by indigenous Africans through provision of finances and advisory services, necessary for expansion, modernization or rehabilitations of existing enterprises. This famous campaign was referred to as the *Kenyanisation programme* or *Africanising Kenya's Commerce and Industry*. The scarcity of private domestic saving's, management talent and entrepreneurial experience, especially among Africans, meant that if Kenyanisation was left to natural forces in the private sector, it would proceed slowly indeed (Leys, 1975; Coughlin, 1988; Himbara, 1994). The Kenya government thus introduced a wide range of business support institutions to provide financial assistance, technical and managerial services for faster industrialization, technology acquisition and development. Other examples of essential services included training on planning and implementation of projects, provision of extension services to solve technical problems and to offer training on management and marketing skills. Operational premises were also offered to the indigenous Africans at reduced rents.

Despite all these institutional and structural support, most indigenous African firms still remained small, medium and sometimes micro in size. It is argued that since the other categories of firms could not qualify for financial and credit support from the existing financial and credit support institutions, they worked very hard and utilised other sources of financial as well as technological resources. This was thought to be more so especially with the Kenyan Asians who began with minor investments and in light industries but have been able to accumulate technological capabilities over time in comparison to Africans of Kenyan origin. This classification therefore points to an interesting and an existing case that is likely to influence spillover occurrence into the Kenyan firms. We therefore formulate the proposition that occurrence of spillovers is likely to be dependent on ethnic origin of owners: Kenyan African, Kenyan Asian or others if owned by individuals from other nationalities such Europeans and Americans.

(b) Foreign Equity Participation

One of the most important contributions by MNCs to the local firms is the formation of JVs. Although not all JVS are beneficial to the local firms, local enterprises in underdeveloped countries are motivated to form JVs in the hope that spillover benefits might follow such partnerships, for example access to efficient product and process techniques, access to management know-how, international marketing skills and so on. Aitken and Harrison (1999) used annual census data on over 4000 Venezuelan firms to measure the productivity effects of foreign ownership. The study found a positive relationship between foreign equity participation and plant performance. This implied that there were productivity gains, which could be attributed to foreign equity participation. In Kenya, JVs would be expected to behave in a similar manner to MNCs in that they invest in technology capacity, undertake more training and acquire technologies regularly compared to the domestic firms. In the Czech Republic, Djankov and Hoekman (1998) investigated the impact of foreign investment on the productivity performance of firms using information on Czech enterprises. He found out that JV firms invested significantly more in technology capacity than purely domestic firms did. A high proportion of workers in the JVs compared to that of purely domestic firms reported that they had undergone trainings of various kinds in the past two years. JVs also obtained new technologies more often than purely domestic firms. Purely domestic firms might have lacked the ability therefore to absorb the technologies introduced by foreign firms. Since this notion is likely to hold in the case of Kenyan firms, we shall therefore test the sub-proposition that occurrence of spillovers is dependent on foreign equity participation in the Kenyan firms. The foreign equity in Kenya will be determined by the share of foreign capital in the total capital outlay of a firm (JVs).

Proposition 2c: Occurrence of spillovers is dependent on ownership structure of the firms in Kenya.

- (a) Sub-proposition 2c: Occurrence of spillovers is dependent on ethnic origin of owners of the firms in Kenya.***
- (b) Sub-proposition 2c: Occurrence of spillovers is dependent on foreign equity participation in the Kenyan firms.***

2.6.2.6 Age of the Firm

To a large extent, the influence of age on the spillover occurrence is similar to that of size from the perspective of those who associate spillover occurrence with firm size as discussed above. We therefore hypothesise that firms with longer experience are considered to enjoy greater experiential and tacit knowledge and thus the older a firm is, the more the spillovers are likely to occur. In a period of time, large firms are expected to

improve their technical capability and thus efficiency than the small ones. This is supported by the fact that large firms enjoy economies of scale and thus have the resources to spread over learning, capability building and innovation initiatives. In a recent study on Kenyan manufacturing industry, Lundvall and Battese (2000) investigated whether technical efficiency is systematically related to the size and age of firms. They estimated a translog stochastic frontier production function using an unbalanced panel of 235 Kenyan firms in the four sectors – food, wood, textile and metal sectors. Firm size had a positive and significant effect in the wood and textile sectors while the age effect was less systematic, but was significant in all sectors, except textiles.

Linking the size and age of a firm, Jovanovic (1982) argued that firms increase in size as a result of a selection process, in which efficient firms grow and survive, while inefficient firms stagnate or exit the industry. He noted that since the process takes time, larger firms are therefore expected to be older. This would then mean that there exists a positive age spillover relationship. This would be expected based on a firm's accumulated stock of knowledge and experience over time, emanating from various kinds of learning processes undertaken in the firms as they imitate their competitors and MNCs, as they do R&D and search for information or simply as they conduct basic adoptions and incremental innovations. The accumulated stock of knowledge and experience over time amounts to absorptive capacity that is necessary if a firm is expected to recognise external knowledge in form of spillovers, absorb it and utilise it for productive purposes. To most firms in the Kenyan industry, the process of knowledge accumulation is slow; hence time becomes a crucial factor leading us to formulate the proposition that occurrence of spillovers increases with the age of a firm. The age of a firm will be determined in terms of absolute numbers – based on the year a firm was establishment in Kenya.

Proposition 2f: *Occurrence of spillovers increases with firm age; spillover occurrence tend to be more in old firms or in other words spillovers occurrence is function of years of experience.*

2.6.2.7 Industrial Specificity

Industrial specificity has a strong bearing on spillover occurrence, learning and technological capability building. To a large extent industries are as different as firms are. A high level of heterogeneity with significant differences in technological capabilities and capacities to undertake technological learning and absorption exist. This is more so to the extent that even technologies used by MNCs in various industrial sectors often differ widely in complexity. There is a wide array of literature in support of this fact. Take for instance the garments and automobile industries. According to Gerrefi (1999: 2002) framework of producer-buyer driven value chains, garments are categorised in terms of buyer-driven chains, while automobiles are characterised by producer-driven chains. However, in both industries there is increased use of technology and tacit knowledge. While garments have become high technology users, the auto parts have equally become more knowledge intensive. The auto parts industry is closely related to machinery and engineering industries and electronics assembly. This is a tremendous transformation from being labour intensive to knowledge intensive since 1980s (Rasiah, 1988; Ernst, 2000; Kraemer and Diedrick, 2003). Another notable characteristic is that changes in national and international policies over time have significant influences in different industries. In auto parts industry the nature of liberalisation measures pursued seem to erode technological capabilities developed through the import-substitution period. As a result, specialised suppliers of auto parts in some host countries have reduced significantly. Countries like South Africa, Mexico, Brazil, Philippines and Taiwan are

typical examples [Barnes and Lorenzen, 2003; Quadros, 2003; Ofreneo, 2003]. With regard to other industries like food processing and beverages, differences arise depending on the nature and characteristics of products processed. Products can vary from small-scale confectionery manufacture to high volume resource-dependent such as fruit and juice packing by MNC firms such as Del Monte and Chiquita. In these industries too, there is increased use of knowledge and technology. Detailed case studies by Mytelka (1999) and Mytelka and Farinelli (2000) have demonstrated that even traditional industries such as wine producing have become knowledge-intensive. From this debate, this thesis will examine the role industry specificity in spillover occurrence by using industry dummies as control variables in statistical analysis as well as elaborate case studies.

Proposition 2g: *The industrial specificities in Kenya have a strong bearing on spillover occurrence.*

2.6.2.8 Firm Performance

Another determinant of spillover occurrence into the Kenyan manufacturing industry is the level of firm's performance. By all standards, a firm in Kenya like in most other developing countries is able to performance well if it has developed a substantial amount of technological capability. Such a firm is characterised by high capacity utilisation, high output in terms of annual sales and thus profits. Such a firm in Kenya would be in a position to undertake dynamic strategies; perform basic R&D, recruit well-trained professionals like scientists and engineers, undertake human resources development and other enrichment programmes. This arguments are articulated in industrial organisation, which postulates that a firm's performance is a function of its own endowments, conduct and the systemic environment characterised by interactions among economic agents [Bain, 1968; Scherer, (1973, 1980)]. The direct implication of this is that a firm with high performance offers more room for learning, acquisition of tacit and experiential knowledge through performing. All these factors enhance the firm's absorptive capacity necessary for assimilation and exploitation of spillovers. Quite often, a high performing firm is also be deemed as competitive. As noted in the spillover literature, competition is one of the important elements that influences spillover occurrence. When locally owned firms have the capacity to offer strong competition to MNCs, this prompts the MNCs to constantly change their techniques by transferring more of their recent technologies, which are in turn imitated by the domestic firms demonstrating some kind of vicious cycle. We would therefore hypothesise that spillover occurrence in Kenya tends to increase with a firm's performance [the performance can be proxied by firm's output; capacity utilisation; annual sales and annual profits].

Proposition 2h: *In a technically underdeveloped country like Kenya, firm's performance increases the probability of spillover occurrence.*

2.6.2.9 Firm Strategy

Another factor that is likely to influence spillover occurrence is firm strategy. Some examples of firm strategies include process modernisation to enhance efficiency and flexibility of the firm, diversification into new products, capturing new markets including exports. Others include lowering of overhead costs, scale expansion and quality improvement – i.e. through achievement of HACCP, ISO 9000 or ISO 14000 certifications. A firm may also have a strong strategy to broaden its knowledge base. This may take place through conducting R&D or human resources development by adopting a training strategy in vocational, technical or professional education aimed at improving

skills to the technicians, equipment maintenance and other skilled workers. The direct implication of this is that a firm with a demonstrated strong path dependence leading towards absorption capacity accumulation would result in spillover occurrence to the locally owned firms. To the contrary, a firm locked into old habits and techniques with limited or no learning; is not likely to assimilate any spillovers. Other strategy adopted by firms included continued importation or reliance of foreign knowledge and technology depicting foreign technology dependency discussed earlier. Consequently, we hypothesise that in Kenya, the strategy adopted by a firm influences spillover occurrence.

Proposition 2i: A firm's strategy in Kenya influences the probability of spillover occurrence; e.g. a firm with a strong training policy is likely to increase the probability of spillover occurrence.

2.6.2.10 Trade Orientation

Trade orientation is another factor widely believed to influence the technological spillover process. In this thesis, trade orientation at the level of a firm will be considered in terms of export and import participation. Exports are likely to result in spillovers in two ways. First, when MNCs in a host country export, and second, when locally owned firms begin to participate in export. To a locally owned firm producing for the domestic market, participation in export market would imply adding sunk costs looking for new global markets, establishing international distribution linkages and networks as well as establishing overseas transport infrastructure. More time and increased effort would be required to understand the global regulatory framework and continuously learn the constantly changing consumers' tastes and preferences internationally. We hypothesise that locally owned firms are likely to benefit from MNCs existing stock of knowledge on international market and hence enable them to become exporters. This shortens their process, which would have inadvertently been longer for the locally owned firms. This would take place if the MNCs in the host country produce for export market – this is often the case in developing countries. In such cases, MNCs will already have an existing export networks abroad supported by established transport infrastructure internationally. Locally owned firms can benefit from the 'export information externalities' through collaboration or more likely demonstration and penetrate the export markets. The MNCs' knowledge of international market could spill over to the locally owned firms through the MNCs' export activity. Through demonstration effects, the domestic firms can learn or imitate the techniques (processing, production, marketing, networks, managerial or organisational) from MNCs, which would in turn enable them participate in the international export market.

The arguments are supported by the assimilation literature based on the East Asian miracle. That exports contributed tremendously to development of technology capability building as a result of international spillovers occurring from interactions with MNCs as well as sophisticated foreign clients abroad [Dahlman and Westphal, 1982; Westphal, Kim and Dahlman, (1985: pp. 137-50); Westphal, 1990; Lall, 1990; Rasiah, (1995: 2004)]. Aitken, Hanson and Harrison (1997) used Mexico to estimate the effect of export activity by MNCs in the industry and region. Export activities of MNCs in a sector had positive effects on the probability of whether a firm in the same sector, either foreign or domestic was an exporter. Similar results were observed for Uruguay using cross-sectional firm level data (Kokko, Zejan and Tansini, 2001). The same phenomenon was observed from studies conducted in developed countries, where locally owned firms were also shown to have benefited from 'export information externality' or demonstration effect from MNCs – examples include Greenaway, Sousa and Wakelin (2004) for UK and Barrios, Gorg and Strobl (2003) for Spain.

In the second case, participation in the export market is anticipated to stimulate a dynamic learning process in several ways. First, by introducing pressure to compete in international markets the locally owned firms are made to pay attention to the global tastes and preferences and thus by doing so maintain world standards. We can refer to this as learning by exporting. Secondly, participation in the export market forces locally owned firms to increase their technological effort in order to continuously learn and master techniques required in maintaining international competitiveness at the world market. As a result of the two factors, the locally owned firm learns and accumulates technological capability. Its innovative as well as absorptive capacity are enhanced and thus its assimilation of knowledge spillovers. Even at the local level the competition for foreign market based on the host country's available resources by the MNCs and locally owned firms stimulates domestic firms to learn and improve on their export performance. Export orientation is believed to relax the market size constraint, which means more MNCs and new locally owned firms can enter. The larger the number of firms the larger will be the spillover effects be as argued by the postulates of agglomeration economies.

Importation by a firm is also believed to have a positive relationship with spillover occurrence to the firm. This means that high spillover occurrence would be expected in locally owned firms that import than in those that do not import. The argument in support of this is that through imports, a firm is likely to increase its level of knowledge and technology particularly when imports are sourced from countries with frontier R&D and innovative capabilities. This would result in accumulation of absorption capacity necessary to assimilate spillovers. Imports of new capital and intermediate goods are viewed as some of the main channels for international transfer of knowledge, technology and innovation. In this regard countries that participate in imports benefit the foreign technologies (Coe, Helpman and Hoffmaister, 1995). The proponents of international trade have elaborated this in detail (see Posner, 1961; Vernon, 1966; Romer, 1990; Grossman and Helpman, 1995). By importing, the firm learns through imitation, becomes innovative and at the same time builds absorptive capacity necessary to absorb spillovers from the MNCs. The argument is founded on the view that knowledge is embodied in international trade. Following the discussion above, we therefore set the following hypothesis for our testing:

Proposition 2j: *A firm's trade orientation in Kenya influences spillover occurrence.*

- (a) **Sub-proposition 2j:** *Exporting activities by the locally owned firms in Kenya influences spillovers occurrence positively.*
- (b) **Sub-proposition 2j:** *Importing activities by locally owned firms in Kenya influences spillover occurrence positively.*

2.6.2.11 Labour Market Conditions

Labour market conditions often influence spillovers occurrence and thus learning, capability building and innovation. When analysing labour market conditions the most common factors examined include wages and affiliation to trade unions. Related studies examining the role of labour market conditions indicate that good labour conditions can positively contribute towards industrialisation by stimulating competitiveness [Sabel, 1989; Sabel and Piore, 1984; Zeitlin, 1989; Sengenberger and Zeitlin, 1991; Wilkinson and You, 1995]. The same studies have shown the converse to be also true involving low road to industrialisation when good labour market conditions are not observed. In the

current context, we argue that when a firm observes good labour market conditions it is bound to pay high salaries and wages, offers fringe benefits, provides staff with human resources training opportunities including enrichment programmes etc. In such cases, however, the workers morale is motivated reducing their willingness to leave their jobs. Hence the premium paid involving professionals, skilled and technical workers translates into reduced spillover occurrence, which would inadvertently occur through mobility of such workers³⁶. Contrary to the above, if the labour market conditions are just fair, uncertain or even bad, then the mobility of workers is bound to be high and so would be the accompanying technology spillovers. Given that the two industries considered are believed to observe good labour market conditions, it is predicted that good labour market conditions will affect the spillover occurrence negatively following the reasons advanced above. Wages will be used to represent labour market conditions.

Proposition 2k: Good labour market conditions influences spillover occurrence negatively in Kenya.

2.6.2.12 *Influence of Spillover on Technological Innovations at the Enterprise Level*

We begin this section by looking at innovation from the perspective of a technically underdeveloped country. Quite often when talking about innovation there is a tendency to identify and define technological innovation with major, radical innovations or “Schumpeterian breakthroughs³⁷” associated with activities undertaken by firms at the technology frontier. Almost all the radical innovations take place in technologically advanced countries and are characterised by major contributions to the existing stock of knowledge, organisational changes and behavioural patterns.

Although much of what we therefore know in the innovation literature seems to have been derived principally from technologically advanced countries, this should not be construed to reflect absence of innovation in the underdeveloped country industries. This has only to do with how innovation was initially conceptualised, in actual fact, even the most technologically backward countries within the underdeveloped countries have their own kinds of innovations only that their nature may differ substantially from innovations taking place in the advanced countries. Technological innovations taking place in underdeveloped countries do not constitute any landmark changes, which may be deemed as revolutionary in the world. The reason is simple, that they do not result in vast increment to the existing stock of knowledge or productivity in the industries. This is however expected given that firms in underdeveloped country industries have not yet accumulated enough and adequate, and perhaps necessary resources to facilitate occurrence of such breakthrough innovations. In the same vein, this argument helps explain the wide difference between the nature of innovation trajectories followed by the advanced countries and those followed by the rest of the countries.

As emphasised elsewhere in this study, innovation is now recognised in a systemic perspective with many users and producers of innovations. It's a dynamic and interactive process characterised by many interactions among firms and with many feedbacks involved at all levels of the production chain. Going by this notion, we would expect that

³⁶ Note that good labour conditions could also imply positive impact of spillovers on firms' capabilities.

³⁷ Early work by Schumpeter inspired a whole generation of economists. It should be pointed out that while his early work emphasised the importance of the individual entrepreneur as innovator, Schumpeter points to the big firms and their R&D laboratories as the source of innovation in his later contributions [Schumpeter, (1934: 1952)]. The term “Schumpeterian breakthroughs” is therefore used to reflect major innovation that comes from R&D laboratories of large firms in advanced countries.

MNCs located in the industries of technically underdeveloped countries are participants in the innovation process and with a possible influence on innovation at the enterprises. In line with our study, we believe that in a country like Kenya, where domestic firms are not technically advanced, presence of MNCs is likely to influence innovation in the domestic firms through, competitive pressure compelling them to change, linkages, labour mobility and others.

In a study done by Rasiah (1995) on Malaysian Machine tool industry using a framework based on linkages, from the angle of local firms, revealed significant influence of MNCs on the local firms innovation and learning. The process took place systematically in defined stages; first MNCs subcontracted parts fabrication with particular specifications. This gave local firms the opportunity to have their fabrication technology improved through constant monitoring by MNCs. In the second stage, MNCs monitored vendor's workshops in the early stages of production sometimes by stationing its engineers in vendor firms. Third, MNCs introduced a significant amount of innovation into adaptive engineering techniques employed to modify and restructure machines. Such modifications and innovations were pertinent as the MNCs tailor them to respective flexible production requirements. Local firms began to depict significant signs of flexible specialisation. Fourth, the local firms were able to establish export contacts abroad with sister plants of the MNCs and finally, the local firms were able to take orders from independent firms (for an elaborate discussion on this see Rasiah, 1995; pp 167-74).

We shall therefore propose that occurrence of spillovers in the Kenyan industry is likely to increase the probability of technological innovation and learning. Here we regard innovation as changes firms have made in their own capacity or in response to competition from competing firms. They include new products they have introduced; more attention to feedback from clients; new processes that are more efficient, better quality control; reduced costs through energy or material usage; training of workers; linkage to local research institutions or production centers. The nature of innovation undertaken in developing countries, as we have discussed before, differs greatly from that of advanced countries as it mainly involves technological improvement on products or processes that lead to a fall in manufacturing time, reduction production and operation costs and increase in production and quality. Assessment of spillover influence will be assessed qualitatively from the case studies in Chapter 6 and 7.

Proposition 2I: *Occurrence of spillovers stimulates further technological innovations at the enterprise level in the Kenyan industry³⁸.*

2.7 Research Design and Methodological Setting

To test the above set hypotheses, this study was designed in four stages. In the *first stage* available aggregate and firm-level data was collected from official secondary sources for empirical analysis. The purpose of the first stage was to provide first hand information on spillover analysis in the Kenyan manufacturing industry. With this data, it was possible to understand certain dynamics and industry characteristics in the manufacturing industry. Similarly, it was also possible to identify sectors with high levels of MNCs and their activities. It was possible to determine whether the MNCs outperformed domestic firms in Kenya and if so in which sectors and on what fronts. The role played by MNCs

³⁸ This hypothesis might appear true by the definition of spillover index; however emphasis is paid to further innovations undertaken by Kenyan enterprises as a result of initial spillover occurrence.

in domestic firms' performance could as well be estimated at the level of the entire industry. Finally, it was also possible to empirically determine whether MNCs had any influence of broad capability formation in the firms in Kenya. This was done by use of panel data to investigate the impact of foreign presence on local firms' productivity. However, as discussed widely, use of empirical data and linear models in spillover analysis has its own limitations. It was therefore necessary to get behind the empirical analysis and attempt to investigate what happens in the firms by a way of conducting interviews. This formed the basis of the second stage.

In the *second stage* we therefore conducted a firm level survey. Since, secondary data was insufficient for the objectives set and hypotheses outlined, we resorted to firm level data collection mainly through face-to-face interviews. A pilot study was conducted before the actual survey, to pre-test the questionnaire design. This involved a practical field-test on the questionnaire by conducting face-to-face interviews with respondents in about five cases within the target sectors. This helped to detect and remedy in advance problems and other shortcomings that were likely to troubleshoot in the course of doing the actual survey. Qualitative approach was used to analyse mainly data and information gathered from firm interviews. These data was mainly in form of words as opposed to statistical numbers. The qualitative data was coded putting it into conceptual categories and create specific themes or concepts which enabled the analysis to be undertaken. Given the difficulties involved in qualitative data coding, the process was begun once data collection commenced.

The *third stage* involved case study approach. Based on the survey, several enterprises were selected for a deeper investigation in the form of case studies. The criterion for choosing firms for case studies was biased towards positive information obtained in the survey regarding technological spillovers and other important issues within the framework of this study's focus. These are discussed in detail in the case study chapters. The case study involved face-to-face interviews with production managers, scientists & engineers using semi-structured questionnaires comprising both closed and open questions. The production managers and engineers provided information on technology while general managers provided information on how current government policies in Kenya influence company's decisions and strategies. Where possible, open discussions were held with other staff and a tour of the firms' plants was undertaken to acquaint with techniques in use. Methods used in case study analysis included comparative analysis as well as case and synthesis analysis.

The role of institutions and systemic influences was equally assessed in the spillover occurrence process. Thus in the *final stage*, a few institutions were selected from business associations, government departments and institutions – R&D, academic as well as financial institutions. The information was obtained through interviews and discussions held with personalities deemed knowledgeable mainly in investment, industry, innovation, privatisation and FDI. These personalities included government officials, professionals and academic scholars. Institutions included investment promotion council (IPC); Kenya Industrial Training Institute (KITI); Kenya Industrial Estates (KIE); Industrial and Commercial Development Corporation (ICDC); Kenya Bureau of Standards (KEBS); Kenya Industrial Property Office (KIPO); National Council for Science and Technology (NCST) etc. See Table 2.3 for the whole list of institutions and number of interviews conducted.

Table 2.3 List of Institutions and Number of Interviews Conducted, Kenya

Institutions and Business Associations	No of Interviews Conducted
(1) Policy Makers	
<i>Economic Policy</i>	
Ministry of Finance (MoF)	Several
Ministry of Planning and National Development (MPND)	Several
Ministry of Trade and Industry (MTI)	1
Export Processing Zone Authority (EPZA)	2
Export Promotion Center (EPC)	1
Investment Promotion Council (IPC)	2
<i>Technology Policy</i>	
Ministry of Education, Science and Technology (MEST)	1
National Council for Science and Technology (NSCT)	1
<i>Competition Policy</i>	
The Monopolies and Prices Commission	1
(2) Industrial Development	
Kenya Bureau of Standards (KEBS)	2
Kenya Industrial Research Institute (KIRDI)	1
They include Kenya Industrial Training Institute (KITI)	1
(3) Business Associations	
Kenya Association of Manufacturers (KAM)	2
Fresh Produce Exporters Association of Kenya (FPEAK)	1
Kenya National Chamber of Commerce and Industry (KNCCI)	1
(4) Industrial Development (Financing)	
Industrial Development Bank (IDB)	2
I.C.D.C	1
Development Bank of Kenya (DBK)	1
Kenya Industrial Estates (KIE)	1
(5) Other Scientific and Research Institutions	
IPAR, ECEG, ATPS, IDS	At least 1 each
University of Nairobi & Colleges	several
Kenya Institute of Public Policy and Research Analysis	2

2.8 Summary and Conclusion

The purpose of this chapter was to provide an analysis of technological spillover literature and develop a theoretical framework for guiding the implementation of this study. A critical assessment of both theoretical and empirical literature on FDI and technological spillovers was presented. The analysis of the literature revealed that most of the past work relied on productivity models based on the theories of production function. It was also observed that although estimation techniques had evolved significantly since the pioneering work, the results of spillover occurrence and their impact remained inconclusive. While one side of the literature based on productivity approach produced evidence supporting spillover occurrence, the other side produced contradictory evidence that showed lack of spillovers from FDI. As observed, the differences in the results obtained could be attributed to many things ranging from methodologies employed, firm differences, industry variations to country specificities.

This chapter discussed in detail the weaknesses of earlier approaches, mainly productivity techniques in spillover analysis. On the basis of the emerging issues and following developments in the endogenous and evolutionary literature, an alternative framework was suggested. Technological spillovers were viewed as complex in nature, uncertain, imperfectly understood and thus required an equally complex approach. An endogenous, evolutionary and institutional approach that views enterprises as embedded in dynamically changing economic and social-economic-institutional networks would be required. Hence, in addition to the spillover literature, two strands of theoretical literature from which this study drew much insight were adopted. The first one was cluster and network dynamics. The second one was the literature on technological innovations which particularly emphasises the importance of NSI in the spillovers process.

This thesis seeks to examine production spillovers from foreign firms to local firms by conceptualising the process in terms of learning, capability building and innovation. An integrated spillover index was developed which was taken as the measure of technological spillovers. This index was then used in quantitative analysis of spillovers including determinants of spillover occurrence. Based on the determinants identified using this framework, several hypotheses were identified for our investigation. The hypotheses formulated sought to determine the influence of certain parameters on the spillover process. We shall test the hypotheses using the framework set, survey and case study approach with a few firms and institutions. The subsequent chapters of this study will present detailed analytical chapters mainly based on empirical analysis and later backed by several case studies.

Chapter Three

MANUFACTURING INDUSTRY AND FOREIGN DIRECT INVESTMENT IN KENYA: ORIGIN AND INSTITUTIONAL SETTING

3.1 Introduction

In Chapter 2 we presented a critical analysis of FDI and spillover literature. An alternative theoretical framework was presented on which an analytical framework was developed to guide this study. The purpose of this chapter is to motivate our study by putting FDI analysis into context through a critical examination of their origin and their industrial effect focusing on spillover occurrence, industrial capability development and performance. Given the importance of institutions in FDI and industrial capability development, their role will be equally examined in this chapter. Similarly, since industrial policies pursued in Kenya are believed to have had significant influence on FDI including FDI's role in manufacturing industry; analysis undertaken in this chapter will therefore take such policies into consideration. Further, Kenyan manufacturing industry has a long history that dates back to the colonial days and industrial policies pursued from that period are believed to have largely determined the existing structure of manufacturing in the country. As will be shown in this chapter, manufacturing in Kenya started with establishment of a few manufacturing industries during the colonial era, which were all foreign owned located mainly in agro-based industries performing simple and basic manufacturing activities characterised by limited value added. As a result of foreign capital investment in manufacturing received from Britain during this period, colonial period, it is claimed that Kenyan manufacturing enjoyed an early colonial manufacturing experience from British firms. In addition, the country continued to enjoy most of the infrastructure³⁹ and a vast of revenue earning primary sectors (such as tea, sisal and coffee estates) all developed in that period. In light of these early developments and subsequent changes with time, a historical backdrop coupled with institutional analysis become relevant if we are to understand origin of FDI and its perceived impact on industrial development.

Similarly, institutions created and FDI policies adopted after independence are believed to have had tremendous influence on FDI and their effect in manufacturing. For example, at independence; institutions erected and policies enacted helped attract more foreign investment, mainly European, into the country. Since then, a relatively large FDI stock has been accumulated in Kenya's manufacturing. Due to their participation in manufacturing after independence; i.e. capital investment, contribution in exports, value added, employment and revenue generation to the economy etc the country is over time believed to have benefited tremendous manufacturing experience in the form of technological spillovers from the foreign investments. This is more so with the facilitation and coordination role undertaken by institutions established. The direct consequence of this is that FDI plays a positive role in industrial capability development. However, this is still a contentious issue since to date no concrete studies on FDI have

³⁹ A good example under transport and communication is the Uganda railway line, which was constructed in the period 1895-1901. A few other internal railway lines were built thereafter in the country but primarily designed to serve the interests of the European settlers. The first roads were built during this period e.g. the Mombasa - Kisumu road completed in 1896. The first air transport was also introduced with the first aeroplane imported into the country in 1925. Postal and telephone services were introduced in the same period; 1900 and 1908 respectively. Another important facility developed during this period was the Mombasa port facility.

been conducted in the country to confirm technological spillovers, their form, and mode of occurrence or perceived impact on domestic firms. This notwithstanding, the role of supporting institutions in FDI, spillover and industrial capability development has not been critically addressed either. As discussed in Chapter 2, occurrence of technological spillovers in the industry can be a complex phenomena due to their tacit and non-codifiable nature, takes place through interactions between domestic firms, FDI and host country institutions⁴⁰. Institutions in this context are taken as outlined in Chapter 2, as organisations – economic agents whose systemic embeddedness in the NSI stimulates spillovers occurrence, firms' technological capability, innovation and performance. Consequently, this chapter will address the following issues:

- Examine how the industrial policies pursued, over time, influenced FDI in Kenya's manufacturing industry.
- Examine broadly the role of FDI in Kenya's industrialisation process by investigating spillover occurrence and their consequences on industrial capability development and performance.
- Examine the role of institutions established, over time, in supporting industrialisation with regard to FDI, spillover occurrence, capability development and performance.

This chapter is divided into five sections. Section 3.2 presents a brief overview on Kenya's history, population and economy at a glance. In section 3.3, we address the industrial policies and FDI. The section examines the origin and institutional setting. This is done in four sub-sections. *First one* is during the colonial period. *Second one* is during the early decades of import substitution. *Third one* is during the structural adjustments period. The *fourth one* is during the recent period concentrating on recent performance and effort towards industrialisation. In the last section, 3.4, we present the summary and conclusion.

3.2 Kenya: A Brief Overview

History and Political Situation

The Kenyan history spans over many centuries ago. However, given that this study focuses on FDI, we will not delve much into the history but it is important to mention something briefly about early foreigners into the country. According to the Kenyan history, Arab traders were among the first foreigners to establish their settlement along the Kenyan coast. However, in the 16th and 17th Centuries the Portuguese people also arrived at the Kenyan coast and gradually established a stronghold there until 1700, when Kenya became a British protectorate. In the 18th Century, Kenya saw an influx of explorers and Christian missionaries followed by European settlers. The country gained independence in 1963 and became a republic in 1964 under one political party, Kenya African Nation Union (KANU). Kenya remained a one party state until 1992 when elections were held for the first time under a multiparty system.

Physical Geography

Kenya is a relatively big country with a total land area of 580.4 KM². It shares a border with Ethiopia, Somalia, Sudan, Tanzania and Uganda (see Map 3.1 for more details). The country is well endowed with a broad range of natural resources, flora and fauna, and arable land. Kenyan highlands comprise the most successful agricultural production

⁴⁰ Even then a host of other factors must be present as discussed in Chapter 2 such absorptive capacity, strong human capital, supportive infrastructure and accompanying policies etc.

regions in East Africa. Its savanna is a home to thousands of wild animals, birds and snakes. The Great Rift Valley cuts through the country presenting one of the most magnificent geographical sceneries. The Kenyan Rift valley is a section of about 6,000 Km rift system which stretches from the Dead Sea in the Middle East, South through the Red Sea, Ethiopia, Kenya, Tanzania, Malawi and into Mozambique (see Map 3.1). The country shares Lake Victoria with other East African Countries. Also the country has long coastal line (with Indian Ocean) that stretches 536 Km, richly endowed with nice harbours and beaches that serve as a great attraction to the tourists.

Kenya has a tropical climate characterised by an average temperature of 23 degrees centigrade. The country has two rainy seasons spanning the periods April-May and October-November. The altitude ranges from sea level to 5,199 meters and thus produces a varied average daily temperature.

Population Development and Society

The Kenyan population was estimated at 31.3 million in 2002 with approximately 65% of the population living in the rural areas. More than 40 ethnic groups reside in Kenya with the principle ethnic groups being Kikuyu (22%), Luhya (14%), Luo (13%) and Kamba (11%). All other African groups accounted for 27%, while all non-Africans (Asian, European and Arab) accounted for a paltry 1%. The population annual growth rate, which used to be one of the highest in the world, above 3% until early 1990s, has now fallen below 2.5% since 2000. The life expectancy for males was 46 years in 2002 and that of females was 45 years (see Table 3.1 for details). Fertility in terms of number of births per woman also fell from 8.1 in 1970 to 4.2 in 2002. The mortality rate in terms of infants per 1,000 live births was 78 in 2002.

Table 3.1: Selected Population and Social Indicators for Kenya, 1970-2002

Indicator	1970	1975	1980	1985	1990	1995	2000	2001	2002
POPULATION									
Population, total (Mn)	11.5	13.7	16.6	19.9	23.4	26.7	30.1	30.7	31.3
Population growth (annual %)	3.4	3.7	4.2	3.5	3.0	2.6	2.3	2.1	2.0
Rural population (% of total population)	90	87	84	80	76	72	67	66	65
LIFE EXPECTANCY AT BIRTH (years)									
Both sexes	50	52	55	57	57	53	47	..	46
Females	52	55	57	59	59	53	47	..	46
Males	48	51	53	55	55	52	47	..	45
FERTILITY RATE (TOTAL)									
total births per woman	8.1	8.0	7.8	6.9	5.6	4.9	4.4	..	4.2
MORTALITY RATE									
Infant per 1,000 live births	96	..	73	..	63	73	77	..	78
LITERACY RATE (% aged 15 and above)									
Both sexes	41	48	56	64	71	77	82	83	84
Females	26	34	43	52	61	69	76	77	79
Males	56	63	70	76	81	85	89	89	90
SCHOOL ENROLLMENT (% Gross)									
Secondary both sexes	9	13	20	21	24	24	31	32	..
Secondary, females	5	9	16	16	21	22	29	30	..
Secondary, males	13	17	23	26	28	26	32	34	..
Tertiary both sexes	1.0	1.0	1.0	1.0	2.0	2.0	3.0	4.0	..
Tertiary, females	..	..	0.0	1.0	1.0	1.0	3.0	3.0	..
Tertiary, males	..	..	1.0	2.0	2.0	2.0	4.0	4.0	..

Source: World Development Indicators, WDI 2004; Central Bureau of Statistics

The proportion of Kenyans living in extreme conditions of poverty was high. According to the available poverty report, it was estimated that in 1997 the prevalence of poverty was 52.3% – people who could not achieve the minimum expenditure to acquire the basic food and non-food items⁴¹. Overall there was high poverty in the rural areas compared to the urban areas.

The adult literacy rate for people aged above 15 years has risen by more than twofold to stand at 84% in 2002 from low level of 41% witnessed in 1970. The literacy rate for males was notably higher at 90% compared to that of women at 79%. In 2001, secondary school enrolment for both sexes was 32% while tertiary enrolment for both sexes was 4%. Tertiary enrolment is lower than in most developing countries especially those in Asia, Thailand (37%), Malaysia (26%) and Indonesia (15%) (World Bank, 2004).

The Kenyan Economy at a Glance

Time series data on selected economic indicators is shown in Table 3.2. Although the GDP in constant US\$ continued to expand and had reached 10.1 billion by 2002, the GDP growth rate had declined steadily to an annual average rate of 1%. Ironically, the downward trend in economic growth seemed to have started moments after commencement of the structural adjustment programmes in the country. This point will be revisited at a later stage. The GDP per capital in constant prices was US\$ 322 qualifying the country as a low-income economy. According to the World Bank classification a country with less than US\$ 765 is classified as a low-income economy.

Most of the other economic indicators seemed to indicate a downward trend in economic performance compared to what was observed in 1970s and early 80s. With regard to value added, only services recorded an increase while industry and agriculture did not. Gross capital formation was also on a downward trend. Foreign direct investment as percentage of gross fixed capital formation depicted a mixed performance – erratic trend. This is discussed at a later stage.

As noted in Table 3.2, trade in goods also appeared to be on a downward trend. Although high-tech exports are on an upward trend, exports of goods and services seem to have declined. Kenya is a main exporter of agricultural commodities such as coffee, tea and horticultural products. Kenya also exports textile and garments mainly to USA under AGOA program. Its main imports include primary industrial inputs which include crude petroleum and refined petroleum products, industrial machinery and equipment, iron and steel, agricultural and transport machinery, fertilisers and pharmaceuticals.

The number of fixed line and mobile phone subscribers per 1,000 people was approximately 52 while those with telephone main lines were approximately 10. However, while in the case of mobile phones the number of subscribers is on the increase that of telephone lines seems to have stagnated at 10 per 1,000 people. Similarly people with personal computers and Internet users per 1,000 people had increased substantially to about 6 and 13 respectively compared to the lower levels witnessed in the in the 1990s and before.

⁴¹ For more information see GOK, 1997 report on *poverty in Kenya, incidence and depth of poverty*. See also the PRSP papers in the World Bank site.

Map 3.1: Kenya, Provinces, Principal Cities and Neighbours

Source: <http://www.blissites.com/kenya/map.html>

Table 3.2: Selected Economic and Technology Indicators for Kenya, 1970-2002

Indicator	1970	1975	1980	1985	1990	1995	2000	2001	2002
ECONOMY									
GDP (constant 1995 US\$)	2.6	4.1	5.6	6.4	8.4	9.0	9.9	10.0	10.1
GDP (current US\$)	1.6	3.3	7.3	6.1	8.6	9.0	10.4	11.2	12.3
GDP growth (annual %)	..	..	6	4	4	4	0	1	1
GDP per capita (constant 1995 US\$)	226	301	337	320	358	339	328	325	322
Agriculture, value added (% of GDP)	33	34	33	33	29	31	20	19	16
Services, etc., value added (% of GDP)	47	46	47	48	52	53	62	63	65
Industry, value added (% of GDP)	20	20	21	19	19	16	19	18	19
Gross capital formation (% of GDP)	24	18	25	22	20	18	15	15	14
Inflation, consumer prices (annual %)	2.2	19.1	13.9	13.0	17.8	1.6	10.0	5.7	2.0
Official exchange rate (LCU per US\$, period average)	7.1	7.3	7.4	16.4	22.9	51.4	76.2	78.6	78.7
TRADE AND FINANCE									
Trade in goods (% of GDP)	47	48	46	39	38	54	47	46	44
Exports of goods and services (% of GDP)	30	30	28	25	26	33	26	26	27
Imports of goods and services (% of GDP)	31	35	39	26	31	39	36	36	30
High-technology exports (% of manufactured exports)	..	..	..	..	4	4	4	..	10
Foreign direct investment, net inflows (% of gross capital formation)	4.0	3.0	4.0	2.0	3.0	2.0	8.0	3.0	3.0
Total debt service (% of exports of goods and services)	..	15	21	39	35	30	19	16	14
TECHNOLOGY AND INFRASTRUCTURE									
Fixed line and mobile phone subscribers (per 1,000 people)	..	3.9	4.5	5.9	7.9	10.1	14.6	29.6	51.8
Telephone average cost of local call (US\$ per three minutes)	..	..	..	..	..	0.1	0.0	0.1	0.1
Telephone mainlines (per 1,000 people)	..	3.9	4.5	5.9	7.9	10.0	10.5	10.4	10.3
Personal computers (per 1,000 people)	..	..	..	..	0.4	0.7	4.9	5.6	6.4
Internet users (per 1,000 people)	..	..	..	..	..	0.0	3.3	6.4	12.5
Roads, paved (% of total roads)	..	..	..	..	12.8	13.8	12.1	..	..

Source: World Development Indicators, WDI 2004; Central Bureau of Statistics Kenya

3.3 Industrial Policy and FDI: Origin and Institutional Setting

Kenya's industrial policy can be classified into two main categories; the import substitution and the export orientation. As will be discussed in a moment, import substitution industrialisation, which was the main mode of industrialisation during the colonial days, continued to be encouraged until mid 1980s when it was gradually replaced with export-oriented industrialisation dawning the era of liberalisation measures also advocated as part of World Bank structural adjustment programme (SAPs). Given that import substitution was initiated in Kenya before her independence, an analysis of industrial policies in Kenya without a backdrop to import substitution policies pursued during the colonial period would be incomplete. This is more so because as noted earlier, the mode of industrialisation pursued influenced during this period the inflow and kind of FDI as well as facilitating institutions including those established to support industrialisation. This section therefore starts by examining, albeit briefly, the industrial policies that existed before Kenya's independence, during the colonial days and their influence on FDI and broad industrial capability development. Since industrial policies followed after independence kept changing at different time periods, this would have direct and/or indirect consequences on FDI and hence their effects in manufacturing industry. Consequently, for a comprehensive examination of industrial policies pursued

and their influence on FDI, our analysis will be done in three distinct phases. The early decades of import substitution will be examined first followed by the era of structural adjustments and liberalisation and export promotion, and finally the recent performance and effort towards industrialisation in Kenya.

3.3.1 Pre-Independence: The Colonial Period

The history of Kenyan manufacturing industry dates back to the colonial period from which the existing manufacturing characteristics including those depicted by FDI are likely to have taken their bearing. To appreciate this observation, an examination of industrial policies during the entire colonial period, would have to be examined, albeit briefly, alongside various modes of capital investment with particular emphasis to the kind of manufacturing industries established and their ownership structure. Thus this analysis is presented in two phases: the period before 1945 and the period 1945-63. The choice of the two time periods is not arbitrary. The period before 1945 can be regarded as the pre-war period (i.e. First and Second World War) while the period after 1945 can be considered as the post war period. The period 1945-63 differs significantly from the period before 1945 in that in the period 1945-63 there was a radical transformation towards industrial development in the British colonies. In the later period, Britain encouraged its MNCs to invest in Kenya – as it did in its other colonies. Thus while the former period was characterised by little industrial development activity, the latter period was marked by an improved effort to promote manufacturing industry in Kenya with significant participation by British MNCs.

(i) The Period Before 1945

Kenya was founded as a British colony in 1890s and converted into a Crown colony in 1920. Existing literature on colonial history reiterates that several factors induced the formation of colonies in the nineteenth and twentieth centuries. First, the rush for colonial expansion during this period was to develop and control sources of strategic primary goods, raw materials and foodstuffs. Second, it was assumed that by controlling the activities undertaken in the colonies, the colonial territories would provide an export market 'protected markets' for the colonial manufactured products. As a British colony, Kenya's role was reduced to that of raw material production to supply the British manufacturing industries. It was also clear that Kenya would serve as a growing market for British manufactured products – once these products are manufactured in Britain they would then be exported back to the Kenyan market including those of other British colonies in the region⁴². This had a negative implication in that it would not stimulate strong domestic manufacturing capability development.

In order to achieve the colonial objectives, several things were put in place; first, the British government provided funds for infrastructure development, which included roads and railway to facilitate transportation of primary goods – food crops and raw materials from the mainland. The funds availed facilitated the building of the Kenya Uganda railway in the period (1895-1901). Port facilities were also developed and export-import warehouses established to facilitate export of primary goods and import of consumer goods. Second, the British government encouraged European settlers to settle in Kenya and participate in commercial agriculture directed towards exporting. The commercial agricultural activities were undertaken in the so-called 'white highlands' in Kenya with

⁴² As noted in Jorgensen (1975), the incorporation of the Kenyan economy into the international capitalist system under the aegis of British commercial interests consigned Kenya to the role of raw materials supplier to the British industry.

labour supplied by indigenous Africans (Pearson, 1969). Since commercial agriculture turned out to be the main mode through which raw materials were generated and exported to Britain, the European settlement was further encouraged in 1920 when Kenya was declared a Crown colony in 1920 making the number of European settlers in early 1920s reach about 20,000. Formation of a Crown colony in 1920 was the official sanctioning of settler dominance in Kenya (Swainson, 1980: pp. 5-6; 21-6). Examples of major MNCs from UK, which made their investment during this period, included James Finlay (1924) in tea production; Brooke Bond (1924) in tea and coffee production; Mitchell Cotts (1936) in sisal production [Kaplinsky, 1978; Swainson, 1978: pp. 50-2; 1980: pp. 63-5 – see Table 3.3]. By participating in raw material generation, the European settlers would enable the British government to recover the costs incurred in the construction of the Kenya-Uganda railway line. Finally, in order to encourage and support production for exports by European settlers, import protection and export incentives were offered.

The effort by the settlers to have full control and dominate in all social and economic activities reflected a clear emerging pattern of de-indigenisation. Jorgensen (1975) offered a luminous illustration of how the de-indigenisation process of the Kenyan economy took place during the colonial days. He examined the role of MNCs in the de-indigenisation process using a three-level analytical framework that constituted structure of the economy, control over individual production and the distribution of firms, and the racial division of labour within firms. Jorgensen showed how Kenya entered into the vertical international division of labour during the colonial period by participating in international trade suited to the colonial masters. By so doing the "structure of the domestic economy was transformed to produce agricultural goods needed by the external economy and to import consumer goods and machinery from the external economy." De-indigenisation at the second level took place in the form of ownership of farms, firms and other commercial entities. Africans were not supposed to participate in either the interior or external trade with the rest of the world. These were left exclusively in the hands of non-indigenous Europeans and Asians⁴³. Africans were also denied control over units of production and over production itself. At the third level, division of labour within firms, Africans were forced to become labourers. Under pressure from European settlers, Jorgensen (1975) noted that the colonial regime relegated the African population to a subservient role as labourers meant to produce largely for export to satisfy needs of non-Africans. They were not allowed to participate in production of trade goods except peasant production of foodstuffs for consumption within their native reserves (Jorgensen, 1975: pp.143-155). Asians participated in production but were restricted to light small scale manufacturing, characterised by low capital and thus value added. The phrase below explains it all:

Europeans controlled the colonial administration apparatus, financial institutions, the larger import-export firms, shipping, mining (gold and soda ash), plantations, large farms, large scale food processing firms (breweries, bacon factories, co-operative creameries and canneries), and the larger commercial firms in urban areas. Asians controlled smaller import-export firms, most of the retail shops in cities and towns, financial institutions serving the Asian community, and small-scale manufacturing (aluminum pots, soap, vegetable oils, and sawmills). In addition, Asians filled most of the positions of artisans and clerks in European and Asian firms and in the colonial

⁴³ Note that Asians first arrived in Kenya in the mid of 1890s. History has it that in 1896, a group of 2000 coolies (unskilled labourers) and hundreds of stone masons, black smiths, draftsmen, clerks, carpenters and surveyors arrived in Kenya. They were all brought by the British government, 'colonial government' to participate in the construction of Kenya – Uganda railway line.

administration. Africans controlled petty trade, subsistence farming and subsistence pastoral agriculture within the Native reserves or worked as labourers for Europeans and Asians (Jorgensen, 1975: p. 147).

Based on the colonial setting laid out in Kenya, it is clear that from the outset of British colonial rule emerged as a policy of simple primary production without any substantive and immediate policies towards industrial development. Lack of an industrial policy demonstrated unwillingness and lack of effort by the British government towards the development of a manufacturing industry in Kenya. Hence the manufacturing remained nascent characterised by low technological capability development and thus low value added manufacturing activities. The existing policies were in favour of investment in commercial agriculture and a few mercantile activities strictly dominated by foreign and non-indigenous firms – Asians firms. Existing literature on Kenya's industrialisation explicitly articulates lack of political will from the British colony in support of manufacturing industry i.e. Swainson (1980) puts it that:

During this time it is not surprising that the colonial office were indifferent and often hostile to colonial attempts to develop manufacturing industry. The work of the so-called development agencies before 1939 illustrates the general unwillingness on the part of the British government to encourage colonial industries. The Empire Marketing Board, for instance, gave no assistance to any forms of manufacturing and colonial development advisory committee in theory placed no limit on its spheres of activity, but in practice it totally ignored the industrial sector (Swainson, 1980: p. 26).

Analysis done indicates that very few manufacturing industries were established in the early colonial days and most of the agricultural commodities (78%) were exported to Britain in their raw and unprocessed form (Vaitsos, 1991: p. 10). As Swainson (1980) frames it '... the settler bourgeoisie in Kenya was involved in a process of primitive accumulation of capital' (Swainson, 1980: p. 6). The processing was undertaken under strong tariff wall and trade policies that only allowed processing of a few agricultural commodities for local consumption. It is important to emphasise at this point that a few investments were also made outside the agro-based industries by subsidiaries of major MNCs to supply certain essential services and goods e.g. cement, salt, power and lighting (see Table 3.3 for more details). Such subsidiaries of British MNCs included; Magadi Soda Co LTD (1911) for the extraction of soda ash; East African Power and Lighting Co LTD (1922) for electrical power generation; Gailey and Roberts (1924) for import and distribution of agricultural machinery and East African Portland Cement (1933) for cement clinker grinding. Since imports were protected, generally no imports from other countries were allowed into the Kenyan market during this period as the source of external products remained United Kingdom to a large extent. As mentioned earlier, no strong manufacturing promotion would be encouraged since Kenya was supposed to serve as a protected market for the British manufactured goods and as such emergence of strong manufacturing firms was bound to create competition for the British manufactured goods in the country and other neighbouring colonies. However, during the Second World War, the European settlers in East Africa were unable to get their imports from Britain by sea culminating in a severe shortage of consumer goods (Munene and Wandibba, 1989: pp. 111-3). Due to intense pressure by the settlers, there was a slight change in the imperial policy in 1940 allowing selective kind of processing for import substitution and only by foreign and settlers firms (Swainson, 1980: p 31). Nonetheless, no concrete policy was formulated in favour of industry which still reflected lack of colonial will, commitment and effort to establish a dynamic manufacturing base in the country.

Table 3.3: Principal Foreign-Based Firms in Kenya before 1945

Estates	Firm	Business	Country of Origin/Parent
Estates and Primary Processing:			
1906	British East Africa Co.	Exporters of primary produce, manufacturing agents	BEA, Mitchell Cotts (after 1945)
1907	East African Tobacco Co.	Trading and growing tobacco products	British Imperial Tobacco Co. (UK) (later British American Tobacco Co.)
1922	East African Breweries	Beer manufacture	Ind Coope Ltd (UK)
1924	African Highlands Produce Co.	Tea manufacture	James Finlay (UK)
1931	Anglo-French Sisal Co.	Sisal growing	Anglo-French Sisal Co. (Paris)
1924	Kenya Tea Co.	Tea and coffee processing	Brooke Bond (UK)
1932	East African Tanning & Extract Co.	Wattle bark and extract manufacture	1 Natal Tanning & Extract Co. 2Forestral Land & Timber (UK)
1935	East African Meat Co.	Meat processing	Liebig's (UK) (1969 Brooke Bond, Liebig)
Trading:			
1920	Bird & Co.	Merchants, transport shipping, warehousing	Bird & Co. (UK)
1920	Gibson & Co.	Manufacture gents, export of primary produce	Gibson & Co. (UK)
1924	Gailey and Roberts	Import and servicing of machinery	United Africa Co. (Unilever Ltd, UK)
1934	Holland Soda Co.	Shipping agents and warehousing	Holland Africa Line (Holland)
Manufacture and Minerals:			
1911	Magadi Soda Co.	Soda extraction and processing	1 East African Syndicate 2 Imperial Chemicals Inc. (ICI) UK
1922	East African power	Power generation	Balfour Beatty (UK) and Power Securities (UK)
1933	East African Portland Cement	Cement-processing, clinker-grinding	Associated Portland Cement (UK)

Source: Adopted from Swainson (1980) with minor changes.

The discussion held for the period before 1945 indicates that a few things are important to take into consideration when examining FDI in relation to Kenya's industrialisation process and policy. The first one is that extremely few and simple manufacturing activities were undertaken during this period. Only products meant to substitute imports that were scarce during the war period could be manufactured under high tariff wall. No policy existed in support of an industrial development, one characterised by a strong entrepreneurship culture, hence low technological capability development. Second, despite the simplicity of the manufacturing undertaken, it was fully controlled by the British settlers and FDI from other countries with no involvement of indigenous locals – the indigenous firms remained absent. Third, the British settlers and other foreign investors also dominated commercial agriculture strictly excluding Asians and the indigenous Africans. The investment done was concentrated on estate-based export commodities such as tea, coffee, wattle and sisal which were exported in their raw form. Fourth, while a few settlers showed interest and actually moved into construction and real estate, foreign firms went into large scale trading where they became dominant. Fifth, Asian firms were concentrated in small trading activities. However, some of the Asian-owned firms originally in the mercantile trade branched gradually into light

manufacturing, which formed the basis for their initial capital accumulation in Kenya [Leys, (1975: 1996); Kaplinsky, 1978; Swainson, 1980; Himbara, 1994].

(ii) The Period Between 1945 and 1963

The period after the Second World War was characterised by major changes in the international capital movement [Dunning, (1972: 1993)]. There was free movement of capital across national boundaries with MNCs serving as the main conduit of capital flow across national and international boundaries. This culminated in stiff international competition to expand international capital with United States taking a dominant position. United States had assumed a dominant position as a result of increased domestic investment in technology, extensive capital accumulation and great transformation of its industrial organisation with tremendous increases in labour productivity. It is argued that, the huge advance by the United States in 1940s was the main cause of upheavals witnessed in technology, organisation of labour and relations of production in the world after the Second World War. There was a change in the pattern of international capital when United States industrial capital started turning outward in search of new global markets (Dunning, 1972).

The dominance of the United States capital in the international market had long-term effects to Britain's political and economic levels (Louis, 1977). The increased international competition to expand capital globally made Britain feel threatened over its colonial territories⁴⁴. Economically, Britain was at a disadvantage in that it had just incurred huge expenses during the war resulting in increased foreign aid and dependence on the US. There was also the looming danger of severe unemployment in Britain if production slowed down to match available materials and foreign exchange (Cowen, 1980 p 145). To take care of these constraints, the British government had no option than to try and channel more government resources into primary and industrial production. In addition, the British government encouraged the British firms, MNCs, to invest in colonial territories—both in the production sector and in the manufacturing industry. The British government, therefore, implemented a radical policy change from 'extraction of raw materials and restriction of industrialisation' to promotion of industrialisation alongside agricultural production. An industrial development policy was therefore designed after 1945 to promote development of secondary industries in addition to agricultural production (see Lee, 1967: p 85).

In response to this policy change, FDI initially concentrated in the field of commercial farming and raw material extraction began to change in favour of foreign investment in manufacturing industry, albeit gradually (Swainson, 1980). Many British manufacturing firms went to Kenya after 1945 to manufacture goods previously imported under protected conditions – quota restriction and high tariff walls. Available statistics show that by mid 1960, approximately 78.8% of FDI in Kenya was British owned (Vaitos, 1991: p. 14). Nevertheless, there was also intensified penetration of foreign firms and an inflow of predominantly industrial capital from other countries was witnessed such as: United States, West Germany, Denmark and Canada among others (Eglin, 1978 pp. 106-121; Swainson, 1980 pp. 130-5). A few examples of such MNCs included Del-Monte (1950), Pepsi Cola (1953) and Coca-Cola (1956) all from USA; Jensen and Nicholson (1959) from Denmark and Bata Shoe Company (1958) from Canada (see Table 3.4 for more details). The period after the Second World War in 1945, therefore, marks a significant point of departure in the history of Kenya's manufacturing industry with

⁴⁴ For more details on this see Louis (1977) writings "The Role of US in the De-colonisation of the British Empire".

dynamics of import substitution and participation of FDI in manufacturing becoming more apparent.

Table 3.4: Major Foreign Investments 1945-63

Code	Company	Date	Product	Owned By
Food Products and Beverages				
Np	Schweppes (EA) Ltd	1954	Soda drinks	Allsops & Schweppes
Ext	Allsops East Africa	1954	Beer	Allsops (UK)
Np	Pepsi Cola	1953	Soda drinks	Pepsi Cola (USA)
Np	Fitzgerald Baynes	1953	Soda drinks	Canada Dry (UK)
Np	7-Up Bottling Co.	1954	Soda drinks	7-UP Company (USA)
Np	Kenya Cannery	1950	Canned fruits and vegetables	(a) pickering & West (UK) (b) Del Monte (USA)
To	Associated Packers	1956	Fruit squashes, puddings, juices, jellies	Mitchell Cotts (UK)
To	ABC Foods	1954	Animal feeds	Baumann & Co. and Steel Bros (UK)
To	Lyons Maid	1959	Ice cream	Lyons (UK)
Np	Coca Cola Mid Africa	1956	Soft soda drinks	Coca Cola (USA)
Np	EA Tobacco	1954	Manufacture tobacco and cigarettes	British American Tobacco (BAT) (UK)
To	Kenya Orchards	1948	Canned fruits and vegetables	Marshall's Ltd (UK)
Ext	EA Breweries	1952	beer	Ind Coope (UK)
Non-Food Manufacturing				
Np	Carbacid Manufacturing Co.	1954	Carbon dioxide	Carbacid (USA)
Np	Robbialac Paints	1956	Paints and Varnishes	Robbialac (UK)
Np	Leyland Paints EA	1954	Paints and Varnishes	Baumann & Co. and Leyland Paints (UK)
Np	Cassmann Brown	1953	Roofing felts	Cassmann (UK)
Np	Sadolins Paints	1959	Paints and Varnishes	Sadolins
Np	Jensen & Nicholson	1959	Paints and Varnishes	Jensen & Nicholson (Denmark)
Np	East African Oxygen	1949	Oxygen	British Oxygen (UK)
Np	Bamburi Portland Cement		Cement	Amalgamated Road-Stone Corp. (UK) Cementia Holdings AG
Ext	EA Portland Cement	1956	Cement	Assoc. Portland Cement
Np	Avon Tyre	1958	Bicycle inner tubes	Avon Tyres (UK)
Ext	EA Bata Shoe Co.	1940	Bicycle inner tubes	Bata Shoe Co. (Canada)
		1958	Leather and shoes	
Np	EA Stationary Manufacturers	1949	stationary	Dickinson Co. (UK)
Np	Metal Box EA	1948	Metal containers	Metal Box (UK)
Np	Crown Cork Co. EA	1948	seals	Crown seals (UK)
Np	Van Leer Containers EA	1952	Steel drums, pails	Van Leer Containers (Holland)
Np	Shell Chemical	1952	Industrial Chemicals	Shell-BP (UK)
Np	Sterling Winthrop	1953	chemicals	Sterling Winthrop (USA)
Np	Finlay Industries Ltd	1952	Brushes, wooden articles	James Finlay (Scotland, UK)
Np	EA Oil Refinery	1959	Refining of crude oil	Shell-BP (UK)
Np	Walpamur EA Ltd	1961	Paints and Vanishes	Walpamur (UK)

Source: Adopted from Swainson (1980) with minor changes

Key: Ext – extension of existing plant; To takeover of existing firm and Np – formation of new plant

From the brief discussion undertaken for the period 1945-1963, the following things have emerged. First, it can be argued that the first major drive towards industrialisation in Kenya started in the period 1945-1963. This period can be regarded as the starting point

of actual manufacturing in Kenya with policy support from the authorities, in this case the British government. However, in this early stage, industrial capabilities and their development remained rather weak. Also with the exception of Asians of the Kenyan origin, the indigenous Africans had not ventured into the manufacturing – thus entrepreneurship capability on their side was extremely weak or altogether missing. Second, that the mode of industrialisation adopted at this time was import substitution supported largely by the state. This mode of industrialisation was implemented to a large extent under strong tariff wall and trade barriers. Third, that in comparison to the period before 1945 when investment was largely concentrated in commercial farming and mercantile, there was a significant increase in foreign investment into manufacturing industry in the period after 1945, which was reflected in a major shift in the sectoral pattern of investment by FDI. The fourth one is that comparing settlers' capital to that of the incoming MNCs, the settlers' capital remained weak after their failure to take it into manufacturing industries. In actual fact the incoming MNCs and the Kenyan Asians ended up acquiring most firms that had previously been owned by local settlers making the incoming MNCs and a few Asian firms become dominant in the large manufacturing category especially in the period 1945-1955⁴⁵. Although Asians had ventured into manufacturing before 1945, they were only a few "due to the constraints of capital and lack of credit facilities from European banks" (Swainson, 1978: pp. 124-6).

3.3.2 Post-Independence: The Early Decades of Import Substitution

At independence, Kenya inherited import-substitution industrialisation pursued during the colonial days⁴⁶. Adoption of import-substitution appeared to be the trend world-wide in that during the period 1950s-60s, import-substitution industrialisation strategy appeared to be the norm in most developing countries (Van Arkadie, 1964; Bruton, 1998). In the Kenyan context, the import-substitution framework mainly advocated for a large role of public sector participation and protection of infant manufacturing industries⁴⁷. Broad based economic controls in favour of industrial sector were implemented such as: combination of tariffs and quotas supplemented by foreign exchange allocation measures; use of overvalued exchange rates to maintain import costs low; favourable credit and interest rate policies intended to subsidise manufacturing of consumer goods. As a result of high increase in overall demand for consumer products in the domestic market, the implementation of import substitution framework encouraged production for domestic market shielded from imports and international competition (Van Arkadie, 1964; Mekelsen, 1986; Nyong'o, 1988; Coughlin and Ikiara, 1988; UNIDO, 1996). Under import substitution, the economy was characterised by rapid economic growth – in the Kenyan economic history this period is usually referred to as the "golden economic period" due to the high GDP growth levels recorded. The GDP growth rate averaged above 7% in the period 1965-1972 (see Gachino, 1998), while manufacturing value added grew by over 10% in the period 1964-1971.

At independence, Kenya was ambitious to diversify her foreign investment by attracting FDI from different countries in the world. Unfortunately, during this period of transition to independence, the country was faced with capital disinvestment problem; severe outflow of foreign capital was taking place following the eroding confidence among

⁴⁵ For elaborate details on Asian capital in Kenya see Swainson (1978) and Himbara (1994).

⁴⁶ This was specifically enforced in the period 1945-1963 after the Second World War.

⁴⁷ Various policy instruments to enforce protection in Kenya included tariffs and quantitative restrictions such as import quotas. Exchange rates were overvalued to contain the costs of imported raw materials while credit and interest rates were implicitly subsidised for manufacturing firms – broad based economic controls in favour of industrial sector.

foreign investment resulting from the intended indigenisation of economic activities contained in the 'Kenyanisation' policy⁴⁸. In order to revert this process and to attract more diverse foreign investment, the Kenyan government decided to enact the *Foreign Investment Protection Act (FIPA)* in 1964, which guaranteed foreign investors the right to transfer profits, dividends and capital out of the country. Under FIPA Act, foreign investors were supposed to apply for a "Certificate of Approved Enterprise" from the Ministry of Finance. The determining criterion was the firm's participation on the economy and thus only foreign enterprises viewed as capable to participate in Kenya's economic development would be granted this certificate. These investors would also be assured that their firms would not be compulsorily acquired under the indigenisation policy, which was launched upon independence (Langdon, 1978: p. 162). This was also supported by sessional paper no. 10 of 1965 entitled: *African Socialism and Its Application to Planning in Kenya*. The sessional paper reaffirmed the government's commitment towards attracting more foreign firms with no nationalisation unless state intervention was deemed necessary to prevent wastage of raw materials (Langdon, 1978: pp. 162-3; Nyong'o, 1988).

Continued effort to attract investment and to reduce capital outflow seemed to gather momentum with time. A *New Projects Committee (NPC)* was set up in 1968 to review more vigorously the foreign applications interested in making investment in Kenya. This committee which drew representatives from various institutions and government ministries acted as the negotiation team on all issues pertaining to investment ranging from level of tariff protection, shareholding, and management among others (Langdon, 1978: pp. 162-3). *Capital Issues Committee (CIC)* was set up in 1971 to cut down continued capital outflow from Kenya following the perpetual fever at the time that foreign investment in the country would be forced to go public and allow Kenyans to become shareholders. The aim of CIC was therefore to revert this trend by approving all future issues and capitalisations of reserves in firms with majority foreign interest (Leys, 1974: pp. 128-9 and Swainson, 1980: p. 209). On the international front, Kenya became a member of Multilateral Investor Guarantee Agency (MIGA), which issues guarantees against non-commercial risk to enterprises that invest in member countries. Kenya also became a member of International Center for the Settlement of Investment Disputes (ICSID), and of Africa Trade Insurance Agency (ATIA) (IPC, 2001). As a result, Kenya attracted a substantial amount of FDI in the period 1960s-70s – where in most cases the investors were subsidiaries of wholly owned MNCs and occasionally joint participation between MNCs and the state. A large share of this investment went into import-substituting industries (Kaplinsky, 1978; Swainson, 1980; Nyong'o, 1988).

Compared to the period before independence there was a drastic change in this period with foreign firms showing a clear dominance in Kenya's manufacturing industry. Available statistics show that by 1967, about 33% of the FDI stock in Kenya was in manufacturing (Hveem 1975: p. 86-7). From the *Census of Industrial Production* undertaken in Kenya in 1967 and covering 607 establishments, it was noted that 433 of these establishments with 50 or more employees were mainly or wholly foreign owned by non-citizens. Detailed analysis of the *Census of Industrial Production* data further revealed that these enterprises accounted for 71% of the value added and 72% of the total sales for manufacturing firms employing 50 people and above, which in turn, generated more than 82% of the gross manufacturing product (Eglin, 1978 p 97). This clearly demonstrates the significance of foreign investment in the early decades of Kenya's independence and as noted by Vaitos (1991) on the Kenya's development plan for 1970-74:

⁴⁸ Kenyanisation was a form of nationalisation as discussed in Chapter 2.

.... long-term capital inflows, especially by TNCs, strongly influenced the evolution and growth of modern manufacturing and services during the first decade after independence as confirmed by macro, sectoral and sub-sectoral evidence (Vaitsos, 1991: p. 13).

Besides the fact that most foreign companies saw potential market opportunity in the East African region, the region was also richly endowed with raw materials and cheap labour. An analysis of FDI inflows to Kenya in comparison with other developing countries in Africa revealed that while 32.4% of FDI in Kenya went into manufacturing by 1967 the average for the whole of Africa that went into manufacturing was only 18.8%. FDI going to commercial agriculture in Kenya was also relatively high at 21.4% in comparison to 7.5% for the whole of Africa. The average for FDI in Africa going into trading activities was 19.4% which was slightly higher than FDI going into trading activities in Kenya which was 16.9%. Finally, there was almost negligible foreign invested in petroleum and mining in Kenya while the average investment for Africa was 19.4% and 29.6% respectively (Kaplinsky, 1978: p. 6). This supported empirically the thesis that after independence foreign capital, FDI, in Kenya was not concentrated in primary production but rather in manufacturing and services following increasingly high inflow especially into the two sectors and especially manufacturing industry. It is therefore argued that this trend of foreign investment flow into the manufacturing industry affected significantly the evolution of import-substitution strategy at the time. For instance in 1977, imports of consumer goods dropped sharply to just 15% of the total imports while imports of intermediate goods rose to about 67% of the total imports (Vaitsos, 1991: pp. 13-5). This seemed to indicate success in the pursuance of the import substitution mode of industrialisation. More so, it also indicated transfer of technology to be used in their production processes – although participation by domestic firms was still minuscule, this is important as it would result in demonstration effects, training of the local labour, learning by performing and in turn all these would serve to stimulate broad industrial capability development.

Apart from availability of raw materials and cheap labour, Kenya was also favourable for among other factors stable political climate and macroeconomic conditions, a rapid economic growth rate, a large and growing market encompassing countries of the then East African Community⁴⁹ and high tariff protection. Given their keen interest on the protection level, MNCs wanted and in fact sought involvement even in the determination of the extent and structure of protection to be granted [Swainson, (1978: 1980); Eglin, 1978; Vaitsos, 1991]. As an example, protection from imports was a key pre-investment negotiation issue at the time: effective rates of protection were therefore very substantial, particularly for consumer goods industries. In about 90% of the cases studied by Langdon and Godfrey (1973), it was observed that the type and range of existing protection was largely influenced by the MNCs' bargaining strength and position. Most MNC firms therefore enjoyed a virtual monopoly, which ensured their profits (Eglin, 1978: pp. 97-111). The inflow of equity capital in the 1960s-70s was mainly in the agro-based industries with textile taking a clear lead [Leys, (1975: 1996); Eglin, 1978; Langdon, 1978: Kaplinsky, 1978]. As will be shown at a later stage, this trend has however been reversed since 1980s with food processing and beverages manufacture taking a leading position. Other manufacturing industries like machine and engineering industry and

⁴⁹ The extended demand for consumer goods to the entire East African Community (EAC) in the period 1967-77 provided for a large market which prompted many MNCs to invest in Kenya or expand their existing investment. Kenya seemed to serve as the regional hub due to its locational advantages such as proximity to the sea and advanced infrastructure network of transport.

more recently chemicals, pharmaceutical and plastic industries have also obtained substantial amount of foreign capital investment.

At independence, the Kenya's economy and in particular manufacturing ownership structure was dominated by the European and Asian firms. MNCs from United Kingdom dominated in the European firm's category, which were engaged in heavy manufacturing processes while Asian firms dominated in the light manufacturing industries almost sharing the entire cake with no portion of it left for the indigenous locals (Kaplinsky, 1978; Swainson, 1980; Himbara, 1994; Leys, 1996). Although by this time Kenyan manufacturing industry was relatively the most advanced in comparison to those of the other countries in the region there was a need to integrate the Africans into the mainstream of the economy despite their low entrepreneurship skills, lack of experience and finance. As a preamble to the indigenisation policy; it is recalled that during the colonial days, Africans served as labourers in the commercial firms owned by the foreigners and were not allowed to participate in any form of trade or manufacturing activities – this denied them a chance to become entrepreneurs from early on. Africans could not obtain any form of loan or financial credits to support and nurture their ambition into either trade or entrepreneurship. Incidentally, they had no collateral since at the time, they were not even allowed to acquire and own land title deeds, which could serve as collateral with existing financial institutions. This notwithstanding, the existing Banks viewed Africans as depositors but not as potential borrowers claiming that Africans had a different mentality on repaying loans as they failed to see it as an obligation. The banking style relied to a large extent on social interaction with British banks funding British firms, Asian banks funding Asians and since there were no African banks, no one had the will to extend loans to indigenous African firms (Jorgensen, 1975: pp. 159).

As a result of this disequilibrium in the economic setting, there was a need to indigenise commerce and manufacturing industry at independence. The Kenyan government established a *Kenyanisation of Personnel Bureau* (KPB) with an aim to Africanise senior positions in the civil service including parastatals and to also regulate the number of foreign workers in the private sector by introducing work permits. In addition to encouraging MNCs, the *Trade Licensing Act of 1967* was enacted, to help Africans venture into commerce and trade. To this effect, foreigners were excluded from trading in certain locations and from dealing with certain kinds of goods. Such goods included basic foodstuffs and clothing and a few other items such as cigarettes, soft drinks, farming implements and basic hardware which were all produced or processed locally under MNCs import substitution industries (Leys, 1974: pp. 151). Since the Asians were restricted from joining retail and wholesale trade this forced them to venture into light manufacturing. The greatest effort by the government towards indigenisation took place in the creation of support institutions such as Industrial and Commercial Development Corporation (ICDC), Industrial Development Bank (IDB) and Kenya Industrial Estates (KIE) etc. Some of these institutions allowed joint partnership with MNCs as well as providing soft loans and technical support to the Africans who were by then being encouraged to become entrepreneurs. Some institutions encouraged establishment of linkages between indigenous firms and foreign firms. This was the first significant attempt to integrate indigenous firms into the manufacturing. An interesting scenario that emerged from the intended indigenisation policies was that of Asians in Kenya. After being restricted from participating in trade and commerce, the Kenya Asians ventured into light and medium manufacturing using own finance, and from which they were able to entrench themselves, have developed some manufacturing capabilities and have dominated ever since (Pearson, 1969: p. 12; Swainson, 1980; Himbara, 1994).

Nevertheless, despite the spirited effort by the government to implement indigenisation policy especially in the manufacturing industry not much progress has been achieved. The nature and characteristics of manufacturing industry has virtually remained the same as it was in the early decades of Kenya's independence. Taking as an example, the ownership structure by race in 1990, we note that according to Himbara (1994: p. 49), in a sample of 100 large scale manufacturing firms; Asians accounted for 75%; Foreign and JVs 11%; Kenya Africans 5%; Publicly held 4%; State firms 4%; African/Indian 1%. Although these percentages do not represent performance, they somewhat support the critique that indigenisation policy had not succeeded as the disequilibrium was still widely reflected in Himbara's study. It is common knowledge that the country has not succeeded in transforming its manufacturing industry, which is still dependent on foreign technology as domestic industrial capability remains weak and manufactured export goods with little value added. Jorgensen (1975) offered a strong critique of the Kenyan indigenisation process which still seems to hold regarding it as lacking in credibility. He argued that, "since independence the process would have required integration of the various sectors and sub-sectors of the economy to increase self-reliance and decrease dependence on the import of foreign technology, foreign machinery, foreign intermediate goods and components, and foreign consumption patterns on the one hand and decreased dependence on the export of agricultural raw materials and of minerals on the other" (Jorgensen, 1975 p 156). This has however not been the case and African indigenous firms remained small in size and both technically and financially weak.

Following her ambitious plan for industrialisation in 1960s-70s, Kenya enacted and implemented several industrial promotion policies within import substitution framework particularly meant to stimulate and strengthen the industrial base and especially within manufacturing sector, which was at the time characterised by weak technological capabilities⁵⁰, weak supporting institutions and lack of finance for business expansion. Several development finance and industrial promotion institutions intended to cater for small and large scale firms were established. Ideally, these institutions were supposed to play a facilitation role in industrial development by advancing indigenous manufacturing technology; assisting in technology transfer; offer industrial training, promote industries that exploit locally available raw materials; promote linkage (e.g. between locally owned firms and MNCs); offering financing capital, enhance production of goods that are competitive for exports. Such institutions included Industrial and Commercial Development Corporation (ICDC); Development Finance Company of Kenya (DFCK); Industrial Development Bank (IDB); Kenya Industrial Estates (KIE); Kenya Bureau of Standards (KEBS); Kenya Industrial Research and Development Institute (KIRDI). Others included Kenya Industrial Training Institute (KITI); National Council for science and Technology (NCST) and Universities and Polytechnics. A brief discussion on the role played by some selected institutions in line with their objectives is presented in the next section.

3.3.2.1 FDI and Industrial Capability Development: The Role of Institutions During the Import Substitution Period

In the section above, we have shown that at her independence, Kenya inherited a manufacturing industry characterised by relatively weak indigenous industrial capability with low value added activities and performance. There was however increased FDI

⁵⁰ African firms are well below international 'best practice' technical levels, and below levels by other developing countries (Biggs and Srivastava, 1996; Mazumdar and Mazaheri, 2003).

inflow and participation in the manufacturing. At this time supportive institutions were missing while new ones were getting established and still grappling with learning to perform. In such a context where institutions are missing or weak in performance, then their role in systemic coordination becomes equally weak. This results in weakened role for instance in financing, knowledge generation and diffusion and consequently low levels of industrial capability development and performance. Given this background, this section examines the type and specific role played by institutions during the import substitution period. We shall however limit our discussion to some selected institutions – including those in the financial and technology infrastructure domain.

(i) Industrial and Commercial Development Corporation

Industrial and Commercial Development Corporation (ICDC) was first established in 1954 by the colonial government. ICDC acts as government's main conduit for joint venture investments and has made equity investments in many industrial and commercial ventures along with local and MNC subsidiaries. It was first established as the Industrial Development Corporation (IDC) to promote the colonial industrial development. After Kenya attained her independence in 1963, the role of IDC was expanded and diversified in the economy to provide project and commercial finance to enterprises. As a result of this expansion, IDC was changed to industrial and commercial Development Corporation (ICDC), a wholly owned corporation by the Kenya government.

The responsibilities of ICDC included promotion of industrial capabilities by promoting participation of indigenous Kenyans in industrial and commercial development, encouragement of industries with capacity to earn foreign exchange, facilitate rural development, increase use of locally available raw materials, create job opportunities and enhance diversification of the economy. The industrial and commercial development was facilitated through: venture capital finance; secured long & medium term loan funds and export financing; management, support & consultancy services; administration of funds on social-economic programmes at agreed terms⁵¹.

ICDC has co-invested in various leading commercial and industrial ventures in Kenya that are either local firms or MNC subsidiaries. This is important as it harnesses the resources and expertise of MNCs in the promotion and financing of joint venture projects. From the interviews conducted, it was noted that ICDC had invested in a cumulative total of 105 companies in its equity portfolio. Projects financed included some of the established local companies such as ICDC Investment Company Limited (ICDCIC), Uchumi Supermarkets Limited, Kenya Wine Agencies Limited, Kenya National Trading Corporation (KNTC), Kenya National Transport Company (KENATCO) Taxis. ICDC is also into partnership with several MNC subsidiaries in Kenya among them the General Motors Kenya (GMK) Limited (20%). General Motors Kenya Limited is the largest vehicle assembler and distributor in the region accounting for approximately 80% of the total vehicle exports from Kenya, targeting markets within the East and Central African region. GMK has established linkages in the auto industry with domestic firms including body builders. ICDC also owns Nairobi Bottlers jointly with Coca Cola Sabco, with the ICDC controlling (28%) and Sabco (72%). Coca Cola Sabco brings along processing and production techniques as well as management and marketing skills. It commands one of the widest distribution networks with distributors of its manufactured products. ICDC has a joint venture with Eveready Batteries Kenya Limited (25%) whose parent company is Eveready Batteries Inc, St Louis, USA - the largest battery producing MNC. ICDC was responsible for the supervision and finance

⁵¹ The ICDC website site: <http://www.icdc.co.ke/> provides background information on this.

of the Kenya Industrial Estates (KIE) programme until 1978 when KIE became an autonomous institution. ICDC is an important shareholder in two main industrial financing institutions; it owns 12% of Industrial Development Bank Ltd. and 31% of Development Bank of Kenya Ltd. This kind of coordination and establishment of financial linkages is important for the support of firms in an industry for their capability development and eventual growth, innovation and performance.

We provide an example of a joint activity coordinated and facilitated by ICDC between a locally owned firm and a MNC subsidiary. Kenya Bus Services (KBS), a locally owned firm in the local transport industry embarked on the provision of specialized, comfortable, commuter services in 1999. At this time there was high demand for this kind of services in the transport industry, hence KBS approached ICDC and General Motors Kenya Limited for their support both financial and technical. As a response to this, ICDC and General Motors introduced a special scheme in 2002 meant to finance KBS "Metro Shuttle buses". On its party, ICDC set aside an initial financial facility of KSh. 60 million to finance the purchase of 20 Metro Shuttles. General Motors would provide the engine and the chassis while other locally owned companies would build the body of the coaches with technical/mechanical guidance of engineers from General Motors. The engineers from KBS would also undergo technical training with the General Motors which would enable them maintain the coaches undertake repairs.

However, despite a relatively good performance in ICDC it has been criticized for failing to meet one of its prime objectives to reach the small entrepreneurs, the security required for ICDC's loans has tended to favour the already well-established entrepreneurs and to those already owning other enterprises. The implication of this is that firms owned by indigenous Africans would not qualify for financial support. ICDC officials interviewed felt that ICDC was not playing its role of promoting participation of indigenous Kenyans in industrial and commercial development effectively. Performance in venture capital and export finance had declined. They were severely constrained in that they have to rely on the government for finance making its capacity limited.

(ii) Development Finance Company of Kenya

Development Finance Company of Kenya (DFCK) was incorporated as an investment company in 1963 and as one of the main financial institutions to promote industrialisation in the post independence era. Although DFCK was established with the government as the main shareholder through ICDC, other bodies including foreign financial institutions and developmental agencies were also shareholders⁵². The sources of finance to DFCK therefore included share capital and loans from shareholders, and other institutions and loan repayment and internally generated funds⁵³.

Although DFCK initially favoured existing industrial and agricultural enterprises, there was a change in DFCK investment trend towards new projects by the mid 1970s. From this time onwards, DFCK increased its participation in new projects. There was especially large annual increase in new projects, including indigenous projects, financed by the DFCK in the period 1976-1981 mainly resulting from the 1976-1977 coffee boom in the country. Despite DFCK participation in many economic sectors, by the end of the second decade of its operations, its capital investment was concentrated in engineering and construction (18.3%), agricultural processing, food and beverages (15.4%) and

⁵² Examples of such shareholders included the German Development Corporation, the Common Wealth Development Corporation (CDC) and the Netherlands Finance Company.

⁵³ For a detailed synthesis of DFCK and other financial institutions see work by Swainson, 1980; Ikiara, 1988 and KIPRA, 2001.

textiles (12.2%) [For more details on this see Ikiara, 1988]. Priority was accorded to economically viable projects deemed to have the necessary capacity to contribute to economic development efforts such as creation of employment, earn foreign exchange and increase the use of locally available raw materials.

Since inception, the operations of DFCK had been explicitly biased towards the already well established firms that were either large or medium in size, neglecting the small-scale enterprises and start ups. This was comparable to the ICDC case discussed earlier. To take care of this anomaly, DFCK decided to establish a programme in 1978 that could help identify and offer support to the indigenous enterprises that had failed to obtain any support due to the outright bias in favour of large enterprises – established culture of habits and practices that discriminated a certain category of firms. It incorporated a new programme in 1983 known as Small Enterprises Finance Company Limited (SEFCO) mandated to work out new modalities that could help to attract funds to finance small enterprises⁵⁴. SEFCO promoted indigenous enterprises by providing finance and advisory services necessary for expansion, modernization or rehabilitation of existing enterprises owned and managed by indigenous African enterprises (Ikiara, 1988: p. 222). The conditions governing SEFCO support e.g. financial assistance were made more flexible in order to reduce the problems hindering the penetration by indigenous enterprises into the manufacturing industry. However this was not very effective in the long run due to lack of financial constraints.

From the interviews done with the DFCK officers, several constraints were noted that seemed to hinder the progress of the institution. As noted earlier, the financial institutions were funded primarily through loans and grants received from multilateral and bilateral development institutions, as well as from the Kenyan government. The government allocations of development finance institutions have been virtually eliminated following a government policy to stop funding all the parastatals. More so, the government was gradually declining its role as an active guarantor to loans obtained by development finance institutions from other financial institutions most of which are foreign (KIPPRA, 2001: p. 5). However, despite these changes in its role, the government continues to be a key shareholder in these development finance institutions (DFI) hence making willing lenders and shareholders shy off from lending their funds to DFI. Without privatization foreign lenders are reluctant to continue their participation. To get round this problem, the adoption of universal banking policy affects DFI's and has already resulted in the conversion of the DFCK into a bank. This has worsened the situation as the interest rates remain high and hence not favourable of industrial promotion. Firms will shy from taking loans at such high interest rates, implying that they could not acquire new machinery and technology using loan facilities from DFCK and thus in the long run this works out to weaken firms' entrepreneurship and capability development and thus their ability to learn from and compete with the MNCs present in manufacturing.

(iii) Industrial Development Bank

Industrial Development Bank (IDB) was established in 1973 as a financial institution with an authorised share capital of KShs 40 million, which was shared between the Kenya government (49%), ICDC (26%), the National Bank of Kenya (12%) and the Kenya National Assurance Company (12%) [Ikiara, 1988; KIPPRA, 2001]. The Kenya government established IDB for the purpose of furthering industrial and economic

⁵⁴ As explained, creation of SEFCO was necessary, as it would increase resources for the small indigenous enterprises without affecting the DFCK's main objective of financing large and medium enterprises.

development by promoting, establishing, expanding and modernising of the medium and large scale industrial enterprises, including mining, agro-industries, engineering, tourism, and transport and shipping. IDB strictly excluded operations of enterprises that engaged in commerce, real estate and farming activities. Industrial Development Bank provides the following forms of financial services: medium and long-term finance; working capital, machinery finance and export trade related banking facilities; direct equity investment; guarantees for loans from other sources; underwriting of security issues, shares, stocks and promissory notes. IDB charges interest, fees or commission guided by the prevailing market rates, or which enable it to earn a reasonable return on its operations. To facilitate international trade transactions for its clients, IDB maintains a global network of correspondent banks worldwide (IDB, 2002).

In addition to the finance obtained from equity and accumulated reserves, the government as the main shareholder is supposed to provide finance to IDB. But due to the balance of payments problems, the government role as the chief financier has declined. It was noted from interviews done that the problem was so severe to the extent that IDB had to look for alternative sources of finance – a process faced by its own unique problem. The main source of finance is foreign with key lenders including the World Bank's international bank for reconstruction and development (IBRD); The European Investment Bank (EIB); the Germany Investment Corporation (DEG); Swiss Investment Corporation (SIC); the African development bank (ADB). The Kenya government would act as the guarantor to all the loans obtained (KIPPRRA; 2001: pp. 32-3).

In its operations, IDB has been faced with severe constraints: the government of Kenya no longer invests in IDB given its blanket rule to stop investing in parastatals. In addition the government no longer guarantees its lines of credits. To overcome these problems, officers from this institution explained that IDB decided to offer banking services with mobilization of deposits. Nevertheless, this has not been very successful, as customer deposits have remained yet very low. IDB continued to face severe difficulties in securing credit from foreign financiers, who demand that the government guarantees or privatise IDB to qualify for funding. This has resulted in a declining industrial role of IDB over time. In 1997, the bank approved investments in 10 projects compared with 16 projects in 1996 for a total of KShs 365 and 495 million respectively. It is critical to note that with the introduction of quasi banking activities its interest rates and other services are not different from any commercial Bank, hence no real industrial promotion done by the bank.

(iv) Kenya Industrial Estates

Another institution formed soon after Kenya's independence was Kenya industrial estates Limited (KIE). KIE was formed to encourage entry of indigenous firms into the manufacturing industry since this would result in indigenous manufacturing capability in the long run. Indigenous firms entering into the manufacturing industry were basically characterised by extremely small scale, they were basically 'start ups' small and medium enterprises (SMEs) faced with severe financial constraints and with weak technical skills (KIE, 2003). They needed finance for capital investment alongside technical support mainly on how to set enterprises and manage them. To promote the development of SMEs, KIE was established in 1967 as a supportive institution and as a subsidiary of ICDC to extend assistance by a way of offering technical and financial support to indigenous firms. KIE remained a wholly owned subsidiary of ICDC, then under the Ministry of Commerce and Trade, until 1978 when it became an independent state

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owned corporation registered under the companies act with the government of Kenya as the sole share holder.

While financing industrial projects, KIE attached a lot of emphasis on new or expansions that were likely to generate foreign exchange, create substantial employment, and make use of locally available raw materials increasing linkage formation between locally owned firm and MNCs. KIE targets enterprises ranging from micro enterprises commonly referred to as *Jua Kali* artisans to modern scale industries. The enterprises must be start-ups or expansions solely owned and managed by indigenous Kenyans and located in the country. KIE also advances short-term working capital loans to existing entrepreneurs who have run their business for a period of time. The loans are to be used to finance procurement of machinery and equipment or working capital.

Interviews done showed that KIE attached a lot of importance to some key elements, which ought to be clearly articulated in the business plan before its submission for consideration. There must also be some guaranteed minimum return on assets employed. The owner must possess managerial skills and knowledge necessary to run an enterprise. This is usually determined by past achievements, qualifications or experience obtained while working with MNCs. The entrepreneur is supposed to contribute at least 20-30% of the total capital required. KIE requires some tangible securities in the form of landed security and/or a debenture over the company's assets. Labour intensive projects particularly those that exploit local raw material are given preference. Although rates are generally lower than those charged by other financial institutions, these rates are somehow high making many clients shy away from seeking financial loans. Credit and loan documents collected from KIE showed that interest rate were 24.4% per annum for the formal sector and 2.7% per month for the informal sector. This is already too high making KIE operate once again like a commercial bank – hence reducing its role in industrial promotion through offering finance.

Despite the effort made by KIE, its perceived role to promote industrial development has not been achieved. Operations of KIE are still faced by many constraints. Finance is one of them. The government has not been able to provide adequate finance. It was noted that the funding which used to be obtained from donors declined drastically especially in the 1990s when most international financial bodies and donors pulled out of the country. More so most of them refused to show commitment in funding resulting in KIE's due to its poor performance. KIE also lacks adequate capacity to offer effective technological training and supervision. While this may not be viewed as a serious problem since qualified personnel can readily be obtained. The severe problem is lack of enough working capital required for KIE's recurrent expenditure given the reduced financial support from the government as well as from donors and international funding agencies. This means that KIE was unable to hire and sustain qualified personnel. This leads to the next problem in that KIE lacks the capacity to study the industry and play a more active role in the match making process, which would in turn promote linkage proliferation in the industry. For instance, discussions held with KIE officers revealed that only a few cases existed of linkages formed between SMEs and MNCs as a result of facilitation done by KIE⁵⁵.

Similarly, KIE's role to promote industrial parks/incubators had not been a success with only a few cases of such parks surviving from bankruptcy and collapse. Although one of KIE's mandates was to pass information, interestingly it does not even have an internet

⁵⁵ Interviews conducted by the author 2003/4.

site where information could be placed for easy access by firms. From the point of firms, complaints have been launched that interest rates charged were very high. This being the case coupled with the fact that these firms have been subjected to the forces of liberalisation under the aegis of structural adjustments, it is then expected that most of them would face stiff competition from MNCs and perhaps exit business. This has actually been the case with most of them remaining static in capability development and thus poor performance. These results in low profitability, reduced working capital and most a times inability to meet debt obligations. The implication of this is that KIE plays a very minimum role in industrial development.

(v) Kenya Bureau of Standards

The Kenya Bureau of Standards (KEBS) was established in Kenya by an act of parliament in 1974. The setting of KEBS came at a time when issues pertaining to standards and quality management were becoming important world wide and competitiveness of most manufactured goods was to a large extent being determined on the basis of quality standards. To this end, formation of KEBS served to promote and make manufactured goods competitive in both the local and external markets by raising quality. KEBS was set up at a time when Kenya's manufactured goods had failed to penetrate the export market and were also facing rejection in the domestic market following significant preference attached to the imported manufactured goods. Kenyan manufactured goods were perceived to be of low quality and thus substandard (Ikiara, 1988: p. 235). KEBS was therefore formed as a regulatory body mandated to deal with strengthening of manufactured goods and services through the application of standards, 'metrology' (science of measurement and calibration) and by providing technical advice on quality management in Kenya. The standards are formulated by technical committees constituted from experts and professionals drawn from various stake holders and interested parties such as producers (MNCs and domestic firms), consumers and research organisations.

Enhanced standardisation in an industry can stimulate technology transfer and diffusion. As a technical language needed for communicate industrial and service specifications, it can equally lead to industrial growth and capability development. This would come a long as firms and industries strive to achieve minimum set standards or existing international standards. A lot of time, effort and resources would be required involving interactions of stakeholders. From the interviews conducted it was reported that in some cases research officers from KEBS learnt certain standard and metrological aspects from MNCs operating in the country. A few of these MNC whose skill and technology is higher than that of KEBS have often been accredited to conduct metrological or laboratory tests for local firms on behalf of KEBS. In some cases experts from these MNCs are invited during training sessions organised by KEBS to serve as resource persons. Examples include Unilever Kenya, Nestle, Coca Cola and Canaud Metal Box.

KEBS operates a Certification Marking Scheme (CMS) whereby firms whose products meet the expected Kenyan standards are issued with permits to use the 'Mark of Quality'⁵⁶. To ensure continuous compliance, KEBS conducts random inspections in the firms' processing lines as well as from open market. This forces firms to keep their quality standards high and by doing so they are forced to build their capabilities. In collaboration with international standard bodies (SGS), KEBS is also involved in the training and auditing process of quality management assurance systems such as ISO 1400

⁵⁶ The certification marking schemes administered by KEBS include; The Diamond mark of quality, Quality Systems Registration Mark, Calibration Mark and Safety Mark.

for environmental management, ISO 9000 for quality management or revised ISO 2001: 9000 for production quality management, continuous changes and customer service⁵⁷.

Through increased effort, some of KEBS testing laboratories dealing with Food and Agriculture Laboratory, inorganic Laboratory, Organic Laboratory and Microbiology Laboratory have been accredited to ISO 17025: 2000 by United Kingdom Accreditation Services (UKAS)⁵⁸. Products approved by the bureau are therefore accepted in the regional and international markets. Preparation for this award required heavy firm level investment about KShs. 48 Mn was invested in equipment, staff training and modern testing procedures. This has a positive bearing towards enhancing capability building in the manufacturing industry. Interestingly also, two of KEBS metrology laboratories in the current, voltage & resistance and volume & flow fields of measurements have been accredited by German Calibration Service – Deutsche Kalibrier Dienst (DKD). This implies that these laboratories can issue DKD calibration certificates that are recognized within the European Union and all the countries with mutual recognition agreements with the EU.

KEBS organises trainings and seminars to promote and develop standardisation mainly in manufacturing and service at all levels. Participants would be drawn from local and MNCs. This way the participants get to interact and share knowledge, ideas, skills etc. This is sometimes extended to include attachments and firm visits by the KEBS officers. Mainly the trainings are offered in the following areas: Industrial standardisation (implementation of ISO standards); Quality and Environmental Management (QEM); Hazard Analysis & Critical Control Point Analysis (HACCP); Regional metrology conferences; internal quality audit and statistical quality control; and laboratory testing. In these trainings and seminars, the resource persons are drawn from public and private sector – with MNCs as the dominant contributors.

KEBS maintains a Standards Information Resource Centre (SIRC) purposely designed to promote flow of information and standards related documentation from regional and international organisations and national standard bodies world wide. It has a collection of over 1,800 printed Kenyan Standards and well over 250 000 foreign standards. This is remarkable given that only 450 standards had been established by late 1980s. Information is processed and systematically stored for easy retrieval for individuals interested in standards information.

One of the WTO agreements dealing with matters pertaining to trade information related to standards, standard-type documentation and technical regulations is the Agreement on Technical Barriers to Trade (WTO-TBT). This Agreement requires that each of its signatories sets up and operate a National Enquiry Point (NEP) – a standards and technical regulations trade information reference point linked to a network of similar NEPs world-wide. The Kenya Bureau of Standards is the officially designated WTO-TBT National Enquiry Point that provides information on standards and technical regulations affecting trade worldwide, including WTO members' notifications on Technical Barriers to Trade. NEP is also supposed to notify WTO of all proposed government regulations, conformity assessment procedures and standards-related trade information that might significantly affect international trade. The NEP's main objective is to improve Kenya's competitiveness in domestic and world markets.

⁵⁷ The Kenya Bureau of Standards website: <http://www.kebs.org/> provides more information on this.

⁵⁸ <http://www.kebs.org/>

In sum, despite the achievements made so far, there are still many problems facing KEBS. Inadequate funding to facilitate training, dissemination of information by a way of exhibiting in show grounds and others such as trade exhibitions, seminars and symposia to educate the manufacturers as well as consumers on standardization work and increase their awareness. There is extremely low patronisation by manufacturers blaming it on lack of capacity such as recent metrology techniques coupled with few skills available in terms of professionals required. Although it was indicated that with regard to human resources development some of the research officers had been sent abroad to countries like Japan, USA, Germany, UK and Sweden for further training, there is still inadequate capacity to deal with standardisation and metrology. Although KEBS maintains a website providing background information on the institute and the services offered, there is lack of a strong ICT back up from where queries can be launched. Information, say on training placed on the internet site would reach a larger audience. Another problem is that there are few testing centres in the country subjecting manufacturers to unnecessary delays waiting. KEBS also need to strengthen its modalities to come up with a meaningful cooperation between players from both the public and private sectors.

(vi) Kenya Industrial Research and Development Institute

Kenya Industrial Research and Development Institute (KIRDI) was established in 1979 under the Ministry of Science and Technology to conduct industrial R&D. Its specific mission was "to enhance the national industrial innovation process through the development of a sufficient national capacity in disembodied and embodied industrial technologies for the attainment of self-sustaining industrialisation process"⁵⁹.

Functions of KIRDI can be classified into four major divisions. First, project studies and development division conducts feasibility studies, conducts market intelligence studies, undertakes economic/statistical analysis of industrial projects and provides extension services. Second, process and product development division conducts laboratory studies for the purpose of improvement and development of industry processes and products for instance food technology, ceramics, textile and leather technology, microbiology and cereals technology. Third, analytical and testing division concentrates in analytical chemistry, biological and organic chemistry, physical chemistry and materials testing. The research undertaken attempts to develop new analytical techniques or modify analytical methods to suit local conditions. Fourth, engineering and design division deals with development of indigenous designs of products machinery and equipment primarily with maintenance, electrical and electronics, mechanical engineering and chemical engineering.

All the services offered by each of these centres are done at a specified fee. Many firms in the manufacturing industry including small and large firms, locally and foreign owned firms have sought the services from all these divisions. Interviews conducted indicated that due to the increased demand in their services from the industry, KIRDI has recently started outsourcing for professional services from the private sector. They contended that there are many firms, especially MNCs with higher technological capabilities. This strategy seems successful and is now being extended to include other institutions and universities where experts will be taken on contract or part time bases. This coordination strategy is expected to reduce the time manufacturing firms spend waiting for certain services.

⁵⁹ The KIRDI website: <http://www.kirdi.org/> has more elaborate information.

Although relatively good progress has been made at KIRDI, internal constraints have hindered KIRDI from achieving its full potential. To begin with, there is extremely high staff mobility, which seems to be in one direction, from KIRDI to the private sector or learning universities. This makes retention of trained workers difficult. As is the case with many public institutions, the salaries paid are low, this factor makes the retention of workers difficult and once they get trained they leave to join private firms or teaching institutions, universities and polytechnics. This is alright since it would indicate that KIRDI generates human capital for the industry but because of this, most of the time the core staff constitute young graduates with little experience in research. The effect of these is that the productivity of the institute is reduced in terms of research conducted or services offered to the industry. As noted in recent studies almost all the researchers and engineers had less than three year stay at the institute (Mwamazingo, 1999 p. 80-1). Another interesting thing noted was that although KIRDI used to have large employment size, this was drastically reduced by more than half from about 700 in early 1990s. In a study done by Mwamazingo (1999), he found out that KIRDI employed 340 staff in 1992. He showed that in 1992 only about 50 of the staff, about 14% of the total constituted what could be described as the core professional employees either PhDs, masters or bachelors degree. However, considering core professionals to include only those with PhDs and masters the number reduced to only 26 staff which accounted for 7.3% of the total.

With the activities of KIRDI funded by the government, it is obvious that this funding may not be enough as this is usually the case with the institutes funded by the government. For instance in 1992, KIRDI spent over 81% of its recurrent expenditure budget in personnel expenses such as salaries with the remaining devoted for actual research. Due to lack of working capital, it becomes difficult to purchase adequate machinery and facilities for use in the laboratories or stock and maintain library. Lack of funds also does not permit improvement in remuneration and conditions of service. It becomes also difficult to contract services of qualified professionals from the private sector. With availability of funds such professionals could be engaged for instance to carry out surveys or experiments or train in management such ISO. Lack of all these denies Kenya flow of spillovers which are necessary for industrial development. To some extent this has an effect to the weak co-operation between KIRDI and the industrialist as they think KIRDI has little to offer. For its development expenditure, KIRDI relied mainly on foreign donors which was no longer enough or assured.

When the government adopted strict fiscal control, especially with SAPs, the implication was that institutions relying on treasury for grants were forced to reduce their operations drastically. To overcome this problem of funds KIRDI established a National Industrial Research Programme (NIRP). NIRP would draw funds from government, private sector and donors. As a response to this, the government in 1999 more than doubled its allocation to the institute to KShs. 900 Million. A technical advisory board to co-ordinate industrial research programmes was launched. The NIRP would play a more active role for technology development, identify constraints to linkage formation and information flow and maintain a database for industrial technologies. The body would also actively play the matchmaking role to identify and connect for instance SMEs to MNC firms for technical assistance etc. However, to-date KIRDI has not been able create a technologically vibrant culture. It has for instance failed to trigger technology and innovation interests in most large firms including MNC in the manufacturing sector. This problem is compounded by the fact that there is no attempt from the government to link and co-ordinate the research institutions in the country. Lack of such intermediation reduces spillovers in an industry and thus learning and capability building.

3.3.2.2 Brief Summary of Emerging Issues Based on the Role of Institutions Examined

Analysis of post independence period has shown that at independence the Kenyan government continued to pursue import substitution mode of industrialisation initiated during the colonial days. The government encouraged this mode of industrialisation by offering a wide range of protection measures and subsidies. For instance, trade barriers and high tariff walls were erected; foreign exchange and exchange rates were controlled and interest rate and credit policies were introduced to subsidise manufacturing.

In the transition period after independence, the country witnessed an outflow of some FDI present in manufacturing. This was perpetuated by the existing fever emanating from impeding implementation of nationalisation policies. The government formulated policies and created institutions to reduce the outflow of capital and more so to attract new and diversified FDI. As a result of the friendly investment policies, sound macro-economic performance coupled with the rapid increase in demand for consumer goods (demand for consumer goods was extended to the entire East African Community) at the time, there was high inflow of FDI into manufacturing all targeted at import substitution. Analysis done showed that FDI dominated in manufacturing industry in the period. Similarly, increased inflow of MNCs into other sectors of the economy was equally observed e.g. trade and services such as banking. The first two decades of Kenya's independence under import substitution were characterised by generally good economic performance generally attributed to the presence of FDI – GDP and manufacturing industry growth rates were among the fastest ever recorded in the country.

The institutions established played a substantial supportive role in industrial development by facilitating formation of joint ventures between MNCs and local firms; offering finance for start up firms or for expansion; advance indigenous manufacturing technology; assist in technology transfer; promote industries that use locally available raw materials and stimulate linkage formation. All these factors were in favour of industrial capability development and spillover occurrence from FDI. However, as time went by some of the institutions were faced with severe constraints such as lack of capital to finance R&D, acquisitions of technology and machinery, training to develop required and adequate human capital to support industrial capability development. Some of the industrial development financing institutions were transforming and re-orienting some of their services to include banking services by soliciting public deposits. They were therefore forced to charge high interest rates similar to those charged by commercial banks implying declined supportive role to industrialisation – as firms will shy from taking loans for development purposes which would result in capability building. This meant a reduction in their role of nurturing indigenous industrial capability promotion.

One of the consequences of the above was that the indigenisation process launched to nationalise jobs, encourage and support Africans to venture into trade and manufacturing did not turn out very successful. The policy was intended to implant and nurture an entrepreneurship culture to the indigenous, a process expected to result in capability development inspired by the existing FDI in manufacturing. However, weak or declined role of the institutions were not the only things to blame; there was also slackened commitment from the government side and by the end of the first two decades a clear distribution pattern in the structure of the manufacturing emerged greatly skewed in favour of MNCs and the Asians. The large manufacturing industries in the country were dominated by either MNCs or parastatals; Asians dominated small and medium

enterprises while Africans dominated the micro and firms in the informal sector. Although Kenyan Asian and Africa firms benefited from FDI, spillover occurrence, it is impossible to quantify that in this chapter. This is done in the subsequent chapters.

3.3.3 Structural Adjustments: The Era of Liberation and Export-Promotion

So far we have examined the role of FDI in industrial capability development during the colonial period and in the early decades of import substitution. The institutions established to encourage foreign investment and support indigenous capability development were also examined. In this section our analysis is done in the context of structural adjustments. This section is divided into a number of sections starting with economic crises of 1980s which served as the stimulus to the adoption of SAPs. We also examine the economic adjustments with the commencement of SAPs and export promotion. Finally we relate that to FDI and discuss how policies adopted affected FDI, spillover and broad industrial capability development.

The Economic Crises of 1980s: Stimulus for Structural Adjustments

Contrary to the high level of economic growth witnessed until late 1970s, in the period 1981 - 1985 the GDP growth rate declined to a bout (3.6%) from a growth rate of (6.2%) witnessed in the period (1977-80). The rate of growth in manufacturing output slowed down – the growth rate declined from (10.3%) in the period 1977-80 to (3.8%) in the period 1981-85. Similarly both agriculture and service sectors recorded substantial declines in the same periods. The breakdown of GDP and sectoral growth rates is provided in Table 3.5. As a result of the economic stagnation, the manufacturing recorded a corresponding decline in manufactured exports. As noted in Glenday and Ndi (2000), merchandise export earnings as a percentage of GDP declined from (19.6%) in the 1970s, to (16.97%) over the period 1980-84 and a further (13.6%) over the period 1985-89 reaching an all time low of (11.5%) in 1987. Compared to the other main sectors of the Kenyan industry, manufacturing share in GDP stagnated at (13%) in the period 1981-1985. The share of agriculture and services in GDP stood at (33%) and (47%) respectively in the same period (see Table 3.6). As will be shown this had some negative ramifications for FDI in terms of inflow and performance.

This decline in economic performance was blamed on the inward-oriented strategy stipulated in the ISI strategy and of course other factors such as break up of the EAC in 1977 had their toll as well⁶⁰. Ensuing economic distortions resulted in severe structural constraints and macroeconomic imbalances – problem of technology upgrading, lack of information on technology sources, lack of managerial and technical skills and financial constraints⁶¹. Firms failed to develop competitive capabilities to penetrate international markets (Lall, 2001; Wangwe, 1995). The efficacy and efficiency of the institutions formed at independence was declining with little co-ordination among them and lack of finance [see Lall and Pietrobelli (2002)]. Admittedly, inward looking policies pursued at the time under import substitution made it difficult to effectively participate and compete keenly in the export markets. Participation in the domestic and immediate regional market seemed to have had negative implications for Kenya's manufacturing in that by so doing Kenya lost its global competitiveness, which would have cumulatively resulted from participation in the international market – path towards accumulation of export and

⁶⁰ For a detailed analysis on economic instability in Kenya: Theory and evidence see Vandemoortele (1985). Also for detailed analysis of economic crises witnessed in this period see Nyong'o (1988: p. 36-9).

⁶¹ For a detailed analysis on financial constraints see KIPPRA (2001).

marketing capabilities. It was believed that following the import substitution path, Kenyan exports would never compete internationally and especially at a time when the global market was becoming increasingly competitive and production for exports highly innovation based.

Table 3.5: Sectoral and GDP Annual Average Growth Rates, Kenya, 1972-2002

Sector	72-76	77-80	81-85	86-90	91-94	95-00	01	02
Agriculture	3.1	4.2	2.8	4.2	-1.1	1.9	1.3	0.7
Manufacturing	9.6	10.3	3.8	5.7	2.2	1.8	0.8	1.2
Services	3.7	6.4	4.4	5.4	3.0	3.0	2.6	2.3
GDP	3.6	6.2	3.6	5.0	1.5	2.46	1.2	1.1

Source: Sessional Paper No. 2 of 1997, Economic Survey and Statistical abstract various issues.

Table 3.6: Average Sectoral Share of GDP, Kenya, 1972-2002

Sector	72-76	77-80	81-85	86-90	91-94	95-00	01	02
Agriculture	35	34	33	31	28	27	27	26
Manufacturing	10	12	13	13	14	13	13	13
Services	47	47	47	50	52	54	55	55
Others	5	7	7	6	6	6	5	6
GDP	100	100	100	100	100	100	100	100

Source: Sessional Paper No. 2 of 1997, Economic Survey and Statistical abstract various issues.

As noted in most studies, high levels of protection seemed to have distorted resource allocation, constricted foreign competition and restricted technology inflows from abroad. There were very few incentives to build technological capabilities and upgrade imported technologies. Not much emphasis was put on things like cost reduction, productivity improvement, quality control, inventory control among others (see Wignaraja and Ikiara, 1999). The import substitution industrial strategy was not achieving its perceived industrial and subsequently overall economic development agenda. As a result the manufacturing industry failed to play a more dynamic role enough to function as "an engine of country's growth" and had not contributed significantly to foreign exchange (Kenya Government, 1994).

Towards Structural Adjustments Programme and Export Orientation

In light of the above developments, there was a need to pursue an outward-oriented industrial policy in order to re-orient industrial production in favour of exports. Faced with economic stagnation and increasing debt, the government had no alternative than to adopt the structural changes, which were at this time being recommended in the structural adjustment programme (SAPs) and economic stabilisation programs advocated by World Bank and IMF receptively (see Logan and Kidane, 1993). Hence, in the second half of 1980s, there was a change in public policy and the government started implementing SAPs⁶². One of the major objectives of SAPs was restoration of internal and external balances through a strong policy of export promotion coupled with drastic

⁶² The Government adopted SAPs through the publication of sessional paper No. 1 of 1986 on *Economic Management for Renewed Growth*. "Government's strategy for industrialisation must concentrate on two approaches. First, the domestic market for manufactured goods must be expanded markedly. Second, Kenya's industry must be restructured to become much more efficient and capable of exporting goods profitably and competing against imported goods with moderate protection".

reduction in public spending and expenditure switching. There was a strong recommendation towards institutional reforms – for the purpose of encouraging FDI inflow, exports and industrial capability development. New FDI was being encouraged following increased openness to local and foreign investment. Price controls were eliminated and trade protection relaxed. There was free entry into production, services and trade (Mwamazingo, 1999; Glenday and Ndii, 2000). This culminated in a slight recovery in the economic performance in the subsequent years, the GDP grew by (5.0%) in the period 1986-1990, Table 3.5. The growth rate in manufacturing suddenly rose to (5.7%) in the same period (1986-90), agriculture (4.2%) and services (5.4%) (see Table 3.5). Available figures on merchandise exports indicated that merchandise exports as a percentage of GDP jumped to (13%) between 1978 and 1992 (Glenday and Ndii, 2000).

However, despite this improvement in economic performance, the rewards were short lived. Part of the blame was put on the government failure to show serious commitment to the reforms it was undertaking. For instance, the liberalisation measures introduced in mid 1980s were being reverted⁶³; some were getting halted or applied intermittently (Mwamazingo, 1999; Ronge and Nyangito, 2000). The economy once again seemed to have been headed for another doomsday as reflected by the figures in Table 3.5 for the interval (1991-94). The government, however, started showing keen commitment in the first half of 1990s. By 1993, the government undertook far reaching structural reforms to reverse the declining trend in Kenya's economic activities: removal of price controls, removal of import licenses, tariff reductions, liberalisation of foreign exchange markets, and privatisation of public enterprises⁶⁴. Reforms aimed at packaging more attractive investment incentives, streamlining public enterprises and strengthening financial institutions were made.

Deeper Economic Crises under Structural Adjustments and the Consequences on FDI

Despite the introduction of SAPs, in the 1980s and introduction of new reforms by early 1990s, the initial years prior to 1990s recorded very low economic growth than any other period before. During the period 1991-1994, the economy recorded a GDP growth averaging below 2.0%. The manufacturing sector growth rate continued to decline tremendously. It declined from (5.7%) in the period 1986-90 to (2.2%) in the period 1991-94 (see Table 3.5). Major monetary indicators such as inflation, real interest rates and exchange rates all shot up during the period 1991-1994 (see Figure 3.1). This scenario presents a weak and un-conducive learning atmosphere hence reduced effort towards industrial capability development in the period.

⁶³ There was a high element of uncertainty; infant industries were being exposed to international competition. Manufacturing capability was weak as were infrastructure and supporting institutions.

⁶⁴ These reforms were contained in a publication of the sessional paper No. 1 of 1994 on Recovery and Sustainable Development to the year 2010. This paper was meant to complement the sessional paper No.1 of 1986.

Figure 3.1: Inflation, Real Interest Rates and Exchange Rates, Kenya, 1980-2000

Several reasons were responsible for the poor economic performance: withdrawal of foreign aids, political unrest, and high oil prices during the Gulf war and the world economic recession. The major one was the multiparty politics which led to immense political unrest resulting in anxiety and uncertainties of foreign aid, which in turn had negative consequences on the inflow of FDI. This also affected the performance of institutions resulting in reduced effort in their role in industrial capability promotion. FDI inflows in Kenya, which was relatively high in the 1970s, began to decline. Table 3.7 shows that FDI inflow that averaged US \$ 60 million in the period 1977-80, declined to US \$ 31 in 1986-90 and had US \$ 8 as the lowest ever recorded in 1991-94. During this period, 1991-94, FDI accounted for less than 1% in gross fixed capital formation as it did in the period 1996-98. Investors complained of high taxation and delays in profit and dividend repatriation, which had fallen three years in arrears and excessive government regulation (Kimuyu, 1999). During this period, corruption increased and infrastructure deteriorated – making the cost of operating in Kenya escalate. However, in the last couple of years inward FDI has risen fairly rapidly relative to the past years reaching US \$ 42 and US \$ 127 million in 1999 and 2000 respectively. The FDI stock has remained on an upward trend; increasing from US \$ 344 million in 1977-1980 to US \$ 732 million in 1995 and US \$ 1,047 million in 2000. FDI stock had an average growth rate of 12.7% (in current terms) for the period 1977-2001 and a GDP average share of 9.4% for the period (2000-1). Despite this increase in the recent years, Kenya still lies behind many other countries in Africa as a recipient of FDI but with high levels of FDI (95%) concentrated in manufacturing and services (Wignaraja and Ikiara, 1999: p. 69). This will also be shown to be the case in Chapter 4 using data gathered from secondary sources.

Table 3.7: FDI Inflow and Stock, Kenya, 1977-2001

Year	77-80	81-85	86-90	91-94	95	96	97	98	99	00	01
Kenya											
FDI Inflows	60	40	31	8	35	13	40	42	42	127	50.4
FDI (% GFCF)	5	1	2	1	2	1	1	1	3	8	3
FDI Stock	344	434	668	694	732	745	785	827	869	996	1047
FDI Stock (% GDP)										9.5	9.2

Note: FDI Inflows and FDI Stock are in Million of Dollars

Source: Kenya, *Central Bank*; UNCTAD, *World Investment Report Various Issues*; World Bank, *World Development Indicators CD-ROM*

As an attempt to attract FDI, stimulate external trade and expand exports the government enacted policies towards investment and export promotion. Investment Promotion Council (IPC) was established and mandated to attract FDI into the country. Export schemes which were introduced in the early 1990s included introduction of Export Processing Zones (EPZ) in 1990 with the enactment of the export processing zones Act to promote export oriented industrial investment. Export Promotion Center (EPC) was established in 1992 to formulate market strategy, promote an export culture and to identify export opportunities regionally and internationally. Manufacturing Under Bond (MUB) established in 1986 and administered by the investment promotion council (IPC) was strategised to exempt from duty and VAT those exporters who imported machinery and raw materials in manufactured goods for exports. Finally Export Programmes Office (EPPO) was established in 1992 as a kind of duty draw back scheme administered by the Treasury (Kimuyu, 1999; Glenday and Ndi, 2000). It is believed that this helped jump the Exports from (13%) of GDP in 1992 to over (20%) between the period 1993-96 (Glenday and Ndi, 2000). Nevertheless FDI has remained low in Kenya, albeit high in some selected sectors of the manufacturing industry.

3.3.3.1 FDI and Industrial Capability Development: The Role of Institutions During the Export Orientation Period.

In the above section we have shown that due to the economic turbulences of 1980s, SAPs were adopted in Kenya by mid 1980s. All the liberal instruments adopted were outlined such as, liberalisation through decreased deregulating, openness to trade and foreign investment. As noted, this did not appear useful to the country as the economy was plunged into deepened crises until 1993 when the government undertook further reforms to revert the crises trend. The reforms included establishment of a number of institutions for promoting exports, FDI, technology transfer, linkage formation, capability building and performance in manufacturing. In light of this background, this section examines the specific role played by institutions during this period focusing on FDI, spillovers, industrial capability and performance.

(i) Export Processing Zones

The Kenya's Export Processing Zones (EPZ) program managed by the EPZ Authority was established by an act of parliament, *The Export Processing Zones Act*, in 1990 for the promotion of export industrial investment in the country. The programme was initiated with the following objectives: to promote investment and technology transfer in export-oriented activities, to diversify the country's export structure by promoting non-traditional exports, to create direct and indirect employment opportunities in the country and to strengthen linkages (between MNCs and domestic firms) within various economic sectors. Despite having been set at a time when Kenya's economic performance was at

its worst, EPZ has recorded substantial growth on many fronts⁶⁵. The programme has attracted MNC investors from Europe (e.g. Denmark, UK, Belgium, Germany and Netherlands); USA; Asia (e.g. Taiwan, Pakistan, China, India, Sri Lanka, and Hong Kong); Africa (e.g. South Africa). The programme has also generated slow but progressive interest from domestic investors. In 2002, 11% of the total EPZ firms were wholly Kenyan firms; joint ventures between local and foreign firms accounted for 15.0% while wholly foreign owned firms accounted for 75% [Figure 3.2].

To attract investors (mainly FDI) EPZ has designed a scheme, which includes among others; attractive fiscal incentives, simplified operating procedures and lower operation costs, faster set up and smoother operations. As is the case in most countries, under fiscal incentives, the EPZ scheme offers 10-year corporate tax holiday and 25.0% tax thereafter; 10-year withholding tax holiday on remittance of dividends; duty and VAT exemption on raw materials, machinery and other inputs; stamp duty exemption; 100% investment deduction on capital expenditure within 20 years. To facilitate easier procedures and smoother operations, the EPZ scheme offers procedural incentives which include rapid project approval (30 days) and operations under essentially one licence; allows any investment level (no minimum) and unrestricted investment by foreigners; allows access to offshore borrowing operations of foreign currency accounts (no exchange controls); removes autonomous control of investment proceeds; exempts firms from industrial registration act, factories act, statistics act, trade licensing act, imports, exports and, essential supplies act; allows work permits for senior expatriate staff; on-site customs documentation and inspection; provides one-stop-shop service by the EPZ Authority for facilitation and aftercare. The EPZ scheme also provides infrastructure such as high quality zone infrastructure – factory buildings, serviced land and common services (EPZA, 2002)⁶⁶.

In issuing enterprises, EPZ authority accords priority to three major export-oriented activities: Manufacturing, Commercial activities and Services. In order to promote

⁶⁵ A detailed analysis of EPZ in Kenya is provided in (Ikiara and Odhiambo, 2001).

⁶⁶ Website: <http://www.epzkenya.com/> provides information on this.

exports, enterprises located in EPZ must export 80% of their output. The EPZ enterprise licences are evaluated under strict criteria to include only enterprises that would lead to development of new export products and new export markets, technology transfer and skill training, job creation, new productive investment in buildings and machinery, and finally establish backward linkages with the Kenyan economy⁶⁷ – hence playing an important role in development of industrial capability.

An assessment based on the objectives of EPZ and based on data available (Table 3.8) indicated growth in performance. For instance, the number of gazetted zones had risen from 11 in 1994 to 31 in by 2002. The number of operating companies in the gazetted zones had also increased from 15 to 54 implying that 39 new enterprises had become operational during the period. From the interviews conducted, it was noted that an increasing number of firms in the EPZ were in agro-processing, especially in cotton weaving, horticulture and tea processing. Diversification was taking place and there were increased investments in textile and garment, electronics, printing, pharmaceutical. Textiles and garments accounted for 55%; electronics 27%; chemicals and pharmaceuticals 11% with the remaining 7% shared among the remaining products. Capital investments in the same period grew by over 500% (in current prices) to stand at Kshs 12.728 billion in 2002 from Kshs 2.097 billion in 1994.

Value added in EPZ output has been increasing over the last few years and was estimated at 34% of the EPZ's turn over (Kenya Economic Survey 2001). Total turn over for the EPZ companies expanded by 1000% (in current prices) from Kshs 945 million in 1994 to a record Kshs 10.673 billion in 2002 (see Table 3.8). The impetus behind the high growth in performance especially after 2000 came as a result of the enactment of African Growth Opportunity Act (AGOA). As a share of total sales, exports increased from 53.7% in 1994 to 82.8% in 2000 and to 91.3% in 2002. Garments accounted for over 81% of the total EPZ exports. High export performance has been attributed to the opening up of the United States market to textiles and garments under AGOA and also preferential access to the common market for Eastern and Southern Africa (COMESA), as well as European Union markets⁶⁸. Exports to United States accounted for 79% of the total exports; Europe 8%; EAC/COMESA 7% and others 6% (EPZA, 2002). On the other hand, imports into EPZ stood at Kshs 635 million in 1994 compared to Kshs 7.043 billion in 2002.

Table 3.8 shows that direct employment in the EPZ had risen to 26,447 in 2002 from only 1,865 in 1994 depicting an average annual growth rate of 43.7% in the entire period, 1994-2002. Interviews conducted revealed that an estimated 4,480 jobs were created in 2001 in sub-contracting and supplies. It was also noted that over 60% of the EPZ employment are female. Employment of expatriates had grown significantly and over 700 foreign expatriates were employed in EPZ by 2002. The average annual growth rate for the employment of expatriates was 47%. The highest annual growth rates recorded after 2000 would be expected as it coincided with the enactment of the AGOA programme. It was also noted that availability of on-the-job and other training opportunities for the employees were provided. Over 25 EPZ companies offered various kinds of training including, computer assembly, garment making, weaving technology, and quality control.

⁶⁷ The EPZ website: <http://www.epzkenya.com/> provides background information on this.

⁶⁸ See the IPC website: <http://www.ipckkenya.org/> for more information.

The data obtained provides evidence of a deepening linkage system between the EPZ and the rest of the economy. Between 2000 and 2002 local purchases increased by more than double from Kshs 1.2 billion to 3.2 billion. Domestic sales also increased by more than two-fold from Kshs 438 million to Kshs 1.3 billion (period 1994-2002, Table 3.8).

Table 3.8: Performance of Export Processing Zones, Kenya, 1994-2002

Years	'94	'95	'96	'97	'98	'99	'00	'01	'02
Gazetted Zones	11	13	14	15	16	16	19	23	31
Enterprises Operating	15	19	22	17	18	22	24	39	54
Employment Locals	1,865	2,718	2,884	2,824	3,645	4,684	6,487	13,444	26,447
Employment									
Expatriates	-	79	71	61	74	83	133	314	701
Total Employment		2,797	2,885	2,885	3,719	4,767	6,620	13,758	27148
Exports Sales									
(KShs Mn)	507	716	1099	1,263	1,805	3,020	3,635	5,962	9,741
Domestic Sales									
(KShs Mn)	438	620	496	503	649	706	755	538	1,299
Total Sales									
(KShs Mn)	945	1,336	1,595	1,766	2,454	3,726	4,390	6,500	10673
Foreign Imports									
(KShs Mn)	635	940	1,009	1,258	2,056	2,126	2,349	3,990	7,043
Local Purchases									
(KShs Mn)	192	209	292	402	511	955	1,229	2,235	3,218
Investment									
(KShs Mn)	2,097	3,899	4,370	4,657	5,747	5,941	6,107	8,950	12,728

Source: Obtained from Kenya, *EPZ Authority and Central Bureau of Statistics*; <http://www.epzkenya.com/>

Despite this performance, some critiques had it that EPZ programme has not lived to its expectations particularly in the area of employment generation and stimulation of industrial growth and development in the country (Chabari, 1999). Another critique was that the EPZ programme had failed to steer the country's industrialisation process (Mireri, 2000). As an example, EPZ had not generated strong linkages both in manufacturing and in the farming sector as anticipated. This implies less spillover benefits through such linkages. With regard to training, it has been argued that skills employed in those industries are not really high especially in the textile firms; can be acquired easily by personnel without a university degree. Graduates working in some of these firms faced with a possibility of de-skilling and low remunerations. Interviews with officers from EPZ indicated that the Kenyan export processing zone follows the traditional assembly-for-export-only pattern. Failure to have singled out specific industry groups for specialisation; facilities are poorly maintained or not promoted to prospective investors' expectations. Nevertheless it is still early and more time should be allowed before a concrete conclusion can be made as the analysis was done within a very short span of time and under severe prevailing economic environment. EPZ has also been faced by some weaknesses.

(ii) Investment Promotion Centre

The Investment Promotion Centre (IPC) was established in Kenya as a statutory body in 1986 through an Act of parliament to promote private investment in Kenya. The investment centre works closely with all government ministries to facilitate acquisition of relevant approvals, license and permits⁶⁹. IPC encourages investments that are: labour

⁶⁹ The IPC website: <http://www.ipckenya.org/> provides background information on this.

intensive; utilises locally available raw materials; stimulate foreign exchange earning or saving and promote efficient transfer of technology. Although there are no legal requirements in equity ownership levels, IPC highly encourages MNCs to form joint ventures with locally owned firms⁷⁰. To facilitate this, IPC maintains a database of locally owned firms interested in forming joint ventures with foreign firms. These firms would then be matched to the incoming foreign investors who are interested in operating joint ventures with locally owned firms. IPC is supposed to facilitate acquisition of all the required approvals and licences from government ministries (IPC, 2001).

Available statistics from IPC does not depict a steady trend in projects processed by IPC. Total capital costs and employment showed high fluctuations in the period 1990-2000. Total capital costs by local firms seemed to have increased tremendously from 1998 while that of foreign firms has been on an upward trend until 1994 when it started declining (Table 3.9). A more or less the same trend is observed with employment. Employment of the locals as well as the expatriates was only high in the early 1990s. However, very slight growth seems to be appearing from 2000 perhaps due to the enactment of AGOA.

Table 3.9: Capital and Employment of IPC Processed Project, Kenya, 1990-2000

TCC in 000'	'90	'92	'94	'96	'98	'00
Total Capital Cost						
Local	3,530	2,027	3,859	3,533	7,831	10,610
Foreign	1,918	1,935	2,874	2,053	2,315	2,349
Employment						
Local	11,235	12,730	12,435	7,083	3,308	3,971
Expatriate	205	184	203	223	116	156
Total	11,440	10,926	12,638	7,306	3,424	4,107

Source: Obtained from Kenya, *Investment Promotion Council (IPC) and Central Bureau of Statistics (CBS)*.

Total projects approved declined significantly from an annual average of 109 in the period 1990-95 to only 50 in 1995-2000 (Table 3.10). During the entire period 1990-2000, an annual average of 69.5 (84.6%) of all the projects approved by IPC were conventional while 12.3 (15.4%) were within MUB. Following annual average computed following IPC's classification (see Table 3.10) the projects approved ranked as follows: manufacturing (15.5), services (14.6), tourism (11.4) and textile (10.6).

⁷⁰ From the interviews conducted it was noted that very few joint ventures had been formed as a result of IPC's active role of match making or otherwise (Interviews by author, 2002: 2003)

Table 3.10: IPC Projects Approved, Kenya, 1990-2000

Sector	90	91	92	93	94	95	96	97	98	99	00
Tourism	11	25	17	15	14	12	7	7	5	7	5
Pharmacy	4	1	7	6	4	3	2	0	0	1	0
Textile	18	14	13	29	23	5	1	0	4	4	6
Leather	0	2	7	3	3	0	0	1	1	4	2
Service	14	17	15	16	16	15	22	18	17	3	8
Agro	20	18	13	12	3	7	6	1	3	3	0
Food	2	11	10	8	5	6	8	6	5	12	8
Computer	4	1	3	3	1	2	2	2	1	2	3
Fish	7	11	4	6	1	3	1	0	1	1	1
Manufacturing	27	30	24	15	16	14	15	5	10	13	2
Building	4	9	6	5	4	1	1	1	2	2	0
Mining	2	2	0	2	1	2	0	4	0	2	0
TOTAL	113	141	119	120	91	70	65	45	49	56	34
MUB	18	14	8	30	27	15	3	1	6	6	11
Conventional	95	127	111	90	64	55	62	44	43	50	23
TOTAL	113	141	119	120	91	70	65	45	49	56	34

Source: Obtained from Kenya, *Investment Promotion Council (IPC) and Central Bureau of Statistics (CBS)*.

Analysis done by countries of capital origin paints a similar picture. Total capital investment of projects approved declined significantly from an annual average of 2,242.23 in the period 1990-94 to only 1911.14 in 1996-2000 (Table 3.11). This represents a decline of 14.8% (in current prices) in foreign investment capital. There was growth in capital investment in the two periods in five of the countries reported in Table 3.11. These countries included United States whose capital investment increased from an annual average of 69.3 in 1990-94 to 157.1 in 1996-2000; United Kingdom from 608.6 to 656.8; China from 95.3 to 170.2; India from 55.0 to 138.4 and Pakistan from 42.6 to 275.7. There were severe declines in capital investment from Germany, Swiss and Italy. An interesting observation that emerges from the data analysis is that there seems to be increasing investment from advanced developing countries compared to developed countries. It would therefore be interesting to know the nature of processing activities they are undertaking and level of value added. Only then we would be in a better position to talk about technology transfer and spillover occurrence.

One of the major constraints is that although IPC is supposed to work closely with government ministry, it does not seem to have much influence. This is explained by the fact that modalities of how to do that have not been laid down properly. IPC lacks the capacity to do that. Staff employed are few against many ministries and their departments and given the normal government salary their motivation/morale is equally not boosted. In a few cases, they have not received the co-operation they expected from the ministries and have not been able to play its facilitation role of one stop shop effectively. This means that the bureaucracies which are supposed to be eliminated by making IPC one stop shop are still far from being eliminated. A report on Kenya's investment TSG (1998) noted that IPC was still "too bureaucratic and understaffed and that the General Authority it issues which authorises an investor to start operations provided that applications for all necessary licences are made within 180 days was ineffective". The country lacked formal guidelines to assist would-be investors seeking to acquire land, obtain a trade licence or clear imports (TSG, 1998).

Table 3.11: Foreign Investment Capital, KShs. Million, Kenya, 1990-2000

Country	'90	'92	'94	'96	'98	'00
United States	55.23	14.57	138.23	465.70	0.00	5.50
United Kingdom	919.03	137.39	769.26	1,097.84	796.10	76.40
Italy	46.75	120.65	263.60	-	30.00	2.00
China	13.71	61.54	210.50	91.40	185.62	233.45
India	62.83	21.00	81.24	17.00	13.13	385.20
Swiss	4.28	10.62	32.00	-	-	-
Pakistan	76.94	12.88	38.07	15.00	812.13	-
Germany	27.54	154.24	3.27	17.32	27.20	-
Others	711.46	1,402.54	1,337.33	348.92	777.55	362.80
Total	1,917.77	1,935.43	2,873.50	2,053.18	2,614.90	1,065.35

Source: Obtained from Kenya, *Investment Promotion Council (IPC) and Central Bureau of Statistics (CBS)*.

From the interviews conducted with several officers from IPC, it was observed that the centre lacks the necessary capacity to undertake an analysis of incoming investors strategies so that this can be matched with strategies of locally owned firms. In comparison to countries in the East Asia the match making process remains largely unexploited in Kenya. It was also noted that IPC failed to effectively market the country internationally. An explanation to this is that the funding from the government has not been adequate for IPC whose budgets are planned in annual cycles. With adequate funding, IPC in collaboration with Kenyan embassies abroad is supposed to market the country investment opportunities, which would perhaps change the countries tarnished image over corruption and bad governance witnessed during Moi's regime. This would perhaps attract more MNCs targeted especially in areas where Kenya would benefit technological spillovers alongside employment. Another aspect, which ought to be strengthened, is the personnel training as most of them seemed misplaced in the sense that they held totally different qualifications from those required in investment. Staff training ought to become continuous in-house, locally and even in abroad for exposure especially to other countries investment promotion centers. However, according to interviews done significant developments have been undertaken whose achievements will be assessed in the near future. IPC has prepared Kenya's investment code expected to govern and guide all investments in the country.

(iii) Export Promotion Centre and Export Promotion Programme Office

The Export Promotion Council (EPC) was established in 1992 to co-ordinate and harmonise export development and promotion activities in Kenya. Working in collaboration with both private and public sectors, EPC identifies new export markets, disseminating export-related information, reviewing the country's export performance on a regular basis and advising government on new policy initiatives designed to boost exports⁷¹. The EPC also co-ordinates national strategies for attracting export investment and finance for export sector. EPC collaborates strongly with Export Promotion Programme Office (EPPO) which was set up in 1992 under Ministry of Finance to promote manufacture for exports in the country. This was done by offering tax incentives, which included administration of duty and VAT waivers on imported materials used by enterprises manufacturing products for export, as well as on materials produced locally for use by industries, which manufacture goods for export. The funding for EPC comes mainly from the Kenyan government. Since this funding is not enough the council also seeks funding from international financial organisations such as: The

⁷¹ The IPC website: <http://www.cbik.or.ke/epc.htm> provides background information on this.

European Union/GTZ Protrade - Germany; Japan International Co-operation Agency; Japan External Trade Organisation; Centre for the Promotion of Imports from Developing Countries.

To promote agricultural exports, EPC undertakes the following activities: identification of bottlenecks relating agricultural exports and making recommendations for government intervention; export market development for agricultural products; product development and adaptation of agricultural exports; training of exporters. EPC also promotes commercial crafts by maintenance of database of reputable commercial craft producers and exporters; selection of producers/exporters to participate at sponsored fairs/exhibitions for the crafts sector; training on business management skills; training on product design, development and adaptation.

EPC has an external liaison division that deals with matters concerning council and other organisations both in Kenya and internationally. Its functions include: developing rapport with Kenya's commercial attaches abroad; production of publications and documentaries; maintaining contacts of public and private organisations, Kenya missions abroad, particularly the commercial attaches, foreign missions based in Kenya and bilateral and multilateral bodies; advertising (It also has a Business Information division in (CBIK)).

The export market development division is responsible for development and implementation of the national export development programme in close collaboration with relevant public and private sector organisations. Activities include: market investigations and surveys; trade missions; buyers/sellers meetings; contact promotion programmes; trade fairs and exhibitions; incoming buying mission. To do this, EPC collaborates with government ministries, organisations and institutions. EPC also maintains a research division responsible for conducting research on policy analysis pertaining to exports promotion this is done with support from collaborating organisations and institutions.

It was noted during the interviews that the funding from treasury was not enough. There was also a need to employ more professionals and to train them continuously extending the training to abroad for exposure. The amount voted for EPC was just enough for staff remunerations and personal emoluments, leaving very little for the actual business of export promotion. Since EPC had come up with a strategic plan covering the period 2004-2007 with an aim to improve the council's efficiency in trade promotion and the services it offers to importers, it was interesting to see if the government would increase its EPC's proposed budget. The council also intends to expand its departments to further its role and to offer a support service. The strategic plan proposes the development of export development fund to finance trade development and product diversification. Nevertheless the council hoped to generate funds by providing trade information services through its Centre for Business in Kenya (CBIK).

(iv) Kenya Industrial Property Office

Kenya Industrial Property Institute (KIPI) was first established in 1990 as Kenya Industrial Property Office (KIPO) after enactment of the Industrial Property Act in Kenya. In 2002, KIPO was changed to KIPI upon the coming into force of Industrial Property Act in 2001. The institute was established under the Ministry of Trade and Industry as one of its departments. The main functions of the Institute were to: administer industrial property rights; provide technological information to the public; promote inventiveness and innovativeness in Kenya; and provide training on industrial

property. Under Industrial Property Act four elements of intellectual property rights are registered: patents, utility models, industrial designs, trade and service Marks⁷². The act also provides for technology transfer agreements and licences. KIPi handles disputes related to patent infringements. The law on patents borrows heavily from the UK law, with some features of the European and US systems. Patents can be granted for a maximum period of 20 years. This is done with conformity with the TRIPS agreement at the WTO.

Kenya is a member of African Regional Industrial Property Office (ARIPO) and World Intellectual Property Organisation (WIPO), which administers the Patent Cooperation Treaty (PCT)⁷³. African regional Industrial Property Office has its headquarters in Zimbabwe. This is a regional organisation of 14 countries. Patents registered with both KIPi and ARIPO are valid in all the member countries. Although almost none of the Kenyan Manufacturing firms has patented with KIPi, most local applications are from individuals and research institutions, a clear reflection of the weak state of local technological activity.

One of the constraints noted is that although KIPi obtains fees from registration, renewal and maintenance of patents, it is usually remitted to the government. The government, through treasury, controls and authorises all the expenditures undertaken by KIPi. This denies KIPi budget autonomy. Whatever comes back from treasury is hardly enough for its operations.

In order to create awareness on the importance of intellectual property rights, KIPi organises conferences and seminars which draws participants from all industrial enterprises, R&D institutions including private and public research institutions. KIPi offers training and information to local institutions, industry and SMEs on patenting. The established international links with European patent office, WIPO, United State & Trade Marks office, serve as source of international information, which is stored in the data centre at the institute. Assistance is offered to the applicants who would sometimes require specialised kind of information.

From the interviews conducted, KIPi appeared not to have the expected technical skills to play the role expected of a functional intellectual property office under the new WTO. It is faced with a general shortage of qualified staff: This implies that the institution is not able to meet these training and advisory functions adequately. The fact that KIPi undertakes the advisory role to its clients as well as examining patent applicants means that, it ends up doing too much. There is perhaps a need to separate the two roles or have them placed in different institutions.

It comes out clearly that due to low levels of innovation undertaken in Kenyan industry, KIPi's role in technology promotion is relatively small. Lack of legal skills in intellectual property rights needs to be addressed.

⁷² The KIPi website: <http://www.kipo.ke.wipo.net/> provides background information on this.

⁷³ See KIPi's website: <http://www.kipo.ke.wipo.net/> for further details.

3.3.3.2 Brief Summary of Emerging Issues Based on the Role of Institutions Examined

As a summary to the above discussion, it has been shown that Kenya started pursuing export promotion under SAPs in the mid 1980s following the decline recorded in economic activities under import substitution. The inward-oriented strategies under import substitution strategy were to blame for the decline witnessed in economic performance. The break up of East African Community (EAC) in 1977 culminated in a diminished market for Kenyan manufactured goods. The ensuing economic distortions resulted in severe structural problems and macroeconomic imbalances. The role and efficiency of the institutions created at independence was declining due to constraints facing them, hence little co-ordination among them and little role in industrial capability development.

High levels of protection under import substitution distorted resource allocation, constricted foreign competition and restricted technology transfer. There was little technological development and imported technologies were not upgraded and thus I-S was not achieving its perceived industrial and economic development. As a consequence of this structural problems and lack of stability there was a change by mid 1980s and Kenya began implementing an outward-oriented industrial policy in favour of industrial production for exports. Export promotion was done under structural adjustment programs SAPs with support from World Bank and IMF to restore internal and external balances through a strong policy of export promotion coupled with strong domestic protection, sharp cuts in public spending and expenditure switching. The existing supportive institutions would also be reformed and new ones would be opened. Price controls were eliminated and trade protection relaxed. There was free entry into production, services and trade. There was a slight recovery in economic performance in the subsequent years as witnessed in GDP, manufacturing and manufactured exports.

However, due to intermittent application of liberalisation measures and lack of commitment to the reforms the government was undertaking, the rewards of economic performance were short lived. Nevertheless, the government undertook further structural reforms in 1993 to reverse the declining trend in Kenya's economic activities. Among other reforms discussed included reforms aimed at packaging more attractive investment incentives, streamlining public enterprises and strengthening financial institutions. This did not seem to have significant impact since economic growth recorded in the early 1990s was lower than for any other period before. Many reasons accounted for the continued poor economic performance ranging from withdrawal of foreign aids, political unrest, high oil prices during the Gulf war to world economic recession. FDI inflows declined making Kenya lie behind most countries in Africa although maintaining relatively high levels of FDI stock in manufacturing. Within the period of SAPs the government policies to promote exports and stimulate FDI resulted in the creation of institutions such as: Investment Promotion Council to attract FDI, Export Processing Zones to promote export oriented industrial investment; Export Promotion Council to formulate market strategy, promote an export culture and to identify export opportunities regionally and internationally; Manufacturing Under Bond administered by IPC to exempt from duty and VAT exporters who imported machinery and raw materials in manufactured goods for exports; KIPi to administer industrial property rights. As noted, most of these institutions have had a substantial performance. Nevertheless this performance is not as expected due to a multitude of problems ranging from lack of adequate financial support, lack of required skills, sometimes poor governance and weak co-ordination.

In a nutshell, we note that the period of export promotion under SAPs, was characterised by poor and intermittent implementation of liberalisation measures with minimal support and sometimes withdrawal of government support by World Bank and IMF. There was severe institutional failure due to minimal and sometimes lack of support from the government; there was macro-economic instability; widening internal and external imbalances. All these factors worked to reduce the inflow of FDI, capability development and thus general performance in the period.

3.3.4 Recent Performance and Effort towards Industrialisation

On recent economic performance, it is obvious that the economy was still in turmoil and was faced with a multitude of problems ranging from interrupted trade liberalisation process by the onset of stabilisation crises in 1997 following the collapse of an IMF programme⁷⁴. This led to significant instability of shilling and foreign exchange markets resulting in macro-economic instability. The economy was characterised by low domestic savings. Comparatively, high interest rates, inadequate and high-terrified electricity supply elevated the cost of production. This was compounded by increased transaction costs due to deteriorating institutions, poor infrastructure mainly roads and railway lines all of which undermined competitiveness of exports. These factors eroded the investment climate; there was a decline in investor confidence, leading to a sharp fall in FDI. The fact that SAPs were still being implemented a decade down the road, did not seem to bare meaningful fruits [Kenya Economic Survey, (1997: 1998: 1999); Phillips and Obwana, 2000; Todaro 2000: p.284; Soderbom, 2001]. In the period 1991-2000, the economy recorded the lowest and worst economic growth level since the country's independence with GDP growth rate averaging 1.5% and 2.46% in 1991-94 and 1995-2000 respectively. Manufacturing declined from (2.2%) in the period 1991-94 to (1.8%) in the period 1995-2000.

Liberalisation has been criticised as lacking in credibility – existing manufacturing firms could no longer maintain their export competitiveness and many more were unable to keep up with cheap imports. This was happening at a time when the international trade regime was no more in favour of poor economies riddled with macro instability and failure to develop competitive capabilities. The rules advocated by WTO recommended for removal of protectionist measures and opening up more to international trade and investment.

In the midst of all these problems the government launched a new effort to have its industry industrialised with the industrialisation policies clearly outlined in sessional paper No. 2 of 1997 whose objective is to transform Kenyan economy into a newly industrialised country by the year 2020⁷⁵. Two main strategies are being considered: First, to consider industry as the leading sector in economic development and second, to earmark specific industries for government support. The proposed industrialisation strategy outlines some of the measures to be implemented, to industrialise over a two-stage period. In the first phase, the government will selectively encourage labour-intensive, resource-based and light manufacturing industries, where the country enjoys comparative advantage. In the second phase, policy will target intermediate and capital goods industries that are more technology and capital intensive but that must await the

⁷⁴ An elaborate analysis on implementation of SAPs in six African countries including Kenya can be seen in Bonaglia and Fukasaku (2002).

⁷⁵ The eighth development plan (Kenya Government 1997 (b)) is the first 5 year planned programme implementation.

removal of infrastructure, technology, and human capital and savings constraints. The policy framework for industrialisation, therefore seeks to provide incentives, improve technological capabilities and provide an appropriate institutional framework that will ensure an industrialisation process led by the private sector (see Kenya government, 1997; Ronge and Nyangito, 2000). FDI was expected to play an important role through increased capital investment, technology transfer through formation of linkages in manufacturing industry.

On the basis of the discussion presented on recent performance, four important developments have emerged. *First*, that due to a wide range of factors discussed – weak infrastructure, weak technological capabilities, lack of sound institutions and coordination among them, macro-economic imbalances etc. – the last one decade the Kenyan economy literally underwent stagnation. *Second*, the poor economic performance alongside poor inconsistent policies under SAPs translated into low levels of FDI and domestic investment. *Third*, the country is still committed to the path of SAPs and stabilisation measures started in 1986, followed with more reforms and commitment in 1993. *Fourth*, Kenya follows a strong policy mission towards industrialising the country by the year 2020. Increased role and participation of FDI was expected to be important in achieving this mission. Kenya now belongs to expanded COMESA tariff free trading block and has been accredited to the AGOA export programme, which has boosted mainly textile and garments industries in EPZ. This has revived the textile industry, which had collapsed following the ban of Kenyan textile and apparel in 1994 due to the transshipment from other regions – mainly Asia.

3.4 Summary and Conclusion

This chapter has attempted to examine how industrial policies pursued influenced FDI in Kenya's manufacturing. The broad role of FDI in Kenya's industrialisation process focusing on spillovers, capability development and performance was examined. Similarly, this chapter examined the institutions established for promoting FDI and supporting industrialisation.

Since the commencement of manufacturing in Kenya, the country has only pursued two main modes of industrialisation: import substitution and export orientation. Import substitution industrialisation was adopted in 1945 when the first major drive towards industrialisation took place in Kenya. This mode of industrialisation continued to be encouraged in the country until mid 1980s when it was gradually phased out and replaced with export orientation industrialisation dawning the era of structural adjustments programme in Kenya.

Since industrialisation was initiated before independence and was widely dominated by European MNCs, the analysis undertaken revealed that Kenya enjoyed an early colonial manufacturing experience from capital investment made in the manufacturing industry from foreign investment and in particular British firms as they were the majority during the colonial period. These benefits can be interpreted as spillovers into manufacturing. The country also enjoyed most of the revenue earning primary sectors developed during colonial days as well as infrastructure such as railway line, roads and port facilities. Under I-S industrialisation, the country was characterised by rapid economic growth with most economic activities witnessing high growth rates. There was increased consumer demand for consumer goods in the domestic market. This resulted in increased FDI inflow into manufacturing mainly in the agro-based industries. In addition to their high capital

investment in manufacturing, contribution in exports, value added, employment and revenue generation to the economy, the country benefited manufacturing experience – spillovers. Based on this chapter's findings, this is no longer a hypothetical case although it needs to be empirically ascertained despite difficulties involved in doing that. This will be attempted in the subsequent chapters; Chapter 4 using productivity approach. Chapter 5 will examine spillovers using direct consequences based on learning and capability building. Chapter 6 examines spillovers from the angle of MNCs while Chapter 8 will do that from the angle of locally owned firms.

The economic crises of late 1970s and 1980s were largely blamed on inward looking policies pursued under import-substitution. As a result, manufacturing growth, value added and exports all declined steadily. It was becoming increasingly difficult to effectively participate and compete in export markets. To stop this trend, the import substitution policy was dropped in favour of an outward-oriented industrial policy to re-orient industrial production in favour of exports under liberalisation in aegis of SAPs. This was followed by a slight recovery in the economic performance, which lasted for only a short time. There was lack of commitment to the reforms being undertaken, hence in 1993, far-reaching structural reforms were undertaken to reverse the declining trend but again without much success. A further decline in most economic activities including those of FDI was noted e.g. most sectoral growths declined. A few factors were touted for that: world economic recession, multiparty politics that led to immense political unrest, withdrawal of foreign aids and high oil prices during the Gulf war. The political unrest resulted in anxiety and uncertainties of foreign aid, which in turn had negative ramifications on the inflow of FDI, which could be rated as only modest at the time. Nevertheless, FDI stock in manufacturing remained high and continued to generate highest levels in employment, revenue generation, value added, export performance etc.

In short, export orientation under SAPs in the last decade was characterised by first, economic stagnation due to weak infrastructure, weak technological capabilities, lack of sound institutions and coordination among them, macro-economic imbalances etc. Second, the poor economic performance alongside poor inconsistent policies translated into low levels of domestic investment as well as FDI in the country. The consequence of this was that, reduced spillovers which would occur had FDI activities been vibrant would certainly reduce. As a result of all the factors advanced, the capability development process slows down. Nevertheless, based on the analysis done, we conclude strongly that FDI played a role in the industrial development. Although presence of spillovers will be confirmed econometrically in the subsequent chapters, we have strong qualitative evidence from our analysis that they existed in Kenya's manufacturing. Also despite severe constraints, institutions examined played an important role in the FDI vis-à-vis industrialisation process.

Chapter Four

FOREIGN DIRECT INVESTMENT AND FIRM LEVEL PRODUCTIVITY A PANEL DATA ANALYSIS

4.1 Introduction

In Chapter 3 we examined FDI, institutional setting and industrial policies and how their interaction influenced further FDI inflow, spillover benefits, industrial capability development and performance. The chapter showed that FDI had played an important role in the Kenyan industrialisation process implying positive benefits of spillover occurrence into the manufacturing industry. Analysis and findings of Chapter 3 were considered to provide a useful background for empirical/econometric analyses in the subsequent chapters. Hence, this chapter uses firm level panel data to examine econometrically the effects of foreign presence on productivity performance in the Kenyan manufacturing. Stated differently, the chapter adopts productivity techniques and estimates a production function in an attempt to examine technological spillovers in the Kenyan context. The production techniques are employed in our estimations despite weaknesses outlined in Chapter 2 in order to provide a broader set of results for Kenyan manufacturing based on the preliminary data obtained from the official sources. Insights drawn from early contributions based on Caves (1974) as well as recent methodological developments such as those by Aitken and Harrison (1999) will be taken into consideration to enable broad comparisons of this chapter's findings. To the best of our knowledge, to-date, not a single concrete study exists based on Kenyan manufacturing industry that uses a rigorous productivity technique for spillover analysis; the results obtained in this chapter will therefore contextualize spillovers in the Kenyan manufacturing and provide a wider set of results for comparisons. One such important comparison will be done with existing studies that have largely remained inconclusive in terms of effect, direction and magnitude of spillover occurrence. Similarly, results obtained in this chapter will be compared to those obtained in the subsequent chapters in line with emerging issues and critiques raised in the preceding chapters.

Most important, the analysis done in this chapter will enable a comparison of foreign and locally owned firms in manufacturing on the basis of general trends on firm and sector level characteristics. The chapter also examines whether technological spillovers occur in Kenyan manufacturing industry by determining the impact of foreign presence on local firms' performance based on total factor productivity. The influence of firm size and technological gap (absorptive capacity) in the spillover process will equally be examined. Data used for empirical analysis comes from an industrial survey conducted annually in Kenya – an eight-year balanced panel database is constructed for the current analysis. This chapter specifically addresses the following issues:

- (1) Undertake a comparative analysis of the behaviour of foreign and locally owned firms in Kenyan manufacturing industry (*by whole industry and sector*).
- (2) Determine whether foreign presence affects productivity of locally owned firms in Kenyan manufacturing industry (*on the basis of labour and total factor productivity*).
- (3) Determine using productivity techniques whether firm size influences spillover occurrence to the locally owned firms.
- (4) Determine using productivity techniques whether technological gap (absorptive capacity) influences spillover occurrence to the locally owned firms.

The Chapter is organised as follows. Section 4.2 presents the theoretical framework, data description and the estimation techniques used in this chapter. In section 4.3, a comparative behaviour of foreign and locally owned firms is undertaken based on the descriptive characteristics derived from the panel data. This involves a detailed and in-depth analysis of panel sample characteristics. In section 4.4, we determine econometrically the effect of foreign presence on labour productivity and total factor productivity using panel data estimation technique. In section 4.5, we also determine using a productivity technique whether firm size influences spillover occurrence to the locally owned firms. Similarly, in section 4.6 we determine using productivity technique whether technological gap influences spillover occurrence to the locally owned firms. Finally, section 4.7 presents summary and conclusion.

4.2 Theoretical Framework, Data and Estimation Technique

In this section, we present a discussion of the productivity approach in spillover analysis. This is briefly done as much of its analysis, including critiques, were extensively discussed in Chapter 2. The discussion done here is intended to outline the existing disjuncture in spillover analysis more appropriately and in line with the objectives of this chapter. In this section, we also discuss the data and the outlined estimation techniques to be used. Under data description, data source, data type and creation of the panel database for use in the analysis are presented. For estimation technique, the section discusses panel data technique analysis, which will be used for econometric analysis in this chapter.

4.2.1 Theoretical Framework: The Productivity Approach Revisited

As discussed in Chapter 2, most of studies examining spillovers from FDI have been largely based on production function approach. The seminal contribution by Caves (1974) is considered to have pioneered in this approach as he presented the first systematic production function framework examining FDI spillovers. According to Caves, technological spillovers included all aspects resulting from the presence of MNCs in a host country that increases the productivity efficiency of locally owned firms. He argued that spillovers occurred since “MNC cannot capture all quasi rents due to its productive activities or to the removal of distortions by the subsidiary’s competitive pressure.” Since then, a plethora of empirical studies conceptualising spillovers in terms productivity gains have emerged. Key studies have been discussed in the literature section such as Globerman (1979); Blomstrom and Pearson (1983); Blomstrom and Wolffe (1994); Blomstrom (1986); Wang and Blomstrom (1982); Blomstrom and Kokko (1997: 1998); Kokko (1994:1996); Kokko, Tansini and Zejan (1996) among others. All these studies, which in actual sense replicated Caves approach, found positive spillovers.

To the contrary, some of the studies conducted have failed to find technological spillovers [Aitken and Harrison, 1992; Haddad and Harrison, 1993; Aitken, Hanson and Harrison, 1997; Aitken and Harrison, 1999]. Interestingly, these studies seem to have something in common, belong to a new generation of spillovers studies, which attempts to advance the frontiers of spillover understanding by extending the original approach, or put in other words, extend the pioneering instruments that Caves had used. In doing so, these studies have refined their methodologies to address among other things; national, locational, industry and firm-level specificities, scale, technological gap, trade orientation and demonstration effect variables. However, on the basis of arguments raised in this

thesis, we still emphasise that despite the considerable evolution demonstrated in estimation techniques of aggregate spillovers, relationships traced through these methodologies cannot be equated with actual spillovers – see critiques outlined in Chapter 2. Technological spillovers were shown to be complex and difficult to capture given their uncertain, incomplete mastery and tacit nature of technology. This is more so when spillover occurrence mechanisms, firm and industry dynamics as well as institutional environment are hardly understood. It is in this understanding that this thesis uses case studies in an attempt to advance spillover understanding beyond the aggregate level econometric methods.

In light of this divergence in spillover analysis and findings, this chapter attempts to make a contribution to this debate by examining spillovers from FDI to domestic firms in the Kenyan context. Contrary to all the studies done in the past, we intend to combine 'traditional estimations' and 'new developments' approaches for comparison purposes. The new developments will be conducted in line with more recent studies such as Aitken and Harrison (1999). Accordingly, we will therefore undertake a panel data analysis taking into consideration industry specificities (industry dummies) and time dynamics (time dummies). Panel data analysis is believed to capture the dynamics of change because of inclusion of both cross-sectional and time series dimensions. Due to the limitation of data (observation required in the panel analysis) we will not be in a position to capture geographical location and other factors as outlined above.

The panel data approach differs from the early contributions, which mainly uses cross sectional data that might lead to spurious biased results. Firm level panel data analyses are preferred for a number of reasons. It allows an investigation of domestic firms' productivity development over a longer time period. This is contrary to a survey data that would have to rely on a specific data point. It would also allow an investigation of technological spillovers after controlling for other factors such as industry differences. As noted in Gorg and Strobl (2001) "cross sectional data, in particular if they are aggregated at the sectoral level, fail to control for time-variant differences in productivity across sectors which might be correlated with, but not caused by foreign presence". In such a case the results obtained would be spurious and biased. As elaborated in Chapter 2, if productivity in a given industrial sector is much higher than in others, MNCs might be attracted into the former in which case a basic cross sectional analysis would produce positive and statistically significant correlation between the MNCs and productivity of the locally owned firms⁷⁶. According to the early contributors, Caves antecedents, these results would be interpreted as indicating spillover occurrence even though MNCs were only attracted in the sector and were not responsible for the high productivity witnessed.

The assessment undertaken here also compares foreign and local firms taking into consideration possible dynamics of the results obtained. Although Kenya is endowed with low levels of FDI at the national level, it has high foreign presence in the manufacturing industry. Overall FDI accounted for 0.32 and 0.96% in Gross Fixed Capital Formation (GCF) in 1994 and 1999 respectively⁷⁷. Its commensurate shares in manufacturing were 69.1% in 1994, 66.2% in 1999 and 63.0% in 2001⁷⁸. Results obtained would therefore enable a policy-relevant assessment of FDI's conduct and performance

⁷⁶ This aspect of selectivity bias was discussed extensively in *Chapter 2*.

⁷⁷ Computed from the World Bank (2001).

⁷⁸ Computed from data supplied by the Ministry of Trade and Industry, Nairobi.

in a country that typifies most developing economies – countries in Sub Saharan Africa characterised by low levels of FDI inflows.

4.2.2 Data Description

For the purpose of this study, the empirical data comes from unpublished plant level data collected in an annual survey by the Ministry of Trade and Industry, Kenya (department of company registration)⁷⁹. This survey was begun in 1988 and is supposed to collect annual data and information on all firms operating in the Kenyan manufacturing industry. The information collected consists of ownership, year of establishment, domestic and export sales, domestic and imported raw materials. Capacity utilisation and value of utilities consumed e.g. electricity, coal, diesel, lubricating oil and water. It also consisted of fixed assets and capital investment by nationality. Other information included employment size including technical, skilled, semi-skilled and unskilled workers, clerical and casuals. It also included firm expenditure on plant, equipment and machinery. Firm's physical location and sectoral classification by international standard of industrial classification (ISIC) are also captured in the survey. The survey data enabled us to create a panel database for the period 1994-2001⁸⁰.

Despite our effort to construct a comprehensive panel database, several firms still had severe cases of missing data points in certain years, either due to non-response or failure by firms to provide all the required data and information. One of the screening criteria for a firm to be included in this study was that the firm must have responded in all the years and must have done so in almost all the required variables. A balanced panel of 420 firms was created comprising firms that showed consistent time series responses to all the relevant questions over the period 1994-2001 making a panel with 3,360 observations⁸¹. The data set is fairly representative as it represents an average of 40%⁸² for both manufacturing output and employment over all the years included in our sample. This representation provides a reasonably good level justifying a meaningful policy relevant assessment of FDI's role in industrial development.

For the purpose of this study, firms with at least 10% of their nominal capital owned by foreigners are defined as foreign firms. All the other firms were defined as locally owned firms⁸³. This definition was adopted since the Kenyan national authorities also used the

⁷⁹ We are grateful to the Ministry of Trade and Industry, Department of Company Registration, Kenya for allowing us the access to the data.

⁸⁰ Since the inception of this survey, it has been characterised by abysmally low levels of response rates. To revert these low rates of response, the Ministry issued a stern warning, made it mandatory for all the companies to respond to the survey on annual basis in which case defaulters risked prosecution and heavy fine. This threat led to a remarkable improvement in the survey response rate beginning 1994 justifying the selection of this year as the base year for our panel data analysis.

⁸¹ The 8-year panel data for the period 1994-2001 compares well to the 5-year panel data for the period 1985-1989 used for the Moroccan study Haddad and Harrison (1993).

⁸² This comparison is based on figures obtained from Central Bureau of Statistics (CBS), manufacturing section – Kenya.

⁸³ This definition follows that of OECD and UNCTAD. Other benchmarks taken by other researchers studying other countries include Sjöholm (1997) who had a benchmark 15% of equity owned by foreigners, Haddad and Harrison (1993) considered foreign firms as those with at least 5% equity owned by foreigners while Djankov and Hoekman (1998) had a bench mark of 20%.

same benchmark. On the basis of this definition, about 175 firms were classified as foreign firms and the remaining 245 firms as locally owned.

Similar to most economic analysis based on data from underdeveloped countries, this analysis was beset by lack of suitable deflators for our data sets. Kenya is no different from most Sub-Saharan economies (poor and technically underdeveloped economy) where it is extremely difficult to identify a relevant deflator to convert the nominal data to constant prices. Data deflation is a necessary condition especially in time series analysis in order to remove data fluctuations that might exist due to inflationary effects over time in an economy. Hence, this study uses the best option that was available⁸⁴. Consequently, sales and capital investment values were deflated using gross domestic product (GDP) deflator – based on GDP price indices. The export values were deflated using export price indices for manufactured goods. The expenditure values of machinery and equipment were deflated using import price indices for machinery and transport equipment.

Another limitation with this data set is that the analysis conducted at 2-digit level ISIC will be limited to only 9 sectors – even then one of the sectors will be dropped due to lack of FDI while two engineering sectors will be combined leaving only 7 sectors for analysis⁸⁵. In Kenya, the 2-digit level classifies the manufacturing industry into 9 sectors, 3-digit classifies it into about 28 sectors while 4-digit level classifies it into 58 sectors. It is impossible to undertake panel analysis at three or four digits as this reduces firms to only a few in each ISIC and would therefore not suffice for the intended panel examination and analysis.

4.2.3 Empirical Analysis: A Panel Data Estimation Technique

Panel data estimation technique is used here to examine the direct contribution and impact of foreign presence on productivity (both labour and total factor productivity) in Kenyan manufacturing. Besides controlling for certain factors that also impinge on productivity, we also intend to control for time effects and industry specificities. Thus our current task is therefore to come up with an empirical specification that will enable us to adequately capture time effects and variations in sector characteristics across sectors. Our attempt to model all these aspects together commences with a general illustration of our panel data as follows:

$$Y_{it} = \alpha_i + \sum_{j=1}^k \beta_{ij} X_{ijt} + \varepsilon_{it} \quad (4.1)$$

Where $i = 1, 2, \dots, n$ denotes a cross sectional unit (a firm), and $t = 1, 2, \dots, T$ denotes a given period. Thus Y_{it} is the value of the dependent variable for firm i at period t and X_{ijt} is the value of j^{th} non stochastic explanatory variable for firm i at period t . The random error term ε_{it} is assumed to be normally distributed with a mean of

⁸⁴ Even where such deflators existed they were normally based on outdated base years as was the case in the current study where the deflators used had 1982 as the base year.

⁸⁵ The two sectors combined were ISCI 37 and ISIC 38 that deal with metal, metal fabrication, machine works etc-also referred in the Kenyan classification as engineering. We refer to it here as machine tool industry (ISCI 37).

zero, $E(\varepsilon_{it}) = 0$ and a constant variance, $E(\varepsilon_{it}^2) = \sigma^2$ and β_j s are unknown response coefficients to be modeled.

The above framework can be generalised into two basic frameworks – fixed effects and random effects models. The two are different in the way the constant is taken and interpreted. In the fixed effects model α_i is captured as the group specific constant term. The assumption in the fixed effects model is that differences across units can be captured in differences in the constant term and thus α_i is unknown parameter to be estimated. On the other hand, random effects approach specifies α_i as group specific disturbance, similar to ε_{it} . The residual term for random effects can then be expressed as: $\mu_{it} = \vartheta_i + \varepsilon_{it}$. The component ϑ_i is the random disturbance characterising the i^{th} observation and is constant through time.

As mentioned above, several effects across industries would be expected to correlate with independent variables. For instance food-processing being one of the most productive and dynamic sectors in Kenya and would therefore attract higher foreign presence than other industries. As a result, an empirical modeling that treats the correlation more explicitly would be required. We attempt to do this by including dummies in our panel model specified in equation (1) above.

$$Y_{it} = \alpha_i + \sum_{j=1}^k \beta_j X_{ijt} + DUMMY_i + DUMMY_t + \varepsilon_{it} \quad (4.2)$$

Where $DUMMY_i$ represents sectoral dummies considered at 2-digit ISIC level.

$DUMMY_t$ represents annual time dummies over the specified panel period 1994-2001.

In our endeavour to examine the impact of foreign presence on productivity, we consider equation (4.2) modeled above as the basis for empirical estimations. Given the nature and amount of data we are dealing with, it is imperative to undertake several estimates for the purposes of checking consistency, validity and robustness of the estimated results across different techniques. Hence, the model was subjected to some preliminary estimations. Estimations done included ordinary least squares (OLS), fixed effects, random effects and generalised least square (GLS) estimations⁸⁶. In addition, the different techniques allow the modeling of specific statistical phenomena for instance gross data outliers, autocorrelation and heteroscedasticity that normally affect econometric data analysis. Preliminary estimations using Hausman specification analysis indicated that random effect had more efficient results compared to the fixed effects model. Hence, the study adopted OLS, GLS and random effects model – very comparable results were estimated by the three techniques.

It is important to make a few further clarifications regarding these techniques. Since we are dealing with a balanced panel, the results obtained with OLS, GLS and random effects are expected to be exactly the same. In this regard the OLS and GLS were estimated allowing for certain statistical aspects – differences in approach. In the case of OLS, we estimated the robust type estimates. Under normal circumstances, three kinds of regressions are commonly known. They are standard regression estimates OLS

⁸⁶ GLS estimates cross-sectional times-series linear models using feasible generalised least squares (Stata, 2003)

primarily based on predicting the mean; quantile regression based on predicting the median and robust regression which performs an initial screening based on spatial distance to eliminate gross outliers prior to computing the estimates using multiple iterations.

The GLS technique, which is a more rigorous technique than OLS method, allows for heteroscedasticity and correlation to be modeled across panels. GLS technique also allows for autocorrelation within panels to be modeled in which case the structure with no autocorrelation, correlation parameter common for all the panels or a unique correlation parameter for each panel can be modeled separately (see Green, 2002: Stata, 2003). In the current case, GLS will be estimated allowing for heteroscedasticity and assuming no autocorrelation⁸⁷. Estimation of heteroscedasticity indicated no serious problem of heteroscedasticity since all estimates easily passed the white (1980) test for heteroscedasticity.

We now turn to random effects. Random effects model can be estimated based on maximum likelihood (ML) or GLS. Our estimations were based on the latter and were thus performed assuming homoscedasticity and no autocorrelation. Given the advancement in modelling panel data, it is also possible to make estimations allowing for autocorrelation. However, we did not find significant differences in the results obtained. Thus for simplicity we decided to restrict ourselves to the panel estimates controlling for both heteroscedasticity and autocorrelation.

As a beginning point to our empirical tests, all the independent variables were tested for possible statistical correlation. The results of this correlation showed that none of the independent variables posted high and significant correlation, which meant that the variables were not correlated.

4.3 Comparative Behaviour of Foreign and Locally Owned Firms: Analysis Based on Panel Data Trends in the Manufacturing Industry

This section presents an analysis of foreign participation in the manufacturing industry using the panel data created. The section is divided into two sub-sections; the first section is intended to give a brief synopsis of the manufacturing industry on the basis of the whole manufacturing industry by ownership. In the second sub-section, a more detailed analysis is presented comparing foreign and locally owned firms by manufacturing industrial sectors. This section therefore lays the foundation for the subsequent sections and chapters, as one of the central issues this thesis seeks to determine is the level of MNC participation i.e. in which sectors of Kenyan Manufacturing industry are the MNC activities concentrated? This question for instance can be addressed by looking at shares of significant trends in the panel data. Are the MNCs located equally in all the sectors, sub-sectors or are they just witnessed in a few selected sectors? If so, is it possible to identify them? Could it be so that sectors with high foreign presence levels are also the most dynamic sectors, characterised with high levels of technological related characteristics such as physical and human capital investment, value added and productivity of labour or raw materials? To answer these

⁸⁷ The data set used did not seem to have serious autocorrelation problem – this was not expected to pose a serious problem since the time span covered was not very long.

questions it is therefore germane to begin by conducting an analysis of general data trends based on key variables for the entire manufacturing industry in Kenya.

4.3.1 Important Firm Trends in the Panel Data Sample: Comparing Foreign and Locally Owned Firms based on the Entire Manufacturing Industry

In this section, we examine the participation of MNCs in the manufacturing industry by comparing their relative shares with those of locally owned firms⁸⁸. Unlike in all other spillover studies, the unique data collected for a country that typifies poor and technically backward economies, gives us a new insight into foreign shares using more data and/or indicators than has ever been done before. In such a context, this is particularly useful for concrete findings from which informed policy dialogue on the role of FDI in manufacturing industry could be based on. The comparison done here is based on certain manufacturing characteristics that can be examined using some key manufacturing industry indicators/variables. They include productivity indicators such as value added (VAD) and labour productivity (VADL) see Table 4.1. Other indicators include factors of production such as capital (KALF), raw material (RMAT) and employment (EMPT). Other indicators include human capital and processing capability usually measured by skilled labour (SKILL) and machinery and equipment (TECHN) respectively. Indicators of firm market performance include output sales (TSALES) and exports sales (EXPTS) while internal firm performance is estimated by capacity utilisation (CAP). Table 4.1 presents the computed percentage shares of both foreign and locally owned firms.

Before discussing the shares computed, we provide a brief analysis of firm age. All the firms were compared in terms of their ages computed in absolute numbers on the basis of their year of establishment. The average age of all the firms in manufacturing was 25 years. A comparison of firm ages revealed that locally owned firms were generally younger with an average age of 24 years while foreign firms were older with an average age of 28 years. This was not surprising given that foreign firms were mainly the pioneers in the Kenyan manufacturing industry. As discussed in Chapter 3, some of the foreign firms were established in Kenya long before independence while locally owned firms were largely started moments after independence and in some cases much later during the nationalisation period in the 1970s and 1980s [Kaplinksy, 1978; Swainson, (1978: 1980)].

According to the shares computed and provided in Table 4.1, foreign firms had higher shares than locally owned firms with virtually all variables. Examination of the data resulted in an interesting finding where foreign firms appeared to literally dominate Kenyan manufacturing with over 50% in all the variables throughout the panel period 1994-2001 (Chart 4.1)⁸⁹. Taking for instance capital, value added and output sales, the data showed that foreign shares remained relatively high, above 70% in the entire period 1994-2000. Employment shares remained above 60% – suggesting that MNCs were the largest employers and larger in size than locally owned firms if employment is considered an indicator of firm size. Another interesting finding was that apart from consumption of raw materials whose foreign share remained constant (68%) for both 1994 and 2001, shares of all the other variables demonstrated a declining trend over the period. Contrarily, Table 4.1 showed that all the variables except raw materials shares and capacity utilisation of locally owned firms had increased over the same period.

⁸⁸ The shares were computed in percentages using the panel database created.

⁸⁹ The chart show averages across 8 years for each variable.

Table 4.1 Important Firm Trends in the Panel Data Sample: Percentage based Shares, Kenya, 1994-2001

	1994		1995		1996		1997		1998		1999		2000		2001	
Variable	Loc	For	Loc	For	Loc	For	Loc	For	Loc	For	Loc	For	Loc	For	Loc	For
RMAT	32	68	31	69	32	68	32	68	33	67	30	70	32	68	32	68
KALF	24	76	22	78	28	72	29	72	28	72	27	73	30	70	30	70
EMPT	30	70	39	61	35	65	36	64	37	63	39	61	40	60	40	60
Skill	36	64	37	64	38	62	38	62	38	62	37	64	41	59	42	58
VAD	18	82	22	78	23	77	17	83	25	76	25	75	28	73	27	74
VADL	41	59	37	63	47	53	55	45	53	47	50	50	54	46	54	46
TSALES	24	76	26	74	27	74	27	73	28	72	27	73	29	71	29	71
EXPTS	32	68	31	69	29	71	33	67	33	67	36	64	36	64	35	65
TECHN	41	59	40	60	42	58	48	52	61	39	48	52	50	50	49	51
CAP	62	65	62	63	62	64	62	63	62	63	61	62	62	62	62	62

Source: Computed by the author from Kenya, Annual Industrial Survey Undertaken by Ministry of Trade and Industry, Kenya.

Two reasons could account for this interesting phenomenon. The first one is that the observed increase in variable shares over the period could demonstrate that domestic firms were gradually catching up with foreign firms. Second, this process could be explained by disappearance (closures and relocations) of some of the MNC subsidiaries as a result of worsened conditions of doing business that characterised the economy in the 1990s. As discussed earlier, the country witnessed massive institution, infrastructure and government failures. Lack of incentives and other support systems led to high cost of operations resulting in economic stagnation. In order to discern what was happening, we computed growth rates of these variables by ownership. Annual growth rates computed for all variables confirmed that foreign firms had a decline in the period 1994-2001 despite their continued dominance in terms of shares. Locally owned firms enjoyed positive growth rates in value added (2.9%), labour productivity (2.2%), skilled labour (2%) and total employment (1%) in the same period⁹⁰.

Specifically, in the period 1994-1997, the average annual growth in exports, skilled labour, value added, labour productivity, capital, raw material, employment, output sales, machinery and equipment of locally owned firms were -4.5, 1.5, 5.1, 7.7, -19.7, -7.7, 0.12, -1.7, 1.9% respectively (Appendix 4.1). Between 1997-2001, the average annual growth in exports, skilled labour, value added, labour productivity and capital, raw material, employment, output sales, machinery and equipment of local manufacturing firms was -14.4, 1.9, -3.7, -5.0, -3.0, -5.7, 1.7, -4.6, -8.7% respectively (Appendix 4.1). Most of these variables are performance indicators and hence proxy for upgrading in products and processes and indicate increased ability to compete. This analysis based on growth rates confirmed that locally owned firms were gradually catching up. A plausible task is then to try and discern if FDI spillovers played any role in the catching up process – which is virtually at the heart of this thesis. As discussed elsewhere, the decline in the growth of FDI's activities could be attributed to the restructuring undertaken to face the newly emerging environment characterised by external competition and entry of new domestic firms. During this period many things were happening. The country was still grappling

⁹⁰ The growth rates were computed from data supplied by the Ministry of Trade and Industry, Nairobi, Kenya.

with SAPs – liberalisation and export orientation. The country was no longer favoured by donors – hence less aid. Institutions continued to weaken, infrastructural decay, poor economic governance etc.

Chart 4.1: Comparisons between Foreign and Locally Owned Firms, Kenya, 1994-2001

Three important distinctions must be addressed from this section when examining Kenyan manufacturing data econometrically. *First*, despite the economic stagnation witnessed in the 1990s, foreign firms continued to enjoy over 50% dominance in all the variables for the period 1994-2001 (Chart 4.1). For instance foreign firms enjoyed high levels of productivity in terms of valued added and labour productivity. With regard to factors of production, foreign firms had high investment levels as they controlled higher shares in capital investment, had high employment and raw material consumption levels. Taking employment as a size proxy, then MNCs were larger in size than locally owned firms. Foreign firms also had high processing capability levels based on high expenditure shares of machinery and equipment. On the side of human capital, foreign firms dominate – with more skilled labour force than domestic firms. Similarly, firm performance, foreign firms had higher shares in output sales and exports than locally owned firms. Local firms maintained a constant level of capacity utilisation (62%) while foreign firms recorded a slight decline from 65 to 62% in the period 1994-2001. *Second*, with the exception of raw material, in all the variables analysed foreign firms appeared to decline in real terms in the period 1994-2001. *Third*, in terms of growth rates locally owned firms performed better than foreign firms in this period since they recorded positive growths in a number of variables: valued added, labour productivity, skilled labour and employment of 2.9, 2.2, 2.0 and 1.0% respectively (see Appendix 4.1).

4.3.2 Important Trends in the panel Data Sample: Comparing Foreign and Locally Owned Firms based on the Manufacturing Industrial Sectors

The discussion below provides further comparison between foreign and locally owned firms by manufacturing sectors. We begin this section by examining foreign presence at the sectoral level on the basis of capital, employment and output sales. Foreign presence computed is derived from the average for the entire panel period 1994-2001 (Chart 4.2). Computation of foreign presence follows Aitken and Harrison (1999) – discussed in Chapter 2 – who used employment values in computing a proxy of foreign presence in

Mexico at the sector level. Capital and output figures have equally been used in many studies in other parts of the world. The most interesting finding was that all the three variables produced very comparable and consistent results. Chart 4.2 shows that foreign presence estimated by all the variables, exceeded 8%⁹¹ only in three manufacturing sectors; ISIC 31 (food, beverages and tobacco), ISIC 35 (chemical, petroleum and plastics) and ISI C37 (machine and engineering industry). Empirically the three manufacturing sectors can therefore be regarded as sectors with highest levels of foreign presence in the Kenyan manufacturing. One of the emerging implications of this finding is that foreign presence is not evenly distributed but is concentrated in just a few manufacturing sectors. Therefore, it becomes interesting to probe further if MNC activities are also spread in a similar pattern. Hence in order to understand the distribution of MNC activities, in the section below we attempt to investigate specific manufacturing sectors where MNC activities are particularly concentrated.

Chart 4.2: Foreign Presence Determined by Capital, Employment and Output Sales

Next, before we discuss manufacturing shares and growth rates computed, we examine the firm age variation by manufacturing sector. Chart 4.3 shows the sectoral age distribution by ownership orientation. It is observed that the age differential between foreign and locally owned firms is mainly high in three sectors; paper, printing and publishing, chemicals, petroleum and plastics, and machine and engineering industry sectors (Chart 4.3). Interestingly, in all these sectors foreign firms were older than locally owned firms at 30.6, 29.4 and 26.9 years respectively. Similarly, in food, beverages and tobacco (27.1 years) and textile, wearing apparel and leather (25.6 years) sectors, foreign firms were relatively older than their local counterparts. Holding other things constant⁹², these results signify that foreign firms joined the respective sectors earlier than their local counterparts. Locally owned firms seemed to have entered manufacturing earlier only in wood and wood products sector. In non-metallic mineral sector, locally owned firms and foreign firms appeared to have joined manufacturing around the same time. Given the observed age differences, then the question that arises is whether locally owned firms did learn something from foreign firms being the entry leaders in the manufacturing

⁹¹ Refers to foreign presence defined as foreign equity participation averaged over all plants in a sector, weighted by each plant's share of sectoral capital, employment and sales (put as percentage).

⁹² High firm average age might be affected slightly when entry and exit are considered during the period; we used a balanced database as explained earlier.

(sectors), which forms part of what the study seeks to find out in the subsequent chapters.

Chart 4.3: Average Firm Age by Manufacturing Sector, Kenya, 1994-2001

We now turn to the comparison of shares computed based on the same variables used above – in section 4.3.1. The emerging results indicate that at two-digit⁹³ level, foreign firms still dominated in virtually all the variables considered. The three sectors with high levels of foreign presence; i.e. food, beverages and tobacco; chemicals, petroleum and plastics and machine and engineering were specifically unique in that foreign firms had over 60% in all the variables (Table 4.2). In this regard, the three sectors were the most dominated by FDI as well as their activities. This was an important finding. Since the focus of this study is to analyse FDI in sectors where foreign presence is high, we will therefore limit our discussion to the three sectors identified. While foreign shares remained above 70% for value added, it remained above 50 for labour productivity in the three sectors identified. Over time, the capital share of locally owned firms tended to increase, albeit slightly, in chemicals, petroleum and plastics and machine and engineering. Although foreign firms were virtually the largest employers in all the manufacturing sectors, employment shares in food, beverages and tobacco seemed to increase for locally owned firms from 38 to 42% in period 1994-2001. Taking employment level as a proxy of firm size, foreign firms were bigger in size than locally owned firms in the three sectors. Foreign firms tended to increase their shares of raw material consumption over the period. On human capital, an equally interesting observation emerged where the level of skill shares tended to increase in all the three sectors for locally owned firms (Table 4.2).

⁹³ ISIC at two-digit (revision 2) represents: (ISIC 31) Food, beverages and tobacco; (ISIC 32) Textile, apparel and leather; (ISIC 33) Wood and Wood Products; (ISIC 34) Paper and paper products; (ISIC 35) Chemicals and petroleum products; (ISIC 36) Non-metallic mineral products; (ISIC 37) Basic metal industries; (ISIC 38) Fabricated metal products, machinery and equipment; (ISIC 39) Other manufacturing industries.

Table 4.2 Important Trends in the Panel Data Sample: Percentages Based on Annual Averages, Kenya, 1994-2001

	ISIC 31		ISIC 32		ISIC 33		ISIC 34		ISIC 35		ISIC 36		ISIC 37	
1994	Loc	For	Loc	For	Loc	For	Loc	For	Loc	For	Loc	For	Loc	For
RMAT	43	57	26	74	81	19	16	84	43	57	5	95	42	58
KALF	32	68	20	80	98	2	11	89	12	88	55	45	23	77
EMPT	38	62	32	68	53	47	24	76	46	54	41	59	39	61
Skill	32	68	32	68	55	45	18	82	41	59	38	62	35	65
VAD	11	89	25	75	73	27	20	80	28	72	36	64	10	90
VADL	21	79	82	18	70	30	43	57	46	54	62	38	18	82
TSALES	20	80	25	75	78	22	18	82	34	66	17	83	19	81
EXPTS	30	70	53	47	0	100	7	93	31	69	7	93	32	68
TECHN	38	62	22	78	48	52	52	48	37	63	66	34	35	65
1996														
RMAT	45	55	29	71	76	24	15	85	44	56	4	96	19	81
KALF	23	77	20	80	98	2	11	89	12	88	39	61	37	63
EMPT	38	62	37	63	51	49	20	80	48	52	35	65	18	82
Skill	33	67	41	59	53	47	19	81	44	56	59	41	36	64
VAD	10	90	29	71	83	17	54	46	26	74	22	78	15	85
VADL	22	78	88	12	81	19	58	42	37	63	22	78	31	69
TSALES	20	80	29	71	79	21	40	60	34	66	14	86	17	83
EXPTS	31	69	44	56	28	72	10	90	25	75	2	98	14	86
TECHN	42	58	23	77	49	51	49	51	38	62	44	56	49	51
1998														
RMAT	45	55	26	74	79	21	15	85	43	57	5	95	19	81
KALF	20	80	20	80	98	2	10	90	17	83	45	55	34	66
EMPT	39	61	33	67	55	45	23	77	44	56	35	65	22	78
Skill	35	65	41	59	56	44	21	79	34	66	52	48	39	61
VAD	11	89	24	76	82	18	40	60	31	69	28	72	17	83
VADL	20	80	93	7	85	15	37	63	32	68	43	57	38	62
TSALES	20	80	25	75	81	19	34	66	37	63	17	83	18	82
EXPTS	37	63	14	86	30	70	8	92	36	64	28	72	18	82
TECHN	41	59	26	74	48	52	89	11	43	57	48	52	48	52
2000														
RMAT	43	57	27	73	81	19	13	87	43	57	4	96	19	81
KALF	27	73	20	80	98	2	10	90	17	83	45	55	32	68
EMPT	42	58	24	76	53	47	24	76	51	49	35	65	30	70
Skill	39	61	33	67	58	42	20	80	49	51	54	46	39	61
VAD	11	89	36	64	82	18	61	39	31	69	20	80	24	76
VADL	22	78	92	8	79	21	69	31	34	66	48	52	36	64
TSALES	21	79	31	69	82	18	42	58	37	63	12	88	21	79
EXPTS	41	59	65	35	79	21	7	93	30	70	15	85	28	72
TECHN	42	58	27	73	49	51	77	23	41	59	44	56	47	53
2001														
RMAT	42	58	26	74	80	20	18	82	41	59	4	96	19	81
KALF	27	73	22	78	98	2	9	91	16	84	45	55	32	68
EMPT	42	58	25	75	54	46	26	74	50	50	35	65	30	70
Skill	40	60	36	64	60	40	22	78	47	53	54	46	39	61
VAD	11	89	31	69	83	17	53	47	30	70	20	80	26	74
VADL	21	79	93	7	80	20	75	25	29	71	48	52	49	51
TSALES	20	80	28	72	81	19	43	57	35	65	12	88	22	78
EXPTS	40	60	63	37	79	21	7	93	27	73	15	85	25	75
TECHN	38	62	29	71	56	44	76	24	39	61	43	57	47	53

Source: Computed by the author from Kenya, Annual Industrial Survey Undertaken by Ministry of Trade and Industry, Kenya.

Similarly, domestic firms seemed to be raising their processing capability in chemicals, petroleum and plastics and machine and engineering. Their shares seemed to increase from 37 to 39% and 35 to 47% in the period respectively (see Table 4.2). Nevertheless foreign firms still remained the largest employers of skilled labour force in most of the sectors. Indicators of firm market performance showed that shares of domestic firms tended to increase for chemicals, petroleum and plastics and machine and engineering from 34 to 35% and 19 to 22% for the period respectively (Table 4.2). An increase in export shares for domestic firms was only registered in food, beverages and tobacco from 30 to 40% for the period 1994-2001.

Interestingly, sectoral analysis tends to arrive at similar conclusion to the one obtained earlier when the analysis on the whole industry was undertaken; that locally owned firms tended to be gradually catching up with foreign firms based on their observed rising shares in the study period. We put this in more context by confirming it using sectoral growth rates computed for both foreign and locally owned firms in the period 1994-2001.

Interestingly, in terms of growth rates domestic firms performed better than foreign firms in this period 1994-2001. This is so because locally owned firms recorded positive growth rates in more variables than foreign firms did (see Appendix 4.1). Starting with food, beverages and tobacco sector, while foreign firms recorded a declining trend for all the variables in the period, their local counterparts had positive growth in four variables; employment (1.4), skilled labour force (3.6), value added (2.0) and technology (0.8). Specific annual growth rates in the period 1994-1997 and the period 1997-2001 can be seen in Appendix 4.1.

Similarly, in chemicals, petroleum and plastics sector, locally owned firms recorded positive growth rates in more variables than foreign firms (see Appendix 4.1). The most interesting case was that of machine and engineering sector where all the variables recorded positive growth rates except total sales, which recorded a slight decline, below 1%. Foreign firms in the same sector had only four cases of variables with negative growth rates. The findings based on these sectors do confirm our findings above; that domestic firms were gradually catching up with the foreign firms.

Next we would like to investigate whether manufacturing sectors observed to have high levels of foreign investment and high levels of foreign activities in the period 1994-2001 are the same sectors that are characterised with high economic performance in Kenya. This will be done by computing annual growth rates and sectoral shares of manufacturing sectors using long time-series data for the period 1963-2000⁹⁴ (Box 4.1 and Table 4.3). However, before we proceed with this analysis, we wish to emphasise that no direct causalities can be established here yet and thus the analysis done here does not indicate how FDI generally affects manufacturing. Determination of productivity spillovers is done in the next section and even then it will, in actual sense, still be impossible to establish whether technological spillovers from foreign to domestic firms do occur or not. Determination of spillover occurrence and its determinants due to foreign presence will be undertaken in the subsequent chapters using a different as approach introduced in Chapter 2.

⁹⁴ This is an aggregate data gathered from Central Bureau of Statistics (CBS) and UNIDO databases. The database does not disaggregate data in terms of foreign and locally owned firms.

Box 4.1

Synopsis Based on Aggregate Data from Secondary Sources

Generally almost all the manufacturing industries had their fastest growth in value added during the periods 1964-71 and 1972-76 when the growth rate for the total manufacturing was 10.6% and 16.7% respectively (see Table 4.3). Interestingly, these growth rates were witnessed during the import substitution period. This was followed by a general decline in growth in all the other periods except 1986-90 and 1995-2000 when the growth rates rose to 5.3% and 5.8% respectively. Total manufacturing value added had an average annual growth rate of 7% for the period 1964-2000. The period 1991-94 had the lowest growth rates with most of the manufacturing industries growing at a negative rate. During this period the country faced severe drought, there was also high fever for multiparty elections, which were being introduced in the country for the first time, all the donor support had been withdrawn [Kenya Economic survey, (1997: 1998: 1999); Phillips and Obwana, 2000; Todaro, (2000: p.284); Soderbom, 2001]. In Chapter 2, it was shown that between the period 1986-90 and 1991-94, the GDP annual growth rate declined from 5% to 1.5% while growth rate in manufacturing also declined from 5.7% to 2.2% in the same period. The relatively high growth rate in the period 1986-90 can be explained by incentives offered upon the implementation of SAPs, which emphasised on exports and thus there was an effort to increase manufacturing value added.

Food, beverages and tobacco had a positive growth except for the period 1977-80, when its growth rate declined from 24.1% in the period 1972-76 to -3.5% in the period 1977-80 (Table 4.3). In period 1995-2000, food, beverages and tobacco with an average annual growth rate of 7.7% was among the fastest growing manufacturing industrial sectors. Other fast growing industries in the period included; metal products, machinery and equipment with an average annual growth rate of 7.3%, other manufacturing with 7% and basic metal industries with 5.7%.

Table 4.3 also shows that the industrial share for food, beverages and tobacco increased from 38.2% in 1964 to 45.5% in 2000. This was as a result of shift in capital investment mainly by MNCs from other industries into food, beverages and tobacco. Data on gross capital formation examined but not reproduced here supported this observation. There was also a slight increase in textile from 6% in 1964 to 7.2% in 2000. Basic metal increased from 1.3% in 1977 to 5.8% in 2000. Although metal products, machinery and equipment declined from 25.8% in 1964 to 13.8% in 2000, it had the second highest level of value added share to food, beverages and tobacco.

Similar to the trends witnessed, all the manufacturing industries had their fastest growth in employment during the periods 1964-71 and 1972-76 when total manufacturing employment grew at 6.9% and 9.9% respectively (Table 4.3). This was followed by a general decline in growth in all the other periods. Total manufacturing employment grew at 4.7% in the 1964-2000.

Only two manufacturing industries had positive growth rates that were greater than 2% for the entire period under examination. These industries included food, beverages and tobacco and chemicals, petroleum and plastic, which grew at an average rate of 5.5% and 6.5% respectively for the period 1964-2000. In terms of shares; only four manufacturing industries had a share greater than 10% by 2000. Food, beverages and tobacco was the highest generator of employment contributing 37.6% of the total manufacturing employment. Textile, wearing apparel and leather generated 17.7%; metal products, machinery and equipment generated 12.4% while chemicals, petroleum, and plastics generated 10.8% of the total employment. Since labour productivity was estimated by normalizing value added with employment then its trend compares to that of value added and employment presented.

Table 4.3: Growth and Shares of Manufacturing Industries, Kenya, 1964-2000

Manufacturing Industry	Average Annual Growth Rates										Industry Shares (Percentage)					
	64-71	72-76	77-80	81-85	86-90	91-94	95-00	64-00	'64	'72	'77	'81	'86	'91	'95	'00
Value Added																
Food, Beverages and Tobacco	7.6	24.1	-3.5	9.2	4.3	2.2	7.7	7.7	38.2	31.8	40.8	32.5	40.4	39.8	45.2	45.5
Textile, Wearing Apparel and Leather	17.8	13.1	12.9	-1.5	4.4	-2.7	3.6	7.9	6.0	11.4	8.2	12.8	10.6	8.8	6.6	7.2
Wood and Wood Products	16.5	18.9	6.5	2.7	1.3	-4.0	4.8	7.9	2.7	4.8	3.9	3.4	3.1	2.9	2.3	2.3
Paper, Printing and Publishing	10.2	22.0	1.1	1.5	9.1	-2.3	5.3	7.5	6.9	7.1	7.8	10.2	6.5	7.3	5.7	6.4
Chemicals, Petroleum, and Plastic	12.0	14.1	3.5	5.9	4.5	-1.8	4.3	6.7	14.2	15.8	15.7	14.9	16.6	16.0	14.2	13.5
Non-Metallic Mineral Products	14.7	9.9	-11.8	4.1	16.9	-6.5	4.7	6.1	6.2	6.0	4.5	3.0	3.2	5.0	3.9	3.7
Basic Metal Industries	-	0.9	12.6	-8.9	16.1	54.3	5.7	13.0	-	-	1.3	1.4	0.9	1.6	5.6	5.8
Metal Products, Machinery and Eq.	11.0	7.0	10.4	-1.5	4.8	-1.2	7.3	6.2	25.8	21.4	16.7	21.3	17.4	16.8	14.8	13.8
Other Manufacturing	-	-8.1	3.7	20.2	16.4	-4.1	7.0	6.8	-	1.8	1.0	0.5	1.3	1.8	1.7	1.8
Total Manufacturing	10.6	16.7	1.9	3.8	5.3	0.4	5.8	7.0	100	100	100	100	100	100	100	100
Employment																
Food, Beverages and Tobacco	4.4	11.0	6.2	7.2	3.7	2.9	3.7	5.5	28.1	22.3	25.2	26.0	31.1	32.5	33.9	37.6
Textile, Wearing Apparel and Leather	10.3	11.7	8.7	2	2.0	-0.04	1.3	5.5	14.2	17.8	18.4	20.9	20.3	18.6	17.7	17.7
Wood and Wood Products	3.9	10.3	2.66	1.2	0.4	0.4	1.7	3.1	8.8	9.8	9.1	7.8	7.3	6.6	6.5	6.5
Paper, Printing and Publishing	7.2	17.1	-2.9	8.7	5.9	1.3	2.4	6.0	5.7	6.7	6.0	6.1	6.5	6.9	7.0	7.3
Chemicals, Petroleum, and Plastic	6.6	16.8	9.7	3.2	4.2	2.8	2.6	6.5	5.7	7.0	8.4	8.4	8.7	9.7	10.3	10.83
Non-Metallic Mineral Products	9.3	7.8	4.0	6.0	2.1	1.0	2.1	5.1	3.6	3.8	3.9	3.1	3.7	3.8	3.8	3.8
Basic Metal Industries	-	11.0	15.8	2.4	21.0	1.6	-	-	-	-	1.1	1.4	1.3	2.9	2.8	-
Metal Products, Machinery and Eq.	8.5	5.1	8.7	-3.1	0.0	-0.4	-2.8	2.6	32.9	30.8	26.9	25.4	20.1	17.2	16.4	12.4
Other Manufacturing	19.8	5.3	-3.2	11.6	14.1	-0.8	1.6	8.3	1.1	1.7	1.1	0.8	1.2	1.8	1.8	1.8
Total Manufacturing	6.9	9.9	6.4	2.6	2.9	1.3	1.7	4.7	100	100	100	100	100	100	100	100
Labour Productivity (VAD/L)																
Food, Beverages and Tobacco	3.2	11.2	-8.6	1.0	0.7	-0.7	3.9	2.0	23.2	38.9	43.7	30.7	32.8	37.0	36.5	41.4
Textile, Wearing Apparel and Leather	7.3	0.3	3.8	-2.0	2.5	-2.6	2.3	2.2	7.2	17.5	12.1	15.1	13.1	14.3	10.2	14.0
Wood and Wood Products	13.7	5.6	3.5	3.0	0.8	-4.4	3.1	4.6	5.3	13.4	11.7	10.8	10.9	13.5	9.6	12.2
Paper, Printing and Publishing	3.2	3.6	4.0	-6.4	3.5	-3.6	2.9	1.3	20.5	29.1	35.2	40.8	25.2	31.8	22.4	29.9
Chemicals, Petroleum, and Plastic	5.6	-2.4	-5.6	2.2	0.3	-4.5	1.7	0.4	42.6	61.2	50.3	43.5	48.1	49.7	37.7	42.8
Non-Metallic Mineral Products	5.1	3.0	-15.2	-1.8	14.3	-7.4	2.7	1.2	29.5	42.8	31.6	23.5	21.3	40.3	27.9	33.3
Basic Metal Industries	111	-8.5	-3.1	-8.5	-3.6	51.8	-	-	-	-	32.4	23.2	18.2	16.7	54.2	-
Metal Products, Machinery and Eq.	3.0	1.3	1.9	3.7	4.8	-0.9	11.0	3.9	13.4	19.0	16.8	20.7	21.9	29.5	24.7	38.3
Other Manufacturing	111	-3.0	4.7	5.1	2.6	-3.2	5.3	2.3	-	28.6	25.2	16.7	28.4	30.7	26.4	35.2
Total Manufacturing	3.7	5.5	-4.3	1.4	2.4	-0.9	4.1	2.2	17.0	27.4	27.0	24.6	25.2	30.3	27.3	34.2

Source: Computed from Kenya, Industrial Surveys undertaken by Central Bureau of Statistics; UNIDO, Industrial Statistics CD-ROM.

To minimize the bulk of computations and result interpretation, examination of the time series data was only limited to value added, employment and labour productivity. Analysis of this database is presented in Box 4.1 below while the computed growth rates are presented in Table 4.3. The following conclusions were made: *First*, high growth levels witnessed in value added in the early years had declined tremendously until in the period 1995-2000. Nevertheless, the growth recorded in the period 1995-2000 was not as strong as that witnessed in the early days during the import substitution era. *Second*, food, beverages and tobacco; metal products, machinery and equipment, and chemicals, petroleum and plastics were the highest generators of value added in 2000. *Third*, all the manufacturing sectors had their fastest growth rates in employment during the first two periods, 1961-1971 and 1972-1976. Food, beverages and tobacco was the highest generator of employment followed by textile, wearing apparel and leather, then metal products, machinery and equipment, and then chemicals, petroleum and plastics. *Fourth*, manufacturing sectors with the fastest growth rates and high relative performance (shares) to the total manufacturing were the same industries characterised by high foreign presence identified based on above analysis using data for the period 1994-2003. These manufacturing sectors were; food, beverages and tobacco; basic metal industry and metal products, machinery and equipment and chemicals, petroleum and plastics. The time series data for the period 1963-2000, indicated that the same sectors had higher levels of value added and employment.

A comprehensive study of comparative behaviour of foreign and domestic firms can not be completed without conducting some econometric tests to confirm our findings especially so with productivity which is the main focus in this chapter as a means to determine spillover occurrence. In this final section, we therefore undertake some concrete econometric tests to compare the productivity of foreign firms and locally owned firms. For this purpose we examined the statistical significance of differences in means of productivity indicators using T-tests. The approach used here differs from Haddad and Harrison (1993) in that more productivity indicators were used for consistency checks and instead of just computing ratios; ours do a direct comparison using a two tailed T-test statistical analysis. For firm productivity, we used the following indicators: value added, labour productivity, productivity of raw materials. More to our analysis, two intensities were computed to enrich our comparisons; capital intensities and skill intensities. Table 4.4 reports the T-test results comparing productivity of performance of foreign and locally owned firms. As an example, in column three, the value of -7.337 for food, beverages and tobacco was statistically significant at 1%. Also in column seven the value -6.625 for food, beverages and tobacco was statistically significant at 1%. The two examples suggest that mean value added and skill intensities for foreign firms were both significantly higher than that of locally owned firms. These results confirmed that foreign firms were empirically more productive than locally owned firms with all the indicators used in food, beverages and tobacco and in chemicals, petroleum and plastics. In all the cases the T-values produced were statistically significant at various levels 1, 5 or 10%.

Interesting results were also obtained with machine and engineering industry as well as textile, wearing apparel and leather. In the former, results in favour of foreign firms dominating in productivity were produced with value added, labour productivity and raw material productivity. Capital intensity was not statistically significant although it showed that foreign firms dominated. Interestingly, domestic firms seemed to be more skill intensive in machine and engineering industry. In textile, wearing apparel and leather, foreign firms were confirmed empirically dominant by value added, raw material

productivity and capital intensity. Although foreign firms appeared to more skill intensive, the results were not statistically significant. Interestingly, results of labour productivity showed that locally owned firms were more productive than foreign firms.

At least the results obtained here do confirm that foreign firms were actually more productive and capital intensive in the three sectors identified to have high foreign presence (Table 4.4). These are: food, beverages and tobacco and chemicals, petroleum and plastics and machine and engineering industry. Results obtained here tend to also include textile, wearing apparel and leather.

As a general conclusion to this section we can state the following: *First*, foreign presence was relatively high in only a few sectors and not evenly distributed across the manufacturing industry. These manufacturing sectors were food, beverages and tobacco; chemicals, petroleum and plastics and machine and engineering. *Second*, on the basis of the variables examined, FDI's activities were highly concentrated in the three sectors – where foreign presence was the highest. *Third*, based on the same indicators, foreign firms dominated in the three sectors. T-tests performed showed that foreign firms were more productive than domestic firms. *Fourth*, in terms of growth rates calculated, locally owned firms performed better than foreign firms in this period 1994-2001. This suggested a gradual catching up process. Nevertheless, they still dominated and thus controlled most of the manufacturing activities. This decline in the growth of FDI's activities could be attributed to the restructuring by firms, foreign firms especially, to face the newly emerging environment characterised by greater external competition and entry of new locally owned firms. Note that observed contraction should not be viewed as a trend towards disappearance of foreign presence in Kenya since MNCs continued to grow in some variables within sectors. The point to be emphasised here is that performance of FDI in a host country is dependent on many things and if one of them (or more) is not favourable then MNC's performance begin to dwindle. This was likely to be the case in Kenya during this period – examples mentioned earlier included weak and missing institutions, infrastructural decay, poor economic governance etc.

Table 4.4: Two-Tail T-test Results Comparing Productivity Performance Behaviour of Foreign and Local Firms, Kenya Sample, 2004

Industrial Sector	Firms	Value Added	Productivity of Labour (VAD/Lab.)	Productivity of Raw Materials VAD/Raw Mat	Capital Intensity Capital/Empt	Skill Intensity Skill Lab./Empt
Two-Digit (ISIC Rev. 2)	Local Firms	(VAD) 22,733 (1,953)	220 (18)	2,428 (0.458)	758 (187)	0.515 (0.015)
	Foreign Firms	189,050 (31,563)	767 (90)	6,202 (1.004)	1230 (173)	0.677 (0.018)
	T-Values	-7.337***	-7.941***	-3.925***	-1.630 *	-6.625***
Textile, Wearing Apparel and Leather	Local Firms	6013 (703)	1061 (302)	1,180 (0.134)	1164 (369)	0.621 (0.017)
	Foreign Firms	15684 (2650)	114 (12)	3,447 (0.943)	2938 (861)	0.636 (0.022)
	T-Values	-4.414***	2.34**	-3.117***	-2.187**	-0.535
Wood and Wood Products	Local Firms	4747 (710)	144 (16)	1,652 (0.221)	780 (213)	0.605 (0.279)
	Foreign Firms	1049 (115)	34 (5)	1,114 (0.137)	41 (9)	0.542 (0.031)
	T-Values	3.13***	4.031***	1.427	2.087**	1.602
Paper, Printing and Publishing	Local Firms	53468 (17002)	447 (121)	2,788 (0.496)	122 (14)	0.691 (0.016)
	Foreign Firms	51074 (11543)	287 (74)	2,462 (1.067)	535 (93)	0.711 (0.026)
	T-Values	0.092	0.871	0.317	-6.234***	-0.697
Chemicals, Petroleum and Plastics	Local Firms	11403 (1019)	162 (9)	1,157 (0.072)	126 (10)	0.529 (0.015)
	Foreign Firms	27494 (3001)	313 (28)	2,735 (0.872)	696 (115)	0.572 (0.014)
	T-Values	-4.875***	-4.873***	-1.715 *	-4.702***	-2.172**
Non-Metallic Mineral products	Local Firms	19762 (5602)	151 (21)	3,827 (0.696)	324 (78)	0.398 (0.032)
	Foreign Firms	59068 (18078)	200 (55)	3,306 (717)	193 (42)	0.446 (0.041)
	T-Values	-2.001**	-0.801	0.520	1.512	-0.918
Machine Engineering Industry; Basic Metal Industries, Machinery and Equipment	Local Firms	7309 (738)	200 (39)	1,30 (0.111)	2809 (921)	0.672 (0.014)
	Foreign Firms	36072 (7310)	409 (91)	1,730 (0.162)	3129 (904)	0.578 (0.016)
	T-Values	-4.063***	-2.160**	-2.226**	-0.247	4.522***

Note: *, ** and *** - Significant at 10%, 5% and 1% levels respectively. Note that the spillover indexes computed for various channels may differ slightly from those computed in other tables due to multiple averaging and aggregations done. The numbers in parenthesis represent standard errors.

Source: Compiled by the author using firm level data obtained from the Ministry of Trade and Industry, Kenya

4.3.3 A Brief Summary of Emerging Trends in Kenyan Manufacturing Industry Based on Panel Data Examined

The comparative behaviour between MNCs and domestic firms undertaken above was done in two stages, first by the entire manufacturing industry and then by manufacturing sectors. In this section, we provide a brief summary of the emerging issues which will then be presumed to characterize the Kenyan manufacturing. The results will therefore serve to guide and further motivate the remaining analysis in the subsequent sections and chapters. The results provide important distinctions that must be taken into consideration when analysing technological spillovers in the Kenyan manufacturing context.

Entire Manufacturing Industry Level

On the basis of firm age in Kenyan manufacturing, foreign firms were older than locally owned firms. While the average age of all firms was 25 years that of domestic and foreign firms was 24 and 28 years respectively. On the basis of employment levels, foreign firms were larger than the locally owned firms.

With regard to firm productivity, foreign firms enjoyed high levels of productivity in terms of valued added and labour productivity. On factors of production, foreign firms controlled high shares in capital investment, employment and raw material consumption levels. Similarly, foreign firms had high shares of labour force – human capital and processing capability observed from high expenditure shares of machinery and equipment.

Foreign firms dominated in market performance based on total sales and exports. Nonetheless the local firms market performance grew more than the foreign firms did over the period. With regard to internal firm performance, the average capacity utilization for all the firms in the period stood at 62%. Foreign firms had an average of 63.1% while local firms had 61.7% capacity utilisation.

An interesting observation showed that foreign firms appeared to decline in real terms in the period 1994-2001. However, locally owned firms performed better than foreign firms since they recorded positive growth rates in several variables that included value added, labour productivity, skilled labour and employment. This supported the argument that locally owned firms were in a gradual process of catching up.

Manufacturing Industrial Sector Level

Empirical estimation of foreign presence showed that foreign presence was highest in three manufacturing sectors; food, beverages and tobacco; chemical, petroleum and plastics and machine and engineering industry. Thus the implication is that in the perspective of foreign presence, sectors were different in that foreign firms were concentrated in only a few sectors and not evenly distributed in Kenya's manufacturing.

With regard to firm age, foreign firms were particularly older than locally owned firms in all the sectors apart from wood and wood products where domestic firms appeared to be older. Taking employment as a proxy for firm size, foreign firms were larger in size than locally owned firms in these sectors. Foreign firms also had a higher capacity utilisation than their local counterparts.

In all the three sectors with high foreign presence, foreign firms dominated in all the variables over the period 1994-2001, further confirming that activities of MNCs were concentrated in a few sectors of the manufacturing industry. However, despite foreign firms dominance in these sectors, most of their shares seemed to decline over the study period, while those of locally owned firms seemed to increase, albeit gradually. Computation of annual growth rates showed that foreign firms appeared to decline in real terms in the period 1994-2001 while locally owned firms performed better as they recorded positive growth rates in more variables than foreign firms. Interestingly, computational of growth rates using a longer time series data confirmed that the three sectors identified to have high foreign presence were the same ones that continued to perform well since 1963. Productivity analysis using T-tests indicated that foreign firms had higher levels of productivity than the locally owned firms, at least in the three sectors with high foreign presence.

4.4 Effect of Foreign Presence on Firm Level Productivity

In addition to the descriptive analysis done in the preceding sections, this chapter aims to empirically determine the role of foreign presence in manufacturing industry on firm level productivity. This is done by examining total factor productivity. The essence of this undertaking is to have a broad set of results, which will form a wider basis for further argument and research given that very few studies existed in Kenya on FDI. Departing from the assumption that technology skills, knowledge and technology embodied in foreign owned firms are transmitted to the domestic firms, then this should result in increased performance levels of local firms in terms of their productivity. We therefore begin analysis by specifying a general form of the production function. We assume a production function of the Cobb-Douglas type where a firm's output is presented by say Y_{ijt} which depends on three input factors capital K_{ijt} , labour L_{ijt} and raw materials M_{ijt} . Such a production function can be specified as follows:

$$Y_{ijt} = A_{ijt} F(K_{ijt}, L_{ijt}, M_{ijt}) \quad (4.3)$$

Where i denotes the firm, j the industry and t the year; all the properties of production function are assumed to hold⁹⁵. As discussed earlier in the recent past use of a production function approach has been increasingly adopted in determining FDI's impact on firm level productivity [Haddad and Harrison, 1993; Harrison, 1996; Aitken and Harrison, 1999; Kinoshita, 2000]. Following Lucas (1988) skilled and unskilled-labour L_{ijt} force can also be categorised into skilled SKILL and unskilled UNSKILL workers. Thus equation 4.3 above becomes:

$$Y_{ijt} = A_{ijt} F(K_{ijt}, SKILL_{ijt}, UNSKILL_{ijt}, M_{ijt}) \quad (4.4)$$

⁹⁵ This follows Griliches (1992) standard approach to modelling externalities in industry productivity growth. In which case the level of productivity achieved by enterprise or industrial sector depends on the level of knowledge accessible to it in addition to its own internal research effort. In related modelling cases, total factor productivity has been used as a procedure to measure productivity growth [Caves, (1974: 1982); Griliches and Lichtenberg, 1984; Coe and Helpman, 1995].

In the above specification Y_{ijt} is total production where A_{ijt} is the total factor productivity, which is assumed to vary across firms, sectors and at the same time fluctuate with time. According to this specification the output production changes only if the inputs into production change. A lot of significance is usually attached to A_{ijt} as an indicator of certain components in a firm all demonstrating the levels of existing skill, usefulness of knowledge, firm capabilities and other characteristics. [Such include managerial capabilities and organisational competence, inter-sector transfer of resources, R&D, increasing returns to scale, embodied technical progress and diffusion of technology]. Hence, taking the log level specification of equation 4.4 above and including an error term μ_{ijt} , yields:

$$\begin{aligned} \text{Log}Y_{ijt} = & \text{Log}A_{ijt} + \beta_1 \text{Log}K_{ijt} + \beta_2 \text{Log}SKILL_{ijt} + \beta_3 \text{Log}UNSKILL_{ijt} \\ & + \beta_4 \text{Log}M_{ijt} + \mu_{ijt} \end{aligned} \quad (4.5)$$

{Where $\mu_{ijt} = \alpha_{ijt} + \vartheta_{ijt}$, this is the standard random effects model as explained in the methodology section}. The analysis undertaken here examines the impact of foreign investment on all firms in Kenya and then on domestic firms only. Although A_{ijt} can be decomposed into just a few determinants as mentioned, for simplicity, we intend to decompose it into only a few components as follows:

$$\text{Log}A_{ijt} = \beta_3 \text{PART}_{ijt} + \beta_4 \text{FORPS}_{ijt} + \beta_5 \text{DUMMY}_{ijt} + \beta_6 \text{DUMMY}_{ijt} \quad (4.6)$$

Where PART_{ijt} is foreign ownership at firm level, FORPS_{ijt} is foreign presence at sector level, DUMMY_{ijt} and DUMMY_{ijt} are dummy variables for sector and time respectively. These two dummies are important in controlling for the industry specific and inter temporal fluctuations. All the standard traditional models failed to control for these phenomena and thus did not include these dummies primarily due to their data constraints. Results of such studies were based only on cross-sectional data at a point in time. Combining equation (4.5) and (4.6) above yields the estimating equation.

$$\begin{aligned} \text{Log}Y_{ijt} = & \beta_0 + \beta_1 \text{Log}K_{ijt} + \beta_2 \text{Log}SKILL_{ijt} + \beta_3 \text{Log}UNSKILL_{ijt} + \beta_4 \text{Log}M_{ijt} \\ & + \beta_5 \text{PART}_{ijt} + \beta_6 \text{FORPS}_{ijt} + \beta_7 \text{DUMMY}_{ijt} + \beta_8 \text{DUMMY}_{ijt} + \mu_{ijt} \end{aligned} \quad (4.7)$$

In this estimation, the dependent variable Y_{ijt} , is proxied by the value added for each firm. Capital was proxied by value of capital investment K_{ijt} . Labour force was classified into skilled $SKILL_{ijt}$ and unskilled $UNSKILL_{ijt}$ workers and both of them were measured in absolute numbers for each firm. Raw material was proxied by the value of raw materials consumed M_{ijt} by each firm. Both industry dummy DUMMY_j and time dummy DUMMY_t were also included to capture various fluctuations due to non-observable sectoral and time effects.

All the estimated coefficients for the factor inputs (capital, skill, unskilled and raw materials) were expected to be positive and significant, while the expected sign for the

foreign presence coefficient both at firm and sector level were expected to be either positive or negative. A positive sign coefficient would suggest a positive correlation – a positive impact of foreign presence on productivity in Kenya while a negative sign would mean a negative impact. A positive correlation would mean that foreign firms contributed positively to the total factor growth in Kenya. This would mean that firms in Kenya would benefit from technology transfer from foreign firms, knowledge, skills and other forms of spillovers. To the contrary, negative correlation would imply that domestic firms in Kenyan manufacturing do not benefit from foreign presence. It could also mean that foreign firms in Kenya operate in clusters that might be characterised by high concentration and perhaps high technology gaps between foreign and Kenyan firms that do not permit such benefits to occur. It could also be that foreign firms have few established vertical and horizontal linkages with domestic firms hindering steady flow of techniques, knowledge and other useful information. It could also be due to the nature and level of employment in the foreign firms. Employment in raw material seeking is not expected to result in much acquisition of knowledge and skills. Similarly, employment at low level cadres only is not likely to result in acquisition of much knowledge and skills. Finally, industry and time dummies were included to capture the non-observable sectoral and time effects; these were expected to be significant. The results of the estimated model 4.7 are presented in Table 4.5 and 4.6.

Table 4.5 presents the OLS, GLS and random effects results of all the firms included in the panel sample. As was done with labour productivity, for each of the econometric techniques used, the model estimation was repeated three times. The first estimation excluded dummies, the second included only time dummies while the last included both time and industry dummies. Based on the three econometric techniques, the coefficient estimated for foreign presence at the sector level were positive and statistically highly significant when no dummy was included. A similar trend was witnessed when only time dummy were included. The coefficient estimated with time dummies only and with no dummies was the same 0.0046 with OLS and was significant at 1%. Similarly results of GLS and random effects were highly comparable and consistent with no dummies and with only time dummies included. In both cases the coefficient estimated was 0.004 which was significant at 1%. The results obtained without any dummies supported those of the early contributors suggesting that an increase of 100% in foreign presence results to an increase of 0.4 to 0.46% in firm productivity.

Interestingly, when time and industry dummies are included, the coefficients obtained in all the cases decreased substantially in magnitude and became insignificant. With OLS a coefficient of 0.001 was obtained, 0.003 with GLS and 0.002 with random effects which were all statistically insignificant. This confirms that results obtained without dummies and with industry dummies are not robust in the context of the three estimation techniques employed. This implies that the effect of foreign presence on firm productivity is reduced when sectoral dummies are considered. These results are in support of recent developments in spillover analysis econometrically. Given that industry differences are important and ought to be taken into consideration, this thesis tends to support these results but emphasises that more work is needed employing different techniques and case studies as will be done in the next chapters.

With regard to foreign presence at the firm level, OLS, GLS and random effects produced very consistent and comparable results were estimated with the three techniques. However, the coefficients tended to change their statistical significance with all dummies included. The estimated coefficient without dummies was 0.0018 with OLS

significant at 5% and 0.002 with GLS and 0.002 with random effects which was significant at 1%. The coefficient estimated with industry dummies was 0.002 with GLS and 0.002 with random effects, all significant at 5%. Although OLS results were not significant, note that they were near significant at 10%. The implication here is that an increase of 100% in foreign presence at the firm level would increase labour productivity by between 0.18 and 0.2% when industry dummies are included. These results suggest that foreign participation at the firm level plays a positive and significant role towards productivity of firms in Kenya.

All the other independent variables had the expected results, produced appropriate signs of the estimated coefficients with a high degree of statistical significance at 1% even when time and sectoral dummies were included (see Table 4.5). Capital had a coefficient of 0.13 with GLS and 0.14 with both OLS and random effects. It means that if a firm increases its capital by 100%, it was likely to increase its firm productivity by between 13 and 14 percentage points. Capital is important as it is the main driver of production. With time and sectoral dummies included the estimated coefficients for raw material was 0.54 with GLS and 0.55 with both OLS and random effects. Implication that if a firm in the Kenyan manufacturing industry increases its raw material consumption by 100% it was likely to increase its productivity by between 54 and 55 percentage points. The estimated results for skilled labour were 0.56 with random effects and 0.54 with both OLS and GLS. Skilled labour is important for firm innovation and to drive production. In the case of unskilled labour, a coefficient of 0.38 was obtained with random effects and 0.39 with both OLS and GLS. Unskilled labour is also necessary for productivity especially more so in technically backward countries like Kenya.

Table 4.6 presents the OLS, GLS and random effects results for only the domestic firms. As in the above, model 4.7 was estimated three times for each econometric technique. The results based on foreign presence at the sector level were positive and significant suggesting that Kenyan manufacturing industry indeed benefited from an increase in foreign presence. The results obtained here confirm results estimated in the above cases. Consequently, results obtained with and without taking industry differences into consideration (industry dummies) were completely different. The results obtained without including any dummies compared to those obtained with time dummies included in all the three econometric techniques used. With OLS foreign presence had a coefficient of 0.0028 while GLS had a coefficient of 0.0024 both of which were statistically significant at 5%. The coefficient estimated with time dummies was 0.0027 for OLS and 0.0024 for GLS both of which were statistically significant at 5 and 10% respectively. Even though a similar coefficient of 0.002 was obtained in the case of random effects it was only near significant at 10%. All these estimates suggest that an increase of FDI presence at the sector level by 100 percentage points would increase productivity output in domestic firms by approximately between 0.2 and 0.3%. We emphasise that results obtained here are in line with traditional models – standard productivity models estimated in the past without taking into consideration industry, time, and locational effects among other things. As discussed extensively in Chapter 2, such studies mainly concentrated on cross-sectional studies, instead of firms, with aggregate industry data and without controlling for productivity differences among industries.

Results estimated with time and industry dummies included were not significant. The results confirm other findings produced above and are in further support of recent developments proponents of spillover analysis. Once again the methodological approach

considered seems to largely determine the outcome of the spillovers analysis. Since we support the argument that for spillovers to occur a more complex approach is needed, one that includes as many factors we would be tempted to support these findings but however emphasise that extra work is required employing diverse techniques as will be done in the subsequent chapters.

All the other independent variables had the expected results, positive and were significant at 1% when time and sectoral dummies were included. Capital had a coefficient of 0.11 with GLS and 0.12 with both OLS and random effects. It means that if a firm increases its capital by 100%, it was likely to increase its productivity by between 11 and 12%. With time and sectoral dummies included the estimated coefficients for raw material was 0.61 with OLS, 0.62 with GLS and 0.63 with random effects. This suggests that if a firm increases its raw material consumption by 100% it was likely to increase its productivity by between 61 and 63%. The estimated coefficient for skilled labour was 0.50 with OLS, 0.53 with GLS and 0.54 with random effects. In the case of unskilled labour a coefficient of 0.45 was obtained with OLS and 0.43 with both GLS and random effects. In all these cases the results were consistent.

Table 4.5 Impact of Foreign Presence on Total Factor Productivity: Panel Regression Estimates for All the Firms, Kenya, 1994-2001

Variable	OLS	OLS	OLS	GLS	GLS	GLS	Ran. eff.	Ran. eff.	Ran. eff.
LKALF	0.145*** (0.012)	0.145*** (0.012)	0.143*** (0.012)	0.134*** (0.012)	0.133*** (0.012)	0.133*** (0.012)	0.144*** (0.012)	0.143*** (0.012)	0.144*** (0.012)
Capital	0.531*** (0.017)	0.529*** (0.017)	0.546*** (0.017)	0.539*** (0.017)	0.537*** (0.017)	0.537*** (0.017)	0.544*** (0.017)	0.541*** (0.017)	0.545*** (0.018)
LRMAT	0.520*** (0.022)	0.518*** (0.022)	0.537*** (0.022)	0.527*** (0.022)	0.526*** (0.022)	0.526*** (0.022)	0.543*** (0.022)	0.543*** (0.022)	0.559*** (0.023)
Raw material	0.393*** (0.019)	0.393*** (0.019)	0.391*** (0.019)	0.394*** (0.019)	0.394*** (0.019)	0.394*** (0.019)	0.383*** (0.019)	0.383*** (0.019)	0.380*** (0.019)
Skilled labour	0.0018** (0.001)	0.0018** (0.001)	0.0011 (0.001)	0.002*** (0.0007)	0.002*** (0.0007)	0.002*** (0.0007)	0.002*** (0.0008)	0.002*** (0.0008)	0.002*** (0.0008)
LUNSKILL	0.0046*** (0.001)	0.0046*** (0.001)	0.001 (0.005)	0.004*** (0.001)	0.004*** (0.001)	0.004*** (0.001)	0.004*** (0.001)	0.004*** (0.001)	0.004*** (0.002)
Unskilled labour	1.78*** (0.122)	1.882*** (0.14)	1.82*** (5.76)	1.774*** (0.121)	1.868*** (0.138)	1.844*** (0.331)	1.682*** (0.126)	1.782*** (0.144)	1.739*** (0.328)
PART-FNS	NO	YES	YES	NO	YES	YES	0.59	0.59	0.59
(Firm-level)	NO	YES	YES	NO	YES	YES	NO	YES	YES
FORPS	NO	YES	YES	NO	YES	YES	NO	YES	YES
(Sector-level)	NO	YES	YES	NO	YES	YES	NO	YES	YES
Constant	710.40 (0.00)	328.69 (0.00)	231.98 (0.00)	2875 (0.00)	2875 (0.00)	2875 (0.00)	2875	2875	2875
R squared									
Time Dummies									
Industry Dummies									
F-Test									
Log Likelihood									
Wald-Test for GroupWise Heteroscedasticity									
No. of observations	2875	2875	2875	2875	2875	2875	2875	2875	2875

Note: Standard errors are presented in parentheses. *, **, *** represent 10%, 5% and 1% levels of significance respectively.

Table 4.6 Impact of Foreign Presence on Total Factor Productivity: Panel Regression Estimates for Domestic Firms, Kenya, 1994-2001

Variable	OLS	OLS	OLS	GLS	GLS	GLS	GLS	Ran. eff.	Ran. eff.	Ran. eff.
LKALF	0.115*** (0.014)	0.114*** (0.014)	0.119*** (0.014)	0.103*** (0.014)	0.103*** (0.014)	0.103*** (0.014)	0.111*** (0.014)	0.113*** (0.015)	0.113*** (0.15)	0.123*** (0.148)
Capital	0.556*** (0.021)	0.553*** (0.021)	0.611*** (0.021)	0.607*** (0.021)	0.607*** (0.021)	0.605*** (0.021)	0.620*** (0.021)	0.602*** (0.021)	0.600*** (0.215)	0.629*** (0.022)
Raw material	0.497*** (0.028)	0.496*** (0.028)	0.497*** (0.027)	0.528*** (0.027)	0.528*** (0.027)	0.527*** (0.027)	0.532*** (0.027)	0.532*** (0.028)	0.532*** (0.025)	0.539*** (0.028)
LSKILL	0.416*** (0.025)	0.416*** (0.025)	0.453*** (0.025)	0.421*** (0.024)	0.421*** (0.024)	0.421*** (0.024)	0.433*** (0.025)	0.408*** (0.026)	0.4084** (0.026)	0.427*** (0.026)
Unskilled labour										
PART-FNS										
(Firm-level)										
FORPS	0.0028*** (0.001)	0.0027*** (0.001)	0.0013 (0.006)	0.0024** (0.001)	0.0024* (0.001)	0.0024* (0.001)	0.0012 (0.006)	0.002 (0.001)	0.002 (0.001)	0.001 (0.007)
(Sector-level)	1.923*** (0.158)	2.011*** (0.180)	1.204*** (0.425)	1.641*** (0.156)	1.697*** (0.178)	1.697*** (0.178)	1.257*** (0.436)	1.640*** (0.162)	1.691*** (0.185)	1.129*** (0.448)
Constant										
R squared	NO	YES	YES	NO	YES	YES	YES	NO	YES	YES
Time Dummies	NO	NO	YES	NO	NO	NO	YES	NO	YES	YES
Industry Dummies	437.65 (0.000)	182.86 (0.000)	138.94 (0.000)							
F-Test										
Log Likelihood				-2716.76	-2712.42	-2712.42	-2693.19			
Wald-Test for GroupWise				2357.94 (0.00)	2376.49 (0.00)	2376.49 (0.00)	2468.16 (0.00)	2246.32 (0.00)	2253.86 (0.00)	2367.47 (0.00)
Heteroscedasticity										
No. of observations	1671	1671	1671	1671	1671	1671	1671	1671	1671	1671

Note: Standard errors are presented in parentheses. *, **, *** represent 10%, 5% and 1% levels of significance respectively.

4.5 Effect of Foreign Presence on Firm Productivity: Analysis by Scale

In this section, we analyse the impact of foreign presence on total factor productivity by scale orientation. In all the earlier estimations conducted, the firms were pooled together without regard for the variation that could arise due to differences in firm size or technology gap. In this section, we attempt to analyse total factor productivity by size orientation and in the next section by technological gap. However, we must first re-emphasise an emerging conclusion from above as this will guide the next round of results. So far, it is clear that results obtained with dummies included differed significantly from those obtained without inclusion of dummies. When dummies are included the estimation tends to be in accordance with the recent contributions and when dummies are ignored the estimation tended to replicate traditional estimations. In the next sections, we intend to include dummies to enable comparison between estimates with dummies and without dummies as was done in the above cases. Thus industry and time factors will be taken into consideration in all the estimation.

The influence of scale on spillover occurrence can either be positive or negative. As explained in Chapter 2, for industries involved with economies of scale then minimum efficiency scale is involved and in such a case scale would influence productivity. On the contrary, due to the importance of flexibility offered by scope, small firms are likely to perform better in specific industries. In order to account for the size factor, all the firms in the sample were considered at three levels. The first level included all the firms in the sample, the second included only domestic firms while the last level included only the foreign firms. Each level was then classified into two groups as shown in Table 4.7. Firms employing less than 138 were classified as "small firms" while firms employing above 138 were classified as "large firms". Large firms in all the categories dominated in the industry with large shares in all the variables except for labour productivity. This was interesting since small firms did not appear to control a high share of value added or employment. Small firms controlled a very small proportion of employment level. Large domestic firms employed over 90% of the skilled labour force and accounted for over 70% of the total expenditure on machinery and equipment, capital and VAD.

Table 4.7: Key Indicators: Percentage Shares by Scale Dummy and Firm Ownership

	All Firms		Domestic Firms		Foreign Firms	
	<i>Small</i>	<i>Large</i>	<i>Small</i>	<i>Large</i>	<i>Small</i>	<i>Large</i>
RMAT	13.5	86.5	20.5	79.5	11.0	89.0
KALF	24.1	75.9	27.9	72.1	26.2	73.8
EMPT	6.7	93.3	7.1	92.9	6.7	93.3
SKILL	8.3	91.7	8.0	92.0	8.9	91.1
VAD	7.8	92.2	11.4	88.6	7.4	92.6
VADL	56.4	43.6	56.4	43.6	57.0	43.0
TSALES	10.0	90.0	15.2	84.8	8.7	91.3
EXPTS	15.9	84.1	33.6	66.4	7.9	92.1
TECHN	18.9	81.1	22.1	77.9	15.1	84.9

Source: Computed by the author from Kenya, Annual Industrial Survey undertaken by Ministry of Trade and Industry

The estimated results of foreign impact on total factor productivity based on size orientation are presented in Table 4.8. It was interesting to obtain consistent and robust results with the classification done. The results of all the variables included were as expected. They produced a high degree of statistical significance with the appropriate signs of the estimated coefficients. Their interpretation follows the above section – which provided sufficient evidence that they all contributed positively to the productivity of the firm. So in the current analysis, we shall concentrate on interpreting the results estimated with foreign presence alone. For all small firms, estimation by GLS produced a coefficient of 0.004 which was statistically significant at 1% without dummies included. Results estimated for random effects without dummies were near significant at 10%. With dummies the results estimated were not significant for both GLS and random effects. On the contrary, results estimated for all large firms were more robust without dummies in the case of GLS and random effects models. The coefficients estimated were positive 0.016 and 0.017 for GLS and random effects and significant at 1% respectively. These results showed that for large firms FDI spillovers contributes positively to the productivity of the firm. As in the above, with dummies included the results were not significant. Two interesting conclusion emerge. *First*, results obtained with large firms are more robust than those obtained from the small firms. The implication of these findings is that large firms in Kenyans manufacturing industry are likely to benefit from spillovers occurrence more than the small firms. In other words the effect of foreign presence is influenced by size. However, the empirical evidence is not very strong in support of that and more analysis in the form of further studies needs to be done. *Second*, results estimated without inclusion of dummies are more robust than those obtained with dummies. Results obtained without dummies tend to support results obtained by the early contributors while results obtained with dummies included support results observed with recent developments in the productivity analysis.

Results obtained for large domestic firms were more robust than those obtained for small domestic firms. While results estimated for small domestic firms were not significant, results of large firms were positive and statistically significant at 5%. The estimated coefficients by GLS and random effects were 0.013 and 0.019 respectively. As in above results obtained with dummies included supported results observed with recent developments in the productivity analysis.

Table 4.8 Impact of Foreign Presence on Total Factor Productivity by Scale:
Panel Regression Estimates for All the Firms by Scale, Kenya, 1994-2001

Variable	All Small Firms				Small Domestic Firms			
	GLS	GLS	Rand. Eff.	Rand. Eff.	GLS	GLS	Rand. Eff.	Rand. Eff.
LKALF	0.129*** (0.012)	0.130*** (0.120)	0.134*** (0.013)	0.134*** (0.013)	0.088*** (0.014)	0.096*** (0.014)	0.089*** (0.015)	0.101*** (0.013)
Capital								
LRMAT	0.558*** (0.019)	0.560*** (0.019)	0.571*** (0.019)	0.572*** (0.019)	0.605*** (0.022)	0.618*** (0.022)	0.608*** (0.023)	0.631*** (0.023)
Raw material								
LSKILL	0.510*** (0.026)	0.512*** (0.017)	0.508*** (0.027)	0.508*** (0.027)	0.528*** (0.032)	0.517*** (0.032)	0.522*** (0.033)	0.510*** (0.034)
Skilled labour								
LUNSKILL	0.377*** (0.023)	0.373*** (0.023)	0.354*** (0.024)	0.352*** (0.024)	0.425*** (0.029)	0.431*** (0.030)	0.412*** (0.031)	0.422*** (0.031)
Unskilled labour								
FORPS	0.004*** (0.001)	0.001 (0.005)	0.002 (0.002)	0.001 (0.005)	0.002 (0.001)	0.002 (0.007)	0.0012 (0.001)	0.002 (0.007)
(Sector-level)								
Constant	1.873*** (0.135)	1.901*** (0.333)	1.888*** (0.161)	1.871*** (0.351)	1.763*** (0.171)	1.310*** (0.461)	1.794*** (0.179)	1.256*** (0.480)
R squared			0.49	0.50			0.51	0.52
Time & Industry Dummies	NO	YES	NO	YES	NO	YES	NO	YES
Log Likelihood	-3656.45	-3640.98			-2231.97	-2214.76		
Wald-Test for GroupWise Heter.	2320.62 (0.000)	2380.22 (0.000)	2120.27 (0.000)	2216.64 (0.000)	1545.17 (0.000)	1617.52 (0.000)	1428.28 (0.000)	1495.99 (0.000)
No. of observations	2258	2258	2258	2258	1389	1389	1389	1389

Variable	All Large Firms				Large Domestic Firms			
	GLS	GLS	Rand. Eff.	Rand. Eff.	GLS	GLS	Rand. Eff.	Rand. Eff.
LKALF	0.237*** (0.028)	0.212*** (0.028)	0.212*** (0.032)	0.178*** (0.033)	0.303*** (0.042)	0.271*** (0.049)	0.314*** (0.045)	0.278*** (0.052)
Capital								
LRMAT	0.472*** (0.039)	0.408*** (0.038)	0.472*** (0.042)	0.408*** (0.044)	0.511*** (0.061)	0.484*** (0.067)	0.528*** (0.063)	0.494*** (0.072)
Raw material								
LSKILL	0.490*** (0.056)	0.491*** (0.057)	0.544*** (0.059)	0.518*** (0.061)	0.229** (0.096)	0.226** (0.098)	0.232** (0.104)	0.211*** (0.110)
Skilled labour								
LUNSKILL	0.384*** (0.054)	0.314*** (0.047)	0.368*** (0.048)	0.296*** (0.050)	0.227*** (0.063)	0.222*** (0.069)	0.201*** (0.067)	0.188*** (0.074)
Unskilled labour								
FORPS	0.016*** (0.003)	0.005 (0.012)	0.017*** (0.005)	0.003 (0.013)	0.013** (0.006)	-0.001 (0.014)	0.019** (0.007)	-0.003 (0.018)
(Sector-level)								
Constant	0.822* (0.443)	2.588*** (0.877)	0.778*** (0.601)	3.024*** (0.940)	2.249* (0.942)	3.466*** (1.200)	1.819*** (1.001)	3.666*** (1.453)
R squared			0.40	0.44			0.37	0.43
Time & Industry Dummies	NO	YES	NO	YES	NO	YES	NO	YES
Log Likelihood	-1096.33	-1038.41			-458.04	-435.55		
Wald-Test for GroupWise Heter.	710.03 (0.000)	730.29 (0.000)	461.05 (0.000)	470.01 (0.000)	166.39 (0.000)	475.71 (0.000)	158.83 (0.000)	200.22 (0.000)
No. of observations	624	624	624	624	282	282	282	282

- Standard errors are presented in parentheses.

- *, **, *** represent 10%, 5% and 1% levels of significance respectively.

4.6 Effect of Foreign Presence on Firm Productivity: Analysis by Technology Gap

The impact of foreign presence on productivity was also examined by technology gap orientation. Firms were classified into two categories; those characterised by low technology gap and those by high technology gap. Except for foreign presence, results estimated for all other variables were as expected – produced appropriate signs of the estimated coefficients with a high degree of statistical significance. Since their interpretation is in the same way as in above, we shall concentrate on the interpretation of results obtained with foreign presence. Table 4.9 shows that results of GLS and random effects methods estimated for all firms in the low technology gap category, without inclusion of dummies produced comparable results. In both cases foreign presence coefficients was 0.006 for GLS and 0.005 for random effects and both were highly statistically significant at 1%. These results compared to those of the early contributors. Results obtained with dummies were not significant and thus comparable with those obtained with recent developments to the empirical spillover literature.

Contrarily, results obtained with high technology gap were somewhat amazing. When all firms were considered, the coefficients of foreign presence produced without dummies remained positive but became insignificant. From the perspective of early contributors, these results could be interpreted to mean that high technology gap does not favour spillover occurrence. Similar to the above, results estimated with dummies included were not statistically significant.

Discussing from the perspective of early contributors, these results fail to support high technology gap requirement for spillover to occur and suggests that a relatively low technology gap was inevitable for spillovers to occur in the Kenyan context. This observation differs with Findlay's (1978) conjecture that a relatively wide gap created the necessary pressure for change in the developing country. A similar school of thought was forged by Abramovitz (1986) seminal contribution in his catching up model whereby countries lagging behind were in a position to generate more growth but only if their social capabilities were sufficiently developed. The observation is in support of low technology gap advocates [Cantwell, 1989; Kokko, 1994; Kokko, Tansini and Zejan, 1996; Sjöholm, 1997]. When technology gap are too large they usually require inputs of far more sophisticated machinery embedded in wider systems of control, quality etc that takes years to acquire through high levels of training and education. Therefore, the wider the gap, the less likely that a locally owned firm could make such a jump without either a foreign partner or a huge amount of public sector support (knowledge flows, technology assistance, finance etc).

The results obtained for domestic firms were comparable to those obtained in the context of all the firms although coefficients estimated were relatively small in magnitude. Table 4.9 shows that results of GLS and random effects estimated without inclusion of dummies produced a similar coefficient of 0.003 that was significant at 5% respectively. This would mean that domestic firms with a low technology gap benefited slightly less than when all the firms were considered. This is not surprising since in the category of all the firms, foreign firms are included who are more endowed with resources necessary in the spillover process than their domestic counterparts.

**Table 4.9: Impact of Foreign Presence on Total Factor Productivity by Technology Gap:
Panel Regression Estimates by Technology Gap, Kenya, 1994-2001**

Variable	Low Technology Gap				Low Technology Gap			
	All Firms				Domestic Firms			
	GLS	GLS	Rand. Eff.	Rand. Eff.	GLS	GLS	Rand. Eff.	Rand. Eff.
LKALF	0.123*** (0.013)	0.122*** (0.014)	0.137*** (0.014)	0.137*** (0.014)	0.060*** (0.017)	0.066*** (0.017)	0.084*** (0.018)	0.096*** (0.018)
Capital								
LRMAT	0.524*** (0.020)	0.523*** (0.020)	0.526*** (0.020)	0.528*** (0.021)	0.574*** (0.023)	0.587*** (0.024)	0.580*** (0.024)	0.605*** (0.025)
Raw material								
LSKILL	0.574*** (0.026)	0.588*** (0.026)	0.598*** (0.026)	0.614*** (0.027)	0.557*** (0.031)	0.563*** (0.031)	0.560*** (0.033)	0.567*** (0.033)
Skilled labour								
LUNSKILL	0.371*** (0.022)	0.371*** (0.022)	0.345*** (0.022)	0.344*** (0.022)	0.378*** (0.027)	0.387*** (0.028)	0.359*** (0.029)	0.374*** (0.029)
Unskilled labour								
FORPS	0.006*** (0.001)	0.004 (0.012)	0.005*** (0.001)	0.003 (0.011)	0.003** (0.001)	0.001 (0.015)	0.003* (0.001)	0.0003 (0.014)
(Sector-level)								
Constant	1.833*** (0.138)	1.943*** (0.759)	1.738*** (1.467)	1.883*** (0.704)	2.048*** (0.177)	1.873*** (0.904)	1.941*** (0.185)	1.674*** (0.864)
R squared			0.59	0.60			0.57	0.58
Time & Industry Dummies	NO	YES	NO	YES	NO	YES	NO	YES
Log Likelihood	-3357.96	-3342.03			-1922.63	-1906.80		
Wald-Test for GroupWise Heter.	3020.52 (0.000)	3103.00 (0.000)	2903.65 (0.000)	2960.07 (0.000)	1652.17 (0.000)	1723.93 (0.000)	1557.24 (0.000)	1633.65 (0.000)
No. of observations	2033	2033	2033	2033	1195	1195	1195	1195
Variable	High Technology Gap				High Technology Gap			
	All Firms				Domestic Firms			
	GLS	GLS	Rand. Eff.	Rand. Eff.	GLS	GLS	Rand. Eff.	Rand. Eff.
LKALF	0.167*** (0.021)	0.167*** (0.021)	0.163*** (0.021)	0.163*** (0.022)	0.174*** (0.023)	0.174*** (0.023)	0.165*** (0.025)	0.162*** (0.025)
Capital								
LRMAT	0.604*** (0.033)	0.605*** (0.033)	0.608*** (0.034)	0.608*** (0.034)	0.679*** (0.042)	0.682*** (0.042)	0.702*** (0.044)	0.710*** (0.045)
Raw material								
LSKILL	0.420*** (0.042)	0.421*** (0.042)	0.422*** (0.042)	0.425*** (0.043)	0.436*** (0.054)	0.447** (0.055)	0.434** (0.057)	0.452*** (0.058)
Skilled labour								
LUNSKILL	0.466*** (0.038)	0.469*** (0.038)	0.477*** (0.038)	0.477*** (0.039)	0.630*** (0.055)	0.624*** (0.055)	0.661*** (0.057)	0.650*** (0.058)
Unskilled labour								
FORPS	0.002 (0.003)	0.004 (0.012)	0.002 (0.003)	0.004 (0.012)	-0.0005 (0.003)	0.005 (0.015)	-0.0007 (0.003)	0.004 (0.015)
(Sector-level)								
Constant	1.614*** (0.240)	1.473*** (0.339)	1.600*** (0.264)	1.377*** (1.115)	0.873*** (0.319)	0.615*** (0.436)	0.782** (0.343)	0.666*** (0.453)
R squared			0.59	0.60			0.62	0.63
Time & Industry Dummies	NO	YES	NO	YES	NO	YES	NO	YES
Log Likelihood	-1417.80	-1413.63			-765.60	-760.25		
Wald-Test for GroupWise Heter.	1249.20 (0.000)	1271.55 (0.000)	1230.07 (0.000)	1237.01 (0.000)	807.58 (0.000)	836.87 (0.000)	769.92 (0.000)	20030.96 (0.000)
No. of observations	849	849	849	849	476	476	476	476

- Standard errors are presented in parentheses.

- *, **, *** represent 10%, 5% and 1% levels of significance respectively.

The results obtained with dummies were not statistically significant. As in the above, these results supported the work and findings of the early contributors. Results estimated for domestic firms in the high technology gap category with dummies included were not significant. This supported the proponents of low technology gap for spillover to occur. Further, the estimated results with all dummies included were insignificant. This supported the work of the recent developments in the spillover literature.

4.7 Summary and Conclusion

The objectives of this chapter were four fold; to undertake a comparative behaviour of foreign and locally owned firms, to examine whether spillovers occurred in Kenyan manufacturing industry, to determine the influence of scale and technological gap in the spillover occurrence process.

The theoretical issues in this chapter draw insights from the productivity literature. Interestingly, it was shown that while studies done following early contributors usually found spillovers, those based on proponents of recent developments failed to find spillovers. For a wider set of results meant for comparison purposes, spillover estimations were done taking 'early contributors' and 'recent developments' into consideration.

Analysis of comparative behaviour undertaken for the whole manufacturing industry showed strongly that foreign firms continued to enjoy higher shares of most economic activities throughout the study period (1999-2001). However, in terms of growth rates, locally owned firms performed better than foreign firms in this period since they recorded positive growths in a number of variables while foreign firms did not. Such variables included value added, labour productivity, skilled labour and employment of 2.9, 2.2, 2 and 1% respectively. This trend could be explained by economic stagnation, infrastructural and institutional failure witnessed in the 1990s, resulting in massive restructuring by most firms – making the MNCs the hardest hit. During the same period there was a new face of emerging environments characterised by tremendous external pressure. Nevertheless, foreign firms continued to enjoyed high dominance in all the variables in the period 1994-2001.

Empirical analysis by manufacturing sector showed that only three sectors had particularly high levels of foreign presence: food, beverages and tobacco; chemical, petroleum and plastics and machine and engineering industry. This implied that sectors in Kenya's manufacturing were different with regard to distribution of foreign firms, foreign presence, as they were concentrated in only a few sectors. Subsequently, in the three sectors with high foreign presence, foreign firms dominated in all the variables over the period 1994-2001. However, although foreign firms enjoyed complete dominance in these sectors, their shares tended to decline over time. On the contrary, the shares of locally owned firms depicted a gradual but increasing trend. Annual growth rates computed showed that foreign firms appeared to decline in real terms in the period 1994-2001 while locally owned firms recorded positive growth rates. In that case, locally owned firms seemed to be catching up with the foreign firms, albeit gradually.

All the independent variables used in our estimations had the expected results. The conclusions presented here will be based on foreign presence in line with the focus of the chapter. Foreign participation at firm level was observed to have a significant influence – based on total factor productivity. These results which were consistent and robust with and without dummies implied that foreign equity participation at the firm level influenced productivity positively – suggesting productive benefits from foreign owners. Foreign presence at the sector level produced two sets of results depending on the methodological approach adopted at a point in time. Estimated results following the early contributors approach indicated spillover occurrence in the Kenyan manufacturing. However, results estimated taking the new developments into consideration produced no sign of spillovers. A similar trend was observed while spillovers were estimated taking size and technology gap into consideration. Hence, the existing divergence in the spillover literature was witnessed in the Kenyan context – reflecting inconclusiveness of spillover analysis using productivity techniques.

Due to recent developments in spillover analysis we would be tempted to agree with their approach and conclude in their favour that no spillovers exist in the Kenyan manufacturing. Nevertheless, we tend to differ and argue that these results ought to be interpreted with a caution: in strict sense these results need not be interpreted to mean no effect on productivity. This could suggest that manufacturing sectors; sub sectors are different on diverse fronts; in terms of FDI presence, structure, conduct, levels of FDI activities etc. It may be the case that sectors with negative effect or low effect due to foreign presence offsetted that of sectors with strong positive impact making the resultant effect neutral sometimes negative hence insignificant. The results of comparative behaviour indicated that FDI activities had a skewed distribution towards sectors with high foreign presence. This observation illuminates an important point in the Kenyan manufacturing industry that an ideal FDI analysis ought to be undertaken sector-wise and if possible by sub sectors while maintaining firm as the basic unit of analysis. This is further inspired by the findings of Chapter 3 which indicated that foreign firms tended to play an important role in Kenya's industrial development, and more so in specific manufacturing sectors.

Hence, before a concrete conclusion that no spillovers exist in the Kenyan context can be made, we emphasise that an alternative framework must be considered as advocated for in Chapter 2. Total factor productivity was observed to be widely used in examining spillovers despite multiple caveats characterising the approach – some of which we were able to confirm from our analysis. A different framework as advocated for in Chapter 2 must be considered before a concrete conclusion can be drawn regarding spillovers. We therefore emphasise that in depth analysis through interviews with the enterprises and detailed case studies would be the only approach through which a meaningful examination of spillovers can be done. This would be a great source of inspiration on our learning effort towards understanding what really happens in both foreign and local firms in the Kenyan Manufacturing. So the broad findings produced in this chapter which we regard as inconclusive serve as a necessary prelude, provide tremendous motivation that provokes further work beyond productivity technique approach – this is what we attempt to do in the subsequent chapters where spillovers are conceptualised differently in terms of technological learning, capability building and innovation.

Appendix 4.1: Annual Growth Rates for All Firms and Some Selected Manufacturing Sectors, Kenya

	Locally Owned Firms			Foreign Owned Firms		
Annual Growth Rates Computed for All Firms in the Manufacturing Industry						
	1994-1997	1997-2001	1994-2001	1994-1998	1997-2002	1994-2001
All Firms						
RMAT	-7.7	-5.7	-6.0	-7.0	-6.0	-10.5
KALF	-9.7	-3.0	-5.7	-16.0	-4.5	-9.2
EMPT	0.1	1.7	1.0	-8.4	-1.9	-4.6
SKILL	1.5	1.9	2.0	-1.8	-2.1	-1.8
VAD	5.1	-3.7	2.9	-6.7	-6.4	-6.5
VADL	7.7	-5.0	2.2	-10.9	-4.0	-5.0
TSALES	-1.7	-4.6	-2.1	-6.8	-6.3	-6.2
EXPTS	-4.5	-14.4	-5.6	-5.5	-16.1	-8.9
TECHN	1.9	-8.7	0.8	-6.6	-9.7	-7.1
Annual Growth Rates Computed for Some Selected Manufacturing Sectors						
Food, Beverages and Tobacco						
RMAT	-9.9	-5.5	-7.3	-12.0	-3.0	-6.8
KALF	-10.1	3.0	-1.4	5.0	-2.6	3.6
EMPT	0.5	1.9	1.4	0.7	-2.2	-1.1
SKILL	2.4	3.2	3.6	-0.1	-2.9	-1.9
VAD	3.3	-0.9	2.0	2.2	-0.1	1.1
VADL	-4.0	-15.0	-7.8	-14.5	-6.2	-7.8
TSALES	-9.0	-6.3	-7.2	-9.3	-6.1	-7.6
EXPTS	-5.9	-10.1	-3.3	-11.3	-16.7	-11.5
TECHN	0.4	1.0	0.8	0.2	0.6	-0.5
Chemicals, Petroleum and Plastics						
RMAT	-3.3	-5.0	-3.3	-4.7	-2.2	-3.3
KALF	-3.3	-0.9	-0.6	-9.0	-5.3	-7.3
EMPT	-3.0	6.2	3.1	-1.2	1.3	-0.4
SKILL	-3.4	5.1	6.7	-0.2	-4.0	-2.8
VAD	4.7	3.8	5.7	1.3	3.8	2.6
VADL	-16.7	-6.1	-11.1	-3.4	0.6	0.6
TSALES	-4.7	-4.2	-3.6	-7.6	-2.8	-5.1
EXPTS	2.2	-16.3	-2.3	-1.3	-10.1	-3.0
TECHN	10.8	1.7	8.0	4.8	3.8	4.7
Machine and Engineering						
RMAT	-6.0	-6.2	0.2	-6.9	-8.9	0.9
KALF	-14.2	-6.7	25.7	-38.0	-0.7	-11.3
EMPT	2.7	-3.2	0.9	-24.0	-8.6	-1.0
SKILL	4.1	-2.2	5.9	1.3	-0.1	2.2
VAD	3.7	2.4	5.3	14.2	-8.2	15.9
VADL	20.4	-6.3	10.7	-13.7	-8.2	1.4
TSALES	-6.6	-5.4	-0.9	-3.4	-11.1	-2.0
EXPTS	-9.0	-14.6	18.9	10.2	-26.2	-0.4
TECHN	3.8	0.4	4.8	4.3	1.4	3.4

Source: Computed by the author from Kenya, Annual Industrial Survey undertaken by Ministry of Trade and Industry

Chapter Five

FOREIGN PRESENCE AND TECHNOLOGICAL SPILLOVER: EXTENT; DETERMINANTS AND MODE OF OCCURRENCE

5.1 Introduction

This chapter uses the analytical framework designed in Chapter 2 to examine the extent of spillover occurrence in the Kenyan manufacturing industry. The kind of spillovers occurring will be examined as well as the channels through which technological spillovers occur. A limited dependent variable estimation technique, ordered logit, is also used to investigate the determinants of spillover occurrence. The data used comes from a survey undertaken in the Kenyan manufacturing industry covering food processing and beverages, and machine and engineering industries. This chapter attempts to answer the following questions:

- (1) To what extent do technological spillovers occur in Kenya's manufacturing industry?
- (2) To what extent does the presence of foreign firms stimulate technological spillovers to local manufacturing enterprises?
- (3) What kind of technological spillovers occur most?
- (4) What are the channels (modes) through which technological spillovers occur?
- (5) Under what conditions do technological spillovers occur?

This chapter is organised in a number of major sections as follows: Section 5.2 presents an overview of the sample characteristics. Detailed descriptive analysis of each mode of spillover occurrence in the two industries is presented. In section 5.3, the spillover index is computed which gives an idea of the extent to which technological spillovers in terms of technological changes; learning and capability building occur in the manufacturing industry. In section 5.4, the determinants of spillover occurrence are examined using binary and ordered logit technique while summary and conclusions are presented in section 5.5.

5.2 Sample Characteristics

The data used in this study comes from a survey undertaken in Kenya in 2003-4 covering food processing⁹⁶ and machine engineering industries located in six most industrialised cities in Kenya⁹⁷. The questionnaire used in data collection is included at the end of this thesis. The two manufacturing industries were selected on the basis of analysis done in the Chapter 3 and 4; that the two industries were the most dynamic in Kenya; were the most productive with the fastest growth rates; high FDI levels, value added, employment generation and contribution to the GDP.

The sample was drawn using proportionate probability sampling (PPS) sampling technique. The frame from which the sampling was drawn from was compiled from various sources. The first list of firms was drawn from firms that are included in the monthly survey of industrial production (MSIP) conducted on a monthly basis by Central

⁹⁶ For the sake of simplicity, we sometimes refer to food and beverages as just food processing sector.

⁹⁷ The survey was conducted by the author in the following cities: Nairobi, Mombasa, Nakuru, Kisumu and Eldoret.

Bureau of Statistics (CBS) in Kenya. Since this survey does not exhaust all the firms, a comparison with the firms in the 'master file' was done – the master file is the frame maintained by CBS containing names of all the firms operating in Kenya. The National Directory of Industries (NDI) prepared by the 'Ministry of Trade and Industry' and the directory of firms and industries prepared by Kenya Association of Manufacturers⁹⁸ were also consulted.

From an initial sample of 250 firms selected for this survey (125 for each industry) about 183 firms were successfully surveyed. This represented approximately 73% retrieval rate of the total firms initially sampled⁹⁹. Nevertheless, information from 3 firms was rejected for incomplete information provided leaving 180 firms for this analysis. According to the breakdown provided in Table 5.1, there were 78 foreign firms, which accounted for 43.3% of the total firms considered for this analysis and 102 local firms, which accounted for 56.7%. Note here that as in Chapter 4, a firm was defined as foreign owned if it had foreign ownership of nominal capital (equity) of at least 10%¹⁰⁰ otherwise the firm is taken as a locally owned firm. Similarly from International Fund (IMF) point of view, a significant impact to a host industry/economy is possible when the foreign investor holds a share of at least 10% of the nominal capital (IMF, 1993, 86F)¹⁰¹.

The term foreign firm was preferred as opposed to MNCs or TNCs. This was as a result of many cases identified of foreign firms in Kenya which could neither be classified as MNCs nor TNCs as they did not have foreign affiliates abroad but 'stood alone'. In the food processing industry there were 14 'stand alone' foreign firms which accounted for 28% of the total foreign firms in food processing industry while there were 9 'stand alone' foreign firms in machine and engineering industry accounting for 32.1% of the total foreign firms in machine and engineering industry. The analysis sample included 105 (58.3%) food-processing firms and 75 (41.7%) machine and engineering firms. Classification by firm ownership shows that foreign firms in food processing accounted for 48% of the total food processing firms while locally owned firms accounted for 52 %. In the machine and engineering industry, foreign and local firms accounted for 37% and 63% respectively of the total firms in machine engineering and industry, Table 5.1. The data collected was representative; both foreign and local firms accounted for well over 50% of manufacturing production for both sectors (interms of output sales) and employment hence the results obtained would enable a policy-relevant assessment.

⁹⁸I am grateful to Central Bureau of Statistics (CBS), Department of Company Registration and Kenya Association of Manufacturers for allowing me access to their firm directories.

⁹⁹ This survey was a success following the logistical and technical support from Central Bureau of Statistics, Kenya.

¹⁰⁰ This is the benchmark used by the Kenyan national authorities as well as OECD, non-OECD transition economies as well as UNCTAD.

¹⁰¹ For more information see IMF (1993), Balance of Payments Manual. Fifth Edition. Washington: International Monetary fund.

Table 5.1: Distribution of Sampled Firms by Ownership, Kenyan Firms, 2004

Firm Type	Food Processing and Beverages	Machine and Engineering	Total
Local Firms	55 (52.0%)	47 (63.0%)	102 (56.7%)
Foreign Firms	50 (48.0%)	28 (37.0%)	78 (43.3%)
Total	105 (58.3%)	75 (41.7%)	180 (100.0)

Source: Tabulated from author's field survey (2003/2004).

In the conceptual framework presented in Chapter 2, four mechanisms/channels of spillover occurrence were identified, which included competition, linkage, labour mobility and demonstration. In the next section, we present a brief descriptive analysis for each of these channels. However, in doing so the discussion is restricted to the relationships with local firms, joint ventures and wholly owned foreign firms. To reduce the bulk of descriptive work in this section, this is done by firm ownership. However analysis by industry (food processing and beverages and machine and engineering) and firm ownership has been presented in the appendix in a tabular form, see Appendix 5.1a; 5.1b; 5.2; 5.3 and 5.4.

5.2.1 Labour Mobility in Food and Beverages and Machine and Engineering Industries

Labour mobility is one of the channels through which spillovers can occur between and among firms¹⁰². Labour mobility is an extremely difficult thing to determine empirically since firms hardly maintain databases on workers movement. Firms did not keep record of where staff joined from or where they left to join. In order to investigate labour mobility at firm level and at the same time examine occurrence of spillovers through labour mobility, both workers *lost to other firms* and *employed from other firms*, are considered. The firms were asked whether they had lost any of their workers to other firms in the past and if they could identify the kind of firms they went to join. Since firms were at least expected to have lost at least some of their workers in their lifetime, they were specifically asked whether the caliber of workers lost to other firms included some of their skilled and technically trained workers (such as professionals and managers, and/or technicians, engineers and scientists). This was of particular importance to us since this category of employees is believed to comprise skilled personnel who have acquired skills from their firm by participating on job training or through experience at work. This makes them acquire experiential tacit knowledge and thus their mobility is likely to result in occurrence of knowledge spillover to the firms which they leave to join. The Kind of firms they went to join were classified into three; wholly owned foreign firms, joint venture firms and local firms. A fourth category of firms emerged during the survey, own firms, where workers left their employment to start their own firms¹⁰³. Table 5.2 presents

¹⁰² Labour mobility as one of the channels through which spillovers can occur has been examined in several studies [Caves, 1972; Dunning, (1993: p. 372); Rajah, 1995; Blomstrom and Kokko, 1997; Gershenberg, 1987; Katz, 1987; Wasow and Hill, 1986; Yoshihara, 1988; Behrman and wallender, 1976; Hill 1982].

¹⁰³ During the survey it was noted that workers from both local and foreign firms had left their employment to join own firms. However, as discussions with workers revealed these would have been more but lack of financial assistance is an obstacle.

descriptive statistics of workers lost to other firms by ownership. Descriptive statistics by ownership and industry are presented in Appendix 5.1a.

Analysis of workers lost to other firms by ownership showed that both local and foreign firms lost skilled and technically trained workers to other firms within the manufacturing industry. A high proportion of firms in both local (62.7%) and foreign firms (88.5%) had lost some of their skilled workers to the locally owned firms. Based on the reported cases for the caliber of workers lost, foreign firms seemed to be losing more skilled workers than domestic firms do. Comparing the calibre of workers lost, both locally owned and foreign firms seemed to lose more engineers and technicians than the professionals and managers¹⁰⁴, Table 5.2. Interestingly, there was a high proportion of skilled and technically trained workers leaving foreign firms (52.6%) to start their own firms than was the case with the local firms (12.7%). This indicates that in addition to local firms, foreign firms in Kenya's manufacturing industry also act substantially as a breeding ground for local entrepreneurs. This is similar to what was noted in Saggi (1999, pp. 23-4) where some of the workers employed by Desh left after obtaining technological training to set up their own firms.

Similar to the above, the firms were also asked whether they had employed workers from other firms in the past, their skill level and the kind of firms they came from. Table 5.2 presents descriptive statistics of workers employed from other firms by ownership. Generally, high proportions of both local and foreign firms had employed skilled and technically trained workers from other firms in the past. Skilled workers here is used to represent managers and professionals; skilled scientists and engineers; technicians, craftsmen and artisans as shown in Table 5.2. As noted from the computed proportions, there were more cases of local firms receiving skilled workers from other firms (local firms) than they lost them (skilled workers). As expected there were high cases of skilled workers joining local firms from local firms than local firms losing to local firms. Interestingly there were high cases of skilled workers joining local firms from wholly owned foreign and JV firms than they had lost to them. Comparing the percentages of local and foreign firms; more foreign firms received workers wholly owned foreign firms, JV and locally owned firms than local firms did. A more or less the same percentage of foreign firms that reported losing skilled workers to local firms (88.5%) reported getting workers from local firms (89.7%). The implication here is that there is an equal gain and loss of workers between local and foreign firms. The proportions computed indicated that foreign firms were employing more managers and professionals (51%) than they were losing (32%). Since the skills required might not be available from the local firms, such could only come from wholly owned foreign firms and joint firms and that is why the two categories reported high proportion levels 53.8% and 47.4% respectively. Lower caliber engineers would then have to come from local firms. This supports the argument that low waged labour exists in this kind of countries. As a conclusion to this section we note that mobility of skilled workers exists in Kenya's manufacturing industry and thus spillovers are likely to occur.

¹⁰⁴ This is based on the firm responses and gives an idea of what is happening. It is possible to have a few cases of firms responding but with more workers involved in the mobility – this was however impossible to tell as firms did not keep information which would have enabled us to make a concrete assessment.

Table 5.2: Labour Mobility¹⁰⁵; Food Processing and Beverages, and Machine and Engineering Industries, Kenya, 2004

Labour Mobility: Analysis of workers lost by Ownership					
Local Firms	Number of cases	Caliber of workers lost	Number of cases	Workers lost to other firms	Number of cases
Lost workers to other firms	71 (69.6%)	Managers and professionals	21 (20.6%)	Wholly owned Foreign firms	8 (7.8%)
		Engineers and technicians	58 (56.9%)	Joint Ventures	9 (8.8%)
				Local firms	64 (62.7%)
				Start own firms	13 (12.7%)
Foreign Firms	Number of cases	Caliber of workers lost	Number of cases	Workers lost to other firms	Number of cases
Lost workers to other firms	72 (92.3%)	Managers and professionals	25 (32.1%)	Wholly owned Foreign firms	20 (25.6%)
		Engineers and technicians	64 (81.1%)	Joint Ventures	30 (38.5%)
				Local firms	69 (88.5%)
				Start own firms	41 (52.6%)
Labour Mobility: Analysis of workers employed by Ownership					
Local Firms	Number of cases	Caliber of workers employed	Number of cases	Workers employed from	Number of cases
Employed workers from other firms	93 (91.2%)	Managers and professionals	36 (35.3%)	Wholly owned Foreign firms	21 (20.6%)
		Skilled scientists & engineers	18 (17.6%)	Joint Ventures	30 (29.4%)
		Technicians, craftsmen & artisans	69 (67.6%)	Local firms	88 (86.3%)
		Others	3 (2.9%)	Others	-
Foreign Firms	Number of cases	Caliber of workers employed	Number of cases	Workers employed from other firms	Number of cases
Employed workers from other firms	76 (97.4%)	Managers and professionals	52 (51.0%)	Wholly owned Foreign firms	42 (53.8%)
		Skilled scientists & engineers	31 (39.7%)	Joint Ventures	37 (47.4%)
		Technicians, craftsmen & artisans	62 (79.5%)	Local firms	70 (89.7%)
		Others	2 (2.6%)	Others	-

Source: Tabulated from author's field survey 2003/2004

¹⁰⁵ Note that the figures in the table represent cases observed by firm and are therefore not supposed to add up to 100%.

5.2.2 Linkages in Food and Beverages and Machine and Engineering Industries

The firms were asked if they maintained any form of backward and forward linkages with other firms in the manufacturing industry. Given the weak nature or non-existence of technological linkages (non-pecuniary linkages) in developing countries especially with R&D institutions this study conceptualised linkages in a wider form to include both pecuniary and non-pecuniary linkages. Backward linkage included relationships with suppliers of raw materials, technical support and other services, machinery and equipment etc while forward linkage included relationships with buyers, distributors among others. Broad consideration of linkages ensured that some kind of relationship would definitely be captured since even in the most backward of the developing countries there exists at least some form of linkage formation. The firms were also asked to explain the kind of firms they had their linkages with. Table 5.3 shows the distribution of linkage formation by ownership based on the survey done.

As expected both locally owned and foreign firms had high proportions (over 95% in both cases) of firms with both backward and forward linkages with other firms in the manufacturing industry. Similarly, over 80% of both locally owned and foreign firms had either backward or forward linkages formed with locally owned firms, Table 5.3. Although locally owned firms had a relatively high proportion of firms with both backward and forward linkages with wholly owned foreign and JVs firms, interestingly, there were more cases of local firms with backward linkages with wholly owned foreign and JVs firms than was the case with forward linkages. This was not surprising since locally owned firms relied on foreign firms and joint venture firms for machinery and equipment, sophisticated maintenance services, consultancy, some raw materials etc. For instance all the locally owned dairy firms relied on Tetra Pack International, a MNC from Sweden for their tetra pack containers to package milk. This is unsurprising since foreign firms were actually the main suppliers of machinery and equipment, technical services needed to support product and process technologies. Similarly the example of many soft drink firms relying on Coca Cola for technical support in product. Although a similar trend was noted with foreign firms, a comparison between foreign and local firms shows that foreign firms had higher proportions of relationships with foreign firms and joint ventures than was the case with local firms. This tends to support argument that for specialised services, foreign firms would tend to relate with wholly owned foreign and JVs firms more than local firms did. This is expected as foreign firms and joint ventures tend to be more technically advanced and with highly skilled workforce. Foreign firms tended to develop forward linkages more with wholly owned foreign and JVs firms than local firms. Descriptive statistics by ownership and industry is presented in Appendix 5.2.

Table 5.3: Linkage Effects: Food Processing and Beverages, and Machine and Engineering Industries, Kenya, 2004

Local Firms	Number of cases	Kind of firms	Number of cases
With backward linkage	100 (98.0%)	Wholly owned Foreign firms	42 (41.2%)
		Joint Ventures	29 (28.4%)
		Local firms	87 (82.3%)
With forward linkage	98 (96.1%)	Wholly owned Foreign firms	30 (29.4%)
		<i>Joint Ventures</i>	18 (17.6%)
		Local firms	94 (92.2%)
Foreign Firms	Number of cases	Kind of firms	Number of cases
With backward linkage	78 (100%)	Wholly owned Foreign firms	60 (76.9%)
		Joint Ventures	46 (59.0%)
		Local firms	74 (94.9%)
With forward linkage	77 (98.7%)	Wholly owned Foreign firms	49 (62.8%)
		Joint Ventures	31 (39.7%)
		Local firms	74 (94.9)

Source: Tabulated from author's field survey 2003/2004

5.2.3 Competition in Food and Beverages and Machine and Engineering Industries

The firms were asked to rate the competition they faced from competing firms domestically. The firms were also asked to identify who their competitors were in terms of firm ownership. Table 5.4 presents the description of competition intensity, rated in an ordinal form from "none" to "very stiff" competition. A high proportion of both local and foreign firms faced stiff competition (42.2%) and (55.1%) respectively. This was an indication that stiff competition existed in the two industries considered. Moreover, a high proportion of local firms (36.3%) faced very stiff competition compared to that of the foreign firms (17.9%). It can be argued that this stiff competition could be emanating from the foreign firms. There are also imports from South Africa and other COMESA regions. In addition to local firms facing competition from other local firms, it was observed that wholly owned foreign and JV firms similarly competed with the local firms. Over 25% of the local firms reported to have had competition from either foreign or joint venture firms. High proportions of foreign firms had wholly owned foreign and JV firms as their competitors. This tended to indicate that a high proportion of foreign firms faced competition from wholly owned foreign firms (50%) and JV firms (50%) than local firms did from wholly owned foreign firms (25.5%) and JV firms (27.5%). Some of the managers interviewed contended that it would take the country some time

before the locally owned firms could effectively compete with foreign firms. *It will take some time before such companies are in a position to compete effectively with MNCs like Del Monte, Coca Cola, Unilever, Cadbury Sweepes or Carnaud Metal Box.* Although this is impossible to tell from the data, interviews conducted revealed that the stiff competition could be as a result of the foreign firms. Descriptive statistics by ownership and industry is presented in Appendix 5.3.

Table 5.4: Competition Effects: Food Processing and Beverages, and Machine and Engineering Industries, Kenya, 2004

Local Firms			
Competition rating	Number of cases	Competitor by kind of firm	Number of cases
None	3 (2.9%)	Wholly owned Foreign firms	26 (25.5%)
Moderate	19 (18.6%)	Joint Ventures	28 (27.5%)
Stiff	43 (42.2%)	Local firms	98 (96.1%)
Very stiff	37 (36.3%)	Others	-
Foreign Firms			
Competition rating	Number of cases	Competitor by kind of firm	Number of cases
None	0	Wholly owned Foreign firms	39 (50.0%)
Moderate	21 (26.9%)	Joint Ventures	39 (50.0%)
Stiff	43 (55.1%)	Local firms	77 (98.7%)
Very stiff	14 (17.9%)	Others	-

Source: Tabulated from author's field survey 2003/2004

5.2.4 Demonstration Effects in Food and Beverages and Machine and Engineering Industries

Similar to the above cases, the firms were asked if they had ever introduced or adopted new products and new techniques observed from other companies in Kenya's manufacturing industry. Such techniques included production techniques, management and organisation techniques, marketing techniques and strategies. The firms were also asked if they were indeed able to make similar but own products. About 78 (76.5%) locally owned firms were able to make similar but new products while 74 (94.9%) foreign firms were able to make similar but own products. The firms were also asked to identify the kind of firms they enjoyed demonstration effects from. The choice was made from their competing firms, ordinary firms, supplying firms, processing firms that buy their products and marketing firms that distribute their products. Table 5.5 shows the distribution of firms with regard to demonstration effect, nature of firms and kind of firms from which demonstration effect occurred. Although both locally owned and foreign firms had substantially high proportions of demonstration effects, foreign firms had a higher proportion of firms with demonstration effects than the local firms. This would be expected given their capacity (firm financial resources and human capital) to do

that as they are technically advanced and can employ skilled workers more than the local firms. For both local (64.7%) and foreign firms (79.5%), most of the demonstration effects seemed to come from competing firms. This further shows influence of competition. There was a high proportion of foreign firms (52.6%) with demonstration effects from processing firms than was the case with local firms (13.7%). As expected both local and foreign firms had their highest demonstration effects from local firms. This is expected as locally owned firms are the majority in the manufacturing industry. About 28% of the local firms had demonstration effects from either wholly owned foreign and JV firms while about 67.9% and 43. 6% of foreign firms had demonstration effects from wholly owned foreign firms and JV firms respectively. The conclusion here is that demonstration effect exists and hence technological spillovers. Descriptive statistics by ownership and industry is presented in Appendix 5.4.

Table 5.5: Demonstration Effects: Food Processing and Beverages, and Machine and Engineering Industries, Kenya, 2004

Local Firms	Number of cases	Nature of firms	Number of cases	Kind of firms	Number of cases
With demonstration effect	78 (76.5%)	Competing firms	66 (64.7%)	Wholly owned	28 (27.5%)
		Ordinary firms	17 (16.7%)	Joint Ventures	28 (27.5%)
		Supplying firms	17 (16.7%)	Local firms	71 (69.6%)
		Processing firms	14 (13.7%)	Others	-
		Distributing firms	6 (5.9%)		
Foreign Firms	Number of cases	Nature of firms	Number of cases	Kind of firms	Number of cases
With demonstration effect	74 (94.9%)	Competing firms	62 (79.5%)	Wholly owned	53 (67.9%)
		Ordinary firms	27 (34.6%)	Joint Ventures	34 (43.6%)
		Supplying firms	27 (34.6%)	Local firms	60 (76.9%)
		Processing firms	41 (52.6%)	Others	-
		Distributing firms	11 (14.1%)		

Source: Tabulated from author's field survey 2003/2004

5.3 Occurrence of Technological Spillovers: Technological Spillover Index

The technological spillover index computed here attempts to quantify firm level technological behaviour based on information collected from survey interviews undertaken in the Kenyan manufacturing industry – restricted to food and beverages, and machine and engineering industries. This section uses the methodology developed in Chapter 2 and briefly repeated below to guide the computation of the spillover index, SPO INDEX, as a simple arithmetic mean. Since "knowledge effects" of spillovers are impossible to quantify and measure them, spillovers were conceptualised in terms of technological changes taking place in the firms. Firms were relied on to provide

information on what technological changes were taking place, what the causes of these changes were and how they were undertaking these changes. Four modes of spillover occurrence were considered for this study: competition, linkage, labour mobility and demonstration effects (see Table 5.6).

Table 5.6: Computation of Technological Spillover Index, SPO INDEX

Spillover Conceptualisation	Competition (c)	Linkage (l)	Labour Mobility (m)	Demonstration (d)	Average Score
Product Changes (Pd)	Pd _c	Pd _l	Pd _m	Pd _d	PD
Process Changes (Pr)	Pr _c	Pr _l	Pr _m	Pr _d	PR
Repair & Maintenance (Rm)	Rm _c	Rm _l	Rm _c	Rm _d	RM
Marketing Strategy (Ms)	Ms _c	Ms _l	Ms _m	Ms _d	MS
Management & Organisation (Mo)	Mo _c	Mo _l	Mo _m	Mo _d	MO
Average Score	C	L	M	D	SPO INDEX

Source: Author 2003/2004

Spillover index is estimated for of all the four modes of spillover occurrence shown in the table, competition **C**, linkage **L**, labour mobility **M** and demonstration **D**. The spillover index is computed for each one of these modes using equation:

$$SPO \text{ INDEX}_{Firm-level} = Composite \text{ Average}(C, L, M, D) \tag{5.1}$$

Similar results of the SPO INDEX can be computed by column average using the following equation.

$$SPO \text{ INDEX}_{Firm-level} = Composite \text{ Average}(PD, PR, RM, MS, MO) \tag{5.2}$$

The spillover index for the whole manufacturing industry can then be computed from any of the two equations above as sample's arithmetic mean. As an example using the equation 5.2 we have:

$$SPO \text{ INDEX}_{Industry-level} = 1/N \sum_{i=1}^N \{Composite \text{ Average}(PD, PR, RM, MS, MO)\}$$

Where *N* is the sample size, equal is to 180 in this case.

The SPO INDEX will assume an ordered framework ranging between 0 and 5 on a Likert scale as follows:

$$SPO \text{ INDEX} = 0, \quad 1, \quad 2.....5 \tag{5.3}$$

Where	SPO INDEX = 0 represents "None" occurrence of spillovers
	SPO INDEX = 1 represents "Least" spillover occurrence
	SPO INDEX = 2 represents "Low" spillover occurrence
	SPO INDEX = 3 represents "Average" spillover occurrence
	SPO INDEX = 4 represents "High" spillover occurrence
	SPO INDEX = 5 represents "Highest" spillover occurrence

5.3.1 Occurrence of Technological Spillovers in the Manufacturing Industry

Employing the above framework, the spillover index for the Kenyan manufacturing industry is computed in this section. The first spillover index computed indicates the extent of spillover occurrence in food processing and beverages, and machine and engineering industries combined, Table 5.7. Since one of the aims of the study is to determine to what extent spillovers occurred in the local firms from foreign firms, spillover indexes for spillover occurrence specifically in locally owned firms from foreign and local firms separately were computed, Table 5.8. In addition to the spillover indexes computed for the two industries pooled, spillover indexes were also computed for each industry separately, which enabled us to compare the two industries in terms of spillover occurrence, section 5.3.2.

(i) *Spillover Occurrence in Food and Machine and Engineering Industries – pooled*

Table 5.7 provides the results of spillover index computed for food processing and beverages, and machine and engineering industries combined. The computed spillover

index, $SPO\ INDEX_{Industry-level}$, was approximately 3.30. This index represented spillover occurrence into the two industries from both local and foreign firms. Based on the ordinal framework developed, with a range from 0 "None" to 5 "Highest", the spillover index computed for the two industries combined indicated an "average" spillover occurrence. Despite the different conceptual setting and methodology used in this study, with spillovers conceptualised in terms of learning and capability building, the results obtained shows that technological spillovers do occur in Kenya's manufacturing industry.

Although following different approaches, our results compare to those obtained in other studies, which have found FDI spillover occurrence in developed and developing countries. Contrary to the approach adopted in this study, their studies use a production framework to examine the impact of FDI on productivity of locally owned firms.

Among the four modes of technological spillover occurrence considered in this analysis, competition generated the highest level of spillover occurrence (3.52) followed by demonstration (3.44), labour mobility (3.16) and finally linkage (3.08). This showed that competition and demonstration effects resulted in more learning and technological changes. This further indicates that compared to competition and demonstration, linkage system and labour mobility have weaker learning effects and thus by implication weaker capability building in manufacturing. Comparisons done using T-test analysis showed the difference to be statistically significant (see Table 5.9). Interestingly, the highest type of spillovers conceptualised in terms of learning and technological changes (new and/or incremental) occurred in products changes occurred in products (3.63) and process (3.58). Marketing strategy had an index of 3.19; while both management and organisation; and repair and maintenance had 3.05 each.

Table 5.7: Occurrence of Technological Spillover in Local and Foreign Firms, Food and Machine and Engineering Industries Combined, Kenya, 2004

Computed Index for Spillover Occurrence in the two Industries from both Local and Foreign Firms					
Spillover Conceptualisation	Competition	Linkage	Labour Mobility	Demonstration	Average Score
	(c)	(l)	(m)	(d)	
Product Changes (Pd)	3.90	3.47	3.43	3.73	3.63
Process Changes (Pr)	3.80	3.36	3.45	3.71	3.58
Repair & Maintenance (R&M)	3.10	2.80	3.18	3.13	3.05
Marketing Strategy (Ms)	3.52	2.98	2.78	3.46	3.19
Management & Organisation (Mo)	3.27	2.79	2.95	3.18	3.05
Average Score	3.52	3.08	3.16	3.44	3.30
Computed Index for Spillover Occurrence in the two Industries from Foreign Firms Only					
Product Changes (Pd)	4.09	3.73	3.80	3.85	3.87
Process Changes (Pr)	3.96	3.53	3.75	3.88	3.78
Repair & Maintenance (R&M)	3.18	2.97	3.41	3.24	3.20
Marketing Strategy (Ms)	3.63	3.16	3.07	3.57	3.36
Management & Organisation (Mo)	3.37	2.95	3.21	3.37	3.23
Average Score	3.63	3.27	3.44	3.59	3.48
Computed Index for Spillover Occurrence in the two Industries from Local Firms Only					
Product Changes (Pd)	3.70	3.21	3.06	3.61	3.40
Process Changes (Pr)	3.63	3.19	3.14	3.53	3.37
Repair & Maintenance (R&M)	3.01	2.63	2.94	3.02	2.90
Marketing Strategy (Ms)	3.41	2.79	2.50	3.34	3.01
Management & Organisation (Mo)	3.18	2.63	2.69	2.98	2.87
Average Score	3.39	2.89	2.87	3.30	3.11

Source: Computed from author's field survey 2003/2004

Examination of spillover occurrence by firm ownership revealed that more spillovers occurred in the two industries from foreign firms than from local firms. The spillover index computed from foreign firms was 3.48 while that of the local firms was 3.11, Table 5.7. Comparative T-test analysis showed this difference to be statistically significant, Table 5.14. By the ordinal scale developed, it can be concluded that there is "high" spillover occurrence into the two industries combined from foreign firms and average spillover occurrence from locally owned firms. The implication of this is that foreign firms generate more knowledge spillovers than the local firms in the two industries. In all the cases, competition generated the most spillovers followed by demonstration effects. Surprisingly, while foreign firms generated more spillovers through labour mobility (3.44) than through linkages (3.27), it was opposite with local firms as they tended to generate more spillovers with linkage (2.89) than with labour mobility (2.87). Similarly most of the spillovers occurring were of product, process and marketing strategy in that order.

(ii) *Spillover Occurrence into only locally owned firms in Food and Machine and Engineering Industries*

Examination of spillover occurrence to the local firms from both foreign and local firms showed an average spillover index of 3.31, Table 5.8. This index compared to that computed for both food processing and beverages, and machine and engineering industries combined (3.30) in Table 5.7. The most kind of spillovers generated was in product changes followed by process changes and the marketing strategy with 3.61, 3.52 and 3.29 respectively. As noted in the above, spillover occurrence to the local firms from foreign firms was significantly different from that of local firms, Table 5.7. Similarly, a comparison by mode and type of spillover occurrence shows that more spillovers occurred to the locally owned firms from foreign firms (3.44) than from local firms (3.19). The implication for this is that foreign firms in the two industries generate more spillovers into the local firms than the local firms do.

These findings are very interesting as they confirm two things: First that that spillovers occur from foreign firms to the local firms in the Kenyan manufacturing industry. Second that spillovers occurring from foreign firms were much more than spillovers occurring from local firms. Occurrence of these spillovers was highest through the demonstration channel, 3.66, Table 5.8. This supports the argument in the spillover literature that demonstration served as one of the mechanisms through which spillover occurs from foreign to the local firms. Langdon (1981) had noted that local firms in Kenya introduced mechanised techniques in soap production following the introduction of mechanised production of soap by the entry of MNCs forced.

The second channel through which high technological spillover also occurred from foreign to the local firms was competition¹⁰⁶, 3.64. Similarly, this is supported in the spillover literature by Langdon (1981) who found that a combination of demonstration and competition pressure resulting from the entry of MNCs forced locally owned firms to introduce mechanised techniques. Competition in the footwear industry as a result of foreign firm entry in Kenya, led to significant changes in the production techniques of the locally owned firms (Jenkins, 1990).

¹⁰⁶ Comparison done by T-test analysis showed that the difference between demonstration and competition on one had and linkage and labour mobility on the other were statistically significant, (see Table 5.9).

Another channel with more than average spillover occurrence from foreign to the local firms was labour mobility¹⁰⁷, 3.35. Although this chapter uses a different methodological approach, the results obtained are in support of some studies in developing countries, which examined occurrence of spillovers from foreign to locally owned firms through labour mobility. For example, Gerschenberg (1987) observed cases of trained managers while working with MNCs who had later moved to join locally owned firms contributing to the diffusion of managerial skills and knowledge. In South East Asia, Yoshihara (1988) found out that mobility of trained workers from foreign firms had contributed to the flow of knowledge into Chinese-owned firms. In detailed case studies of electronic and garments and textile industries in Malaysia, Rasiah (1995) noted that labour mobility from MNCs had contributed to technological spillovers to the local firms. At an international level, the inter-firm mobility of managers from Japan to the United States and Europe contributed to the spread specific management practices (Caves, 1996).

The last channel through which average spillovers occurred from foreign firms to the local firms was linkage, 3.10. This offers empirical support to the fact that linkage between foreign and local firms is crucial in diffusion of skills, knowledge and technology. In Malaysia, production linkages between local firms in the electronic, machine and engineering, and garments and textile industries resulted in tremendous technological spillovers to the local firms [Rasiah, (1995: 2002)]. Similarly, looking at vertical inter-firm linkages in less developed countries Lall (1980) noted that MNCs contributed in raising the productivity and efficiency in locally owned firms. Foreign firms assisted in setting up production facilities, offered training and technical assistance, and assisted in looking for new markets. In Argentina, MNCs forced domestic suppliers to adopt productive processes and techniques similar to those used by suppliers of their main firms in their country of origin (Katz, 1969, p 154). Although not many studies exist on determining the effect of forward linkages on spillover occurrence to the local firms, a few cases however do exist [Reuber, Crookell, Emerson and Gallais-Hamonno, 1973; McAleese and McDonald, 1978]. This has been studied by others in the context of increasing local content [Helleiner, 1973; Watanabe, 1983; Belderbos and Capannelli, 2001].

(iii) *Summing Up*

Analysis done for all the firms has shown that technological spillovers do occur in the Kenyan manufacturing industry. Comparison done by ownership revealed that spillovers occurred more in the two industries from foreign firms than from local firms. T-test analysis showed the difference to be statistically significant. The main kinds of spillover occurring were of product and process followed by marketing. The main mechanisms of spillover occurrence included competition and demonstration effects. The pattern of results obtained when the analysis was done for only locally owned firms was more or less the same.

¹⁰⁷ Saggi (1999) provided several examples where employees left their jobs with MNCs to set up their own firms or to join other newly established companies.

Table 5.8: Occurrence of Technological Spillover in Local Firms Only, Food and Machine and Engineering Industries Combined, Kenya, 2004

Computed Index for Spillover Occurrence in Local Firms (For Both Industries) from both Local and Foreign Firms					
Spillover Conceptualisation	Competition	Linkage	Labour Mobility	Demonstration	Average Score
	(c)	(l)	(m)	(d)	
Product Changes (Pd)	3.85	3.34	3.40	3.83	3.61
Process Changes (Pr)	3.75	3.34	3.31	3.67	3.52
Repair & Maintenance (R&M)	3.23	2.60	3.03	3.32	3.05
Marketing Strategy (Ms)	3.72	2.94	2.91	3.58	3.29
Management & Organisation (Mo)	3.44	2.77	2.88	3.35	3.11
Average Score	3.60	3.00	3.11	3.55	3.31
Computed Index for Spillover Occurrence in Local Firms (For Both Industries) from Foreign Firms Only					
Product Changes (Pd)	3.89	3.48	3.69	3.88	3.74
Process Changes (Pr)	3.79	3.44	3.57	3.80	3.65
Repair & Maintenance (R&M)	3.33	2.67	3.21	3.51	3.18
Marketing Strategy (Ms)	3.72	3.06	3.16	3.63	3.39
Management & Organisation (Mo)	3.46	2.86	3.10	3.50	3.23
Average Score	3.64	3.10	3.35	3.66	3.44
Computed Index for Spillover Occurrence in Local Firms (For Both Industries) from Local Firms Only					
Product Changes (Pd)	3.81	3.20	3.12	3.79	3.48
Process Changes (Pr)	3.71	3.23	3.06	3.53	3.38
Repair & Maintenance (R&M)	3.13	2.53	2.85	3.12	2.91
Marketing Strategy (Ms)	3.72	2.82	2.67	3.53	3.19
Management & Organisation (Mo)	3.43	2.69	2.67	3.20	3.00
Average Score	3.56	2.89	2.87	3.43	3.19

Source: Computed from author's field survey 2003/2004

Table 5.9: Two-Tail T-Test Results Comparing Technological Spillover Occurrence from Foreign and Local Firms, Kenya Sample, 2004

Technological Spillover Occurrence in all firms in Food and Machine and Engineering Industries from both Local and Foreign Firms						
Spillover Occurrence	Mean	Std. Dev.	Linkage	Std. Dev.	Mean Difference	T-Values (2-tailed)
Competition Versus Linkage	3.547	0.064	3.050	0.056	0.497	5.866
Competition Versus Labour Mobility	3.547	0.064	3.101	0.069	0.446	4.753
Competition Versus Demonstration	3.547	0.064	3.439	0.066	0.109	1.180
Linkage Versus Labour Mobility	3.050	0.056	3.101	0.069	-0.051	-0.578
Linkage Versus Demonstration	3.050	0.056	3.439	0.066	-0.389	-4.531
Labour Mobility Versus Demonstration	3.101	0.069	3.439	0.066	-0.338	-3.524
Technological Spillover Occurrence in locally owned firms in Food and Machine and Engineering Industries from both Local and Foreign Firms						
Spillover Occurrence	Mean	Std. Dev.	Linkage	Std. Dev.	Mean Difference	T-Values (2-tailed)
Competition Versus Linkage	3.624	0.092	2.921	0.086	0.703	5.567
Competition Versus Labour Mobility	3.624	0.092	2.989	0.114	0.635	4.362
Competition Versus Demonstration	3.624	0.092	3.580	0.104	0.044	0.314
Linkage Versus Labour Mobility	2.921	0.086	2.989	0.114	-0.068	-0.483
Linkage Versus Demonstration	2.921	0.086	3.580	0.104	-0.660	-4.925
Labour Mobility Versus Demonstration	2.989	0.114	3.580	0.104	-0.591	-3.795

Note: *** - Significant at 1 % level. Note that the spillover indexes computed for various channels may differ slightly from those computed in other tables due to multiple averaging and aggregations done.

Source: Computed from author's survey (2003/2004).

5.3.2 Comparison of Technological Spillover Occurrence by the Two Industries

(i) Occurrence of Spillovers in Food Processing and Beverages Industry

Table 5.10 provides the results of spillover index $SPO\ INDEX_{Food-processing}$ computed for food processing and beverages industry from both local and foreign firms. The spillover index computed was approximately 3.25 representing an "average" spillover occurrence in food processing industry. Competition generated the high level of spillover occurrence (3.53) followed by demonstration (3.32), labour mobility (3.12) and finally linkage (3.03). Spillovers of product (3.57) and process (3.56) changes were the highest followed by marketing strategy (3.12): while repair and maintenance, and management and organisation had 3.02 and 3.00 respectively.

By firm ownership, more spillovers occurred in food processing and beverages industry from foreign firms than from local firms. The spillover index computed from foreign firms was 3.45 while that of the local firms was 3.05, Table 5.10. Results of T-test analysis done showed this difference to be statistically significant at 5%, Table 5.14. By the ordinal scale developed, it can be concluded that there is "high" spillover occurrence in food processing industry from foreign firms and an "average" spillover occurrence from local firms. Foreign firms therefore generated more knowledge spillovers in food processing than local firms did. As in the above cases discussed competition generated the most spillovers followed by demonstration effects for both local and foreign firms. Foreign firms generated more spillovers through all the mechanisms than the local firms. The difference was statistically significant with the exception of backward linkage mechanisms, Table 5.14. In addition, foreign firms generated more spillovers through labour mobility (3.43) than through linkage effects (3.22), while local firms generated more spillovers through linkage effects (2.85) than through labour mobility (2.81). Similar to the above most of the spillovers occurring were of product, process followed by marketing. Interestingly, spillovers of repair and maintenance ranked third after product and process while in the case of foreign firms marketing strategy ranks third.

Table 5.10: Occurrence of Technological Spillover in Local and Foreign Firms in Food Processing Industry, Kenya, 2004

Computed Index for Spillover Occurrence in Food Processing from both Local and Foreign Firms					
Spillover Conceptualisation	Competition	Linkage	Labour Mobility	Demonstration	Average Score
	(c)	(l)	(m)	(d)	
Product Changes (Pd)	3.93	3.40	3.31	3.64	3.57
Process Changes (Pr)	3.85	3.27	3.46	3.66	3.56
Repair & Maintenance (R&M)	3.07	2.76	3.29	2.94	3.02
Marketing Strategy (Ms)	3.56	2.98	2.56	3.38	3.12
Management & Organisation (Mo)	3.27	2.76	2.98	2.98	3.00
Average Score	3.53	3.03	3.12	3.32	3.25
Computed Index for Spillover Occurrence in Food Processing from Foreign Firms Only					
Product Changes (Pd)	4.19	3.69	3.78	3.79	3.86
Process Changes (Pr)	4.01	3.41	3.77	3.86	3.76
Repair & Maintenance (R&M)	3.20	2.92	3.53	3.01	3.17
Marketing Strategy (Ms)	3.67	3.14	2.83	3.48	3.28
Management & Organisation (Mo)	3.42	2.92	3.23	3.18	3.19
Average Score	3.70	3.22	3.43	3.46	3.45
Computed Index for Spillover Occurrence in Food Processing from Local Firms Only					
Product Changes (Pd)	3.67	3.11	2.85	3.50	3.28
Process Changes (Pr)	3.68	3.14	3.16	3.46	3.36
Repair & Maintenance (R&M)	2.93	2.61	3.04	2.86	3.11
Marketing Strategy (Ms)	3.45	2.82	2.28	3.27	2.96
Management & Organisation (Mo)	3.13	2.59	2.73	2.77	2.81
Average Score	3.37	2.85	2.81	3.17	3.05

Source: Computed from author's field survey 2003/2004

(ii) *Occurrence of Spillovers in Locally Owned Firms Only in Food Processing and Beverages*

Table 5.11 shows the results of spillover index *SPO INDEX* Food-processing computed for food processing industry from both local and foreign firms occurring in local firms only in food processing industry. The spillover index computed was approximately 3.27 representing an "average" spillover occurrence in locally owned firms in food processing industry. Competition generated the high level of spillover occurrence (3.68) followed by demonstration (3.39), labour mobility (3.07) and finally linkage (2.94). Spillovers of product (3.55) and process (3.48) changes were the highest followed by marketing strategy (3.26); while repair and maintenance, and management and organisation had 3.02 and 3.03 respectively.

By firm ownership more spillovers occurred in locally owned firms from foreign firms than from local firms. The spillover index computed from foreign firms was 3.40 while that of the local firms was 3.14, Table 5.11. By the ordinal scale developed, it can be concluded that there is "average" spillover occurrence in locally owned firms from both foreign and local firms. Despite a similar ordinal ranking, foreign firms generated slightly more spillovers in locally owned in food industry than local firms did. For both local and foreign firms, competition generated the most spillovers followed by demonstration effects. Foreign firms generated more spillovers through labour mobility (3.32) than through linkage effects (3.00), while local firms generated more spillovers through linkage effects (2.88) than through labour mobility (2.82). While there were "high" spillovers of product and process with foreign firms there were only "average" spillovers of product and process with local firms.

Table 5.11: Occurrence of Technological Spillover in Local Firms Only in Food Processing Industry, Kenya, 2004

Computed Index for Spillover Occurrence into Local Firms in Food Processing from both Local and Foreign Firms					
Spillover Conceptualisation	Competition	Linkage	Labour Mobility	Demonstration	Average Score
	(c)	(l)	(m)	(d)	
Product Changes (Pd)	3.90	3.22	3.31	3.80	3.55
Process Changes (Pr)	3.82	3.28	3.33	3.52	3.48
Repair & Maintenance (R&M)	3.35	2.60	3.09	3.05	3.02
Marketing Strategy (Ms)	3.85	2.92	2.82	3.46	3.26
Management & Organisation (Mo)	3.49	2.70	2.80	3.14	3.03
Average Score	3.68	2.94	3.07	3.39	3.27
Computed Index for Spillover Occurrence in Local Firms in Food Processing from Foreign Firms Only					
Product Changes (Pd)	3.93	3.37	3.75	3.92	3.74
Process Changes (Pr)	3.82	3.29	3.55	3.72	3.60
Repair & Maintenance (R&M)	3.59	2.65	3.24	3.20	3.17
Marketing Strategy (Ms)	3.85	2.99	3.00	3.48	3.33
Management & Organisation (Mo)	3.58	2.71	3.05	3.28	3.16
Average Score	3.75	3.00	3.32	3.52	3.40
Computed Index for Spillover Occurrence in Local Firms in Food Processing from Local Firms Only					
Product Changes (Pd)	3.87	3.06	2.86	3.67	3.37
Process Changes (Pr)	3.81	3.26	3.11	3.31	3.37
Repair & Maintenance (R&M)	3.10	2.55	2.93	2.89	2.87
Marketing Strategy (Ms)	3.85	2.84	2.64	3.43	3.19
Management & Organisation (Mo)	3.40	2.69	2.55	3.00	2.91
Average Score	3.61	2.88	2.82	3.26	3.14

Source: Computed from author's field survey 2003/2004

(iii) *Occurrence of Spillovers in Machine and Engineering Industry*

The spillover index computed was approximately 3.36 representing an "average" spillover occurrence in machine engineering industry. Table 5.12 provides the results of spillover index $SPO\ INDEX_{Machine-Tool}$ computed for machine engineering industry from both local and foreign firms. The spillover index computed for machine and engineering industry was higher than that of food processing computed above by about 3.4%. Another difference is that while in food processing competition generated the most spillovers followed by demonstration effects, in machine and engineering industry demonstration effects generated the most spillovers (3.59) followed by competition (3.49). Labour mobility had 3.21 and linkage 3.14. Spillovers of product (3.71) and process (3.60) changes were the highest followed by marketing strategy (3.27): while repair and maintenance, and management and organisation had 3.10 and 3.11 respectively.

By firm ownership more spillovers occurred in machine and engineering industry from foreign firms than from local firms. The spillover index computed from foreign firms was 3.53 while that of the local firms was 3.19, Table 5.12. This difference was statistically significant at 5%, Table 5.14. By the ordinal scale developed, it can be concluded that there is "high" spillover occurrence in machine and engineering industry from foreign firms and an "average" spillover occurrence from local firms. Foreign firms therefore generated more knowledge spillovers in food processing than local firms did. Comparing the two industries we note that spillovers generated by foreign firms were more in machine and engineering than in food processing and beverages. However, the difference was not statistically significant.

As in the other cases discussed above; both local and foreign firms generated most spillovers through demonstration effects followed by competition. Foreign firms generated more spillovers through labour mobility (3.47) than through linkage effects (3.34) while the two had similar results for local firms (2.94). Comparison of spillover mechanisms using T-test analysis by ownership and industry is provided in Table 5.14 and 5.15 respectively. Foreign firms generated higher spillovers statistically through all the mechanisms than the local firms with the exception of competition mechanism, Table 5.14. A comparison of the spillover mechanisms by the two industries showed that foreign spillovers were statistically and significantly higher in machine and engineering in demonstration and backward linkage effects Table 5.15.

Product, process and marketing strategy spillovers generated by foreign firms were rated "high" while only spillovers of product alone were rated "high" in case of local firms. Spillovers of management and organisation, and repair and maintenance generated by local firms were rated "low".

Table 5.12: Occurrence of Technological Spillover in Local and Foreign Firms in Machine and Engineering Industry, Kenya, 2004

Computed Index for Spillover Occurrence in Machine and Engineering from both Local and Foreign Firms					
Spillover Conceptualisation	Competition	Linkage	Labour Mobility	Demonstration	Average Score
	(c)	(l)	(m)	(d)	
Product Changes (Pd)	3.84	3.57	3.59	3.83	3.71
Process Changes (Pr)	3.72	3.49	3.43	3.77	3.60
Repair & Maintenance (R&M)	3.14	2.85	3.03	3.38	3.10
Marketing Strategy (Ms)	3.47	2.98	3.09	3.57	3.27
Management & Organisation (Mo)	3.28	2.84	2.92	3.42	3.11
Average Score	3.49	3.14	3.21	3.59	3.36
Computed Index for Spillover Occurrence in Machine and Engineering from Foreign Firms Only					
Product Changes (Pd)	3.93	3.79	3.82	3.93	3.87
Process Changes (Pr)	3.86	3.71	3.73	3.91	3.80
Repair & Maintenance (R&M)	3.14	3.03	3.26	3.54	3.24
Marketing Strategy (Ms)	3.57	3.18	3.37	3.70	3.46
Management & Organisation (Mo)	3.29	3.00	3.18	3.61	3.27
Average Score	3.56	3.34	3.47	3.74	3.53
Computed Index for Spillover Occurrence in Machine and Engineering from Local Firms Only					
Product Changes (Pd)	3.74	3.35	3.35	3.73	3.54
Process Changes (Pr)	3.58	3.26	3.12	3.62	3.40
Repair & Maintenance (R&M)	3.14	2.66	2.79	3.21	2.95
Marketing Strategy (Ms)	3.36	2.77	2.81	3.43	3.09
Management & Organisation (Mo)	3.26	2.68	2.65	3.23	2.96
Average Score	3.42	2.94	2.94	3.44	3.19

Source: Computed from author's field survey 2003/2004

(iv) *Occurrence of Spillovers in Locally Owned Firms Only in Machine and Engineering*

Table 5.13 shows the results of spillover index $SPO\ INDEX_{Machine-Tool}$ computed for machine and engineering industry from both local and foreign firms occurring in local firms only in machine and engineering. The spillover index computed was approximately 3.35 representing an "average" spillover occurrence in locally owned firms in machine and engineering industry slightly higher than 3.27 recorded for food processing industry. Demonstration effects generated high spillovers (3.69) followed by competition (3.50), labour mobility (3.15) and linkage (3.05). Spillovers of product (3.66) and process (3.54) changes were the highest followed by marketing strategy (3.30): while repair and maintenance, and management and organisation had 3.05 and 3.18 respectively.

By firm ownership more spillovers occurred in locally owned firms from foreign firms than from local firms. The spillover index computed from foreign firms was 3.46 while that of the local firms was 3.23, Table 5.13. By the ordinal scale developed, it can be concluded that there is "high" spillover occurrence in locally owned firms from foreign and "average" occurrence from local firms. Foreign firms therefore generated more spillovers in locally owned in demonstration machine and engineering industry than local firms did. For both local and foreign firms demonstration effects generated the most spillovers followed by competition. More spillovers were generated through labour mobility than through linkage effects for both local and foreign firms. While there were "high" spillovers of product and process with foreign firms while there was only "high" spillovers of product with local firms.

(v) *Summing Up*

Analysis done by industries separately has further shown that spillovers do occur in the Kenyan manufacturing industry. From the two industries studied; the difference between spillovers occurring from foreign firms and spillovers occurring from local firms was shown to be statistically significant. A comparison of spillover occurrence from foreign firms by the two industries showed higher foreign spillover occurrence in machine and engineering than in food processing and beverages. The difference was however not statistically significant. The main kinds of spillover occurrence remained of product and process followed by marketing. Similarly, competition and demonstration effects were also observed to be the main mechanisms of spillover occurrence in the two industries. Spillovers generated by foreign firms through all the mechanisms were statistically higher than spillovers generated by the local firms, Table 5.14. There was however the exception of backward linkage mechanism in food processing and competition mechanism in machine and engineering industry. A comparison of the spillover mechanisms by the two industries showed that foreign spillovers were statistically and significantly higher in machine and engineering in demonstration and backward linkage effects Table 5.15. The pattern of results obtained when the analysis was done for only locally owned firms was more or less the same with foreign firms generating higher spillovers than local firms.

Table 5.13: Occurrence of Technological Spillover in Local Firms Only in Machine Tool Industry, Kenya, 2004

Computed Index for Spillover Occurrence in Local Firms Machine and Engineering from both Local and Foreign Firms					
Spillover Conceptualisation	Competition (c)	Linkage (l)	Labour Mobility (m)	Demonstration (d)	Average Score
Product Changes (Pd)	3.80	3.47	3.52	3.87	3.66
Process Changes (Pr)	3.67	3.40	3.29	3.81	3.54
Repair & Maintenance (R&M)	3.09	2.58	2.97	3.56	3.05
Marketing Strategy (Ms)	3.57	2.97	2.98	3.69	3.30
Management & Organisation (Mo)	3.38	2.86	2.97	3.53	3.18
Average Score	3.50	3.05	3.15	3.69	3.35
Computed Index for Spillover Occurrence in Local Firms in Machine and Engineering from Foreign Firms Only					
Product Changes (Pd)	3.85	3.60	3.65	3.84	3.74
Process Changes (Pr)	3.75	3.59	3.58	3.87	3.70
Repair & Maintenance (R&M)	3.00	2.67	3.20	3.77	3.16
Marketing Strategy (Ms)	3.55	3.14	3.26	3.74	3.42
Management & Organisation (Mo)	3.30	3.02	3.13	3.68	3.28
Average Score	3.49	3.20	3.36	3.78	3.46
Computed Index for Spillover Occurrence in Local Firms in Machine and Engineering from Local Firms Only					
Product Changes (Pd)	3.74	3.34	3.39	3.90	3.59
Process Changes (Pr)	3.59	3.20	3.00	3.74	3.38
Repair & Maintenance (R&M)	3.17	2.48	2.74	3.34	2.93
Marketing Strategy (Ms)	3.59	2.80	2.70	3.63	3.18
Management & Organisation (Mo)	3.46	2.69	2.80	3.37	3.08
Average Score	3.51	2.90	2.93	3.60	3.23

Source: Computed from author's field survey 2003/2004

Table 5.14: Two-Tail T-Test Results Comparing Spillover Occurrence from Foreign and Local Firms, Kenya Sample, 2004

Kind of Spillovers	Spillovers from Foreign Firms		Spillovers from Local Firms		Mean Difference	T-Values	Sig. (2-tailed)
	Mean	Std. Dev.	Mean	Std. Dev.			
Food Processing and Machine Engineering							
Labour Mobility	3.44	0.90	2.87	0.85	0.55	5.22	0.000***
Backward Linkage	3.12	0.91	2.79	0.86	0.33	3.27	0.001***
Forward Linkage	3.43	0.81	3.01	0.85	0.41	4.07	0.000***
Competition Effects	3.63	0.90	3.40	0.84	0.23	2.18	0.030**
Demonstration Effects	3.59	0.86	3.31	0.82	0.27	2.66	0.008***
All Channels Combined	3.35	0.78	3.10	0.66	0.26	3.32	0.001***
Food Processing							
Labour Mobility	3.42	0.79	2.84	0.91	0.58	4.21	0.000***
Backward Linkage	3.02	1.00	2.81	0.89	0.21	1.48	0.141
Forward Linkage	3.44	0.79	2.92	0.85	0.52	3.88	0.000***
Competition Effects	3.70	0.91	3.38	0.85	0.32	2.32	0.021**
Demonstration Effects	3.46	0.94	3.18	0.77	0.28	2.01	0.046**
All Channels Combined	3.28	0.800	3.05	0.65	0.24	2.3	0.022**
Machine and Engineering							
Labour Mobility	3.47	1.03	2.97	0.75	0.50	3.07	0.003***
Backward Linkage	3.27	0.75	2.77	0.82	0.50	3.58	0.001***
Forward Linkage	3.42	0.84	3.14	0.83	0.28	1.77	0.079*
Competition Effects	3.52	0.88	3.43	0.83	0.09	0.56	0.578
Demonstration Effects	3.74	0.72	3.47	0.86	0.27	1.86	0.065*
All Channels Combined	3.44	0.74	3.15	0.67	0.28	2.43	0.016**

Note: *, **, and *** - Significant at 10 %, 5 % and 1 % levels respectively. Note that the spillover indexes computed for various channels may differ slightly from those

Note: *, **, and *** - Significant at 10 %, 5 % and 1 % levels respectively. Note that the spillover indexes computed for various channels may differ slightly from those computed in other tables due to multiple averaging and aggregations done.

Source: Computed from author's survey (2003/2004).

Table 5.15: Oneway Results Comparing Spillover Occurrence in Food and Machine and Engineering Industries, Kenya Sample, 2004

Kind of Spillovers	Food		Machine		Mean Difference	F-Values	P-Values
	Processing		Engineering				
	Mean	Std. Dev.	Mean	Std. Dev.			
Labour Mobility (<i>From foreign firms</i>)	3.42	0.79	3.47	1.03	-0.05	0.08	0.779
Labour Mobility(<i>From local firms</i>)	2.84	0.91	2.97	0.75	-0.13	0.90	0.344
Backward Linkage (<i>From foreign firms</i>)	3.02	1.00	3.27	0.75	-0.25	2.76	0.099*
Backward Linkage (<i>From local firms</i>)	2.81	0.89	2.77	0.82	0.04	0.09	0.769
Forward Linkage (<i>From foreign firms</i>)	3.44	0.79	3.42	0.84	0.02	0.02	0.896
Forward Linkage (<i>From local firms</i>)	2.92	0.85	3.14	0.83	-0.22	2.85	0.094*
Competition Effects (<i>From Foreign Firms</i>)	3.70	0.91	3.52	0.88	0.18	0.99	0.321
Competition Effects (<i>From Local Firms</i>)	3.38	0.85	3.43	0.83	-0.05	0.16	0.685
Demonstration Effects (<i>From foreign firms</i>)	3.46	0.94	3.74	0.72	-0.28	3.23	0.075*
Demonstration Effects (<i>From local firms</i>)	3.18	0.77	3.47	0.86	-0.29	4.27	0.040**
From Foreign Firms	3.28	0.80	3.44	0.74	-0.16	1.59	0.209
From Local Firms	3.05	0.65	3.15	0.67	-0.10	1.08	0.300

Note: * and ** - Significant at 10 % and 5 % levels respectively. Note that the spillover indexes computed for various channels may differ slightly from those computed in other tables due to multiple averaging and aggregations done.

Source: Computed from author's survey (2003/2004).

5.4 Determinants of Technological Spillover Occurrence in the Kenyan Manufacturing Industry

In this section, an econometric determination of spillover occurrence is undertaken. The section begins with a detailed descriptive statistics of the sample firms, followed by binomial logit estimation and then multinomial logit estimation of spillover occurrence.

5.4.1 Descriptive Statistics of the Sampled Firms

Table 5.16 presents a descriptive analysis of each of the spillover determinants identified in the conceptual framework developed in Chapter 2. The total sample for the study was 180 firms of which 102 (56.7%) were selected from locally owned firms and 78 (43.3%) were selected from foreign firms. There was an average spillover occurrence in both food processing and machine and engineering industries. Although spillover occurrence in domestic firms seemed higher than in foreign firms in the two industries; it was however not statistically significant. As observed in Chapter 4, foreign presence was higher in food processing than in machine and engineering industry. Similar to Chapter 4, the foreign presence was computed following Aitken and Harrison (1999: p. 608) by normalising foreign equity with the firm's share of employment in the industry¹⁰⁸.

An important firm characteristic expected to influence spillover occurrence is firm size which was considered in terms of employment size. Foreign firms were bigger in size than the local firms with an average employment level of 456 and 113 in food and machine and engineering industries respectively: versus 117 and 102 for the local firms. Similar findings were arrived at in Chapter 4 based on industrial survey data from official sources. Further, this compares to the results of RPED study where Ramachandran and Shah (1998) found firms with foreign ownership to be generally larger than those without in Kenya, Ghana and Zimbabwe. Similarly, in Czech Republic Djankov and Hoekman (1998: p. 10) observed a similar trend where firms with foreign partnerships tended to be significantly larger than firms that remained independent. This is however not surprising since foreign firms have more resources than local firms to invest in big firms abroad or to expand existing local firms once they have merged or acquired them. It is consistent with the literature on MNCs, which reiterates that foreign firms have ownership advantages (both intangible and tangible ownership characteristics) which enable them to invest internationally [Hymer, 1960; Kindleberger, 1969; Dunning, (1973: 1993); Caves, (1974:1982); Buckley and Casson, 1976].

The average age of all the firms in the two industries was 29 years. Foreign firms had a higher average firm age (39 years) compared to the local firms (22 years). Interestingly, local firms in the two industries had a similar average age of about 22 years. Foreign firms in food processing were older with an average age of 45 years in comparison to those in machine and engineering with an average age of 29 years. Again these results compare well to those obtained in Chapter 4. The age differential between foreign firms in the two industries is not surprising given that early foreign investment in Kenya was mainly in agro-based industries [Leys, 1975; Jorgensen, (1975: pp. 143-155); Kaplinsky, 1978; Swainson, (1978: 1980); Vaitos, 1991]. However, two possible reasons could

¹⁰⁸ This was defined as $FS_{jt} = \frac{\sum_i FS_{ijt} * Emp_{ijt}}{\sum_i Employment_{ijt}}$, which is foreign equity participation averaged over

all plants in the sector, weighted by each plant's share in sectoral employment (Aitken and Harrison, 1999 p. 608).

account for the wide age differential between local (22 years) and foreign firms (39 years). The first one is that as outlined in Chapter 3, according to the history of Kenya's industrialisation process foreign firms started their production activities much earlier than local firms. For instance, many foreign firms invested in Kenya long time before her independence in 1963. Examples of early foreign investment included James Finlay-UK (1924), Brooke Bond-UK (1924), Unilever-UK (1953), Del Monte-US (1948) in the agro-based industry and Greif-US (1952) in machine and engineering industry [Swainson, (1978; 1980)]. The second reason is that the rate of foreign manufacturing investment in Kenya declined tremendously in the late 1980s and 1990s after extensive institutional failure, infrastructure decay and inconsistent policies (Gachino and Rajah, 2003; WDI-CDROM, 2003). The observed trend on Kenya's investment pattern showed that most of the new firms were local firms and mainly Asian firms [Himbara, (1994: p. 35-74); Bigsten and Kimuyu, (2002: p. 22)]. This is supported by a study on Ghana under structural adjustments which showed that local firms were relatively newer than foreign firms (Lall, Navaretti, Teitel and Wignaraja, 1994).

The firm age factor is also reflected in the age of the core production machinery. With an average of 22 years foreign firms had the oldest production machinery compared to local firms with an average age of 17 years. To some extent this observation contradicts the argument in the literature that foreign firms would tend to use relatively newer production machinery. However this age difference could be explained as in the above by looking at the differences in investment trend between local and foreign firms. It may also imply that foreign firms in Kenya do not replace or introduce new production machinery and technology regularly. A possible explanation for this could be that the nature of manufacturing undertaken has little value added, supporting the argument by Kimuyu (1999, p. 166) that from a comparative perspective, the manufacturing sector in Kenya suffers from low value added. This has a negative consequence for learning and innovation.

The average capacity utilisation in the two industries averaged 64% indicating existence of excess capacity in the two manufacturing industries. Foreign firms had higher capacity utilisation in food processing (70%) than local firms (61%) while the converse was true in machine and engineering industry¹⁰⁹. This would be expected given that most of the foreign firms in food processing industry are exporters (internationally and regionally) and thus the relative demand for their products is higher than that of local firms. High capacity utilisation by the foreign firms could also be attributed to their ability to engage skilled workforce and more efficient and well maintained production machinery and equipment. For the industry in general, insufficient domestic demand sometimes due to competition from imports was observed to be the main cause of low capacity utilisation¹¹⁰. This supports an earlier finding by Coughlin and Ikiara (1991) and Mazumdar and Mazaheri (2003 p. 231-240) who using RPED data found out that the highest obstacle to capacity utilisation in Kenya was lack of demand followed by lack of working capital and then shortage of raw materials. Interviews conducted revealed that in addition to weak demand, lack of working capital and shortage of raw materials, there

¹⁰⁹ These results compare well to those obtained by Mazumdar and Mazaheri (2003) who found out that average capacity utilisation in food processing industry was 68.8 % while that of metal (in our case machine tool industry) was 63.9 %. Using the first round of RPED data, Nairobi University, 1993 found out that food processing had a capacity utilisation of 70.87 % while metal had 65.77 %.

¹¹⁰ This is supported by theory which posits that excess capacity arises when firms fail to determine the anticipated growth in demand, cyclical downturns in demand or existence of a secular decline in demand over time (Shaw and Sutton, 1976).

were other factors contributing to low capacity utilisation which included poor transportation facilities that resulted in high transport cost, high cost of fuel and power and machinery and equipment breakdown.

On infrastructural and institutional support, firms were asked to rate the provision of key infrastructural and institutional support on an ordinal scale ranging from 1 *very poor* to 5 *excellent*. A simple index was computed, which allowed us to classify the firms into two groups, those rating the provision of infrastructure as good and those rating it as poor. With the exception of food processing where 50% of the total foreign firms rated provision of infrastructure as good, in all the other cases only about a third felt they were provided with relatively good infrastructure. This is rather low but it is not surprising in Kenya since in the last one-decade, there was little attention paid to the infrastructure development, expansion and maintenance which resulted in massive degradation of infrastructure. The transport services especially roads and railway services deteriorated after several years of neglect resulting in increased inefficiency and cost of transport. The cost of electricity and power supply remained high while telecommunication network (telephone) improved only a little¹¹¹. A number of studies found poor infrastructure to be a big obstacle to the industrialisation process in Kenya [Kimuyu and Kayizzi-Mugerwa, 1993; Department of Economics, (1994: 1995); Kayizzi-Mugerwa and Kimuyu, 2002; and Rasiah and Gachino, 2004].

A similar trend was observed in the case of institutions where on average only a third of the firms felt they were receiving above average institutional support. This is an expected case in Kenya where most of the institutions just like the infrastructure had deteriorated performing below expectation. This was extensively discussed in Chapter 3. The problem was and is still compounded by poor policies and lack of coordination among the existing institutions meant to promote industrialisation in Kenya. Access to capital is constrained by high cost of credit, legal system and judiciary is weak, academic institutions are isolated from industry (rarely are they industry demand driven), R&D institutions are weak with few incentives for R&D activities [Department of Economics, (1994: 1995); Himbara, 1994; Pietrobelli, 2001; Gachino, 2003]. These characteristics typify a developing country as discussed extensively by Tybout (2000) in his review of manufacturing firms in developing countries.

The firms, which benefited from the services offered by business organisations, were equally very low. Foreign firms in food processing which benefited from business organisations were 33% while in the machine and engineering industry were 24%. Of the food processing firms only 15% and 20% benefited from businesses organisations. This is not surprising given the weak capacities of most of the business associations and therefore a more or less the same story to that of infrastructure and institutions advanced above also holds in the current situation.

Table 5.16 also shows the extent to which a firm benefited from 'formal and informal interactions' with machinery and raw material suppliers, government and private institutions, universities and technical training institutions, industry and business associations, investment and export promoters, buyers and distributors. While 43% of the foreign firms reported having benefited from this kind of interactions, only 28% of the locally owned firms had benefited from such interactions. For both local and foreign firms, the firms that benefited from interactions were more in food processing than in

¹¹¹ The little improvement in the telephone industry was as a result of partial liberalisation undertaken in the telecommunication industry.

machine and engineering industry. In general terms the level of benefit reported from interacting formally and informally was very low given that it remained below 50% on average for the two industries. This is expected for two reasons. First is that the level and frequency of interactions are usually low. This links to the second reason that most of the institutions or business associations to interact with are often faced with major drawbacks such as inadequate physical and human resources, finance and working capital. Third, lack of adequate support and facilitation from the government to institutions as most of them remain inefficient. Moreover, the government has also failed to offer an appropriate institutional and legal framework to provide entrepreneurs with the required guidance, which would promote interactions and foster knowledge spillovers in the industry. To cite an example, which emerged during the interviews, most MNCs interested in investing in Kenya were affected by the immature structure and inefficient state of institutions and business associations. For instance, they were faced with lack of comprehensive information on the existing research institutions and their specific capabilities, operations of the judiciary and legal system, business partners with whom they can match make as well as on how to conduct business in Kenya. This made MNCs stay away or shy from full engagement in the industry.

In order to determine the firm's absorptive capacity, the proportion of staff with university, technical and vocational training was considered. In the two industries foreign firms had the highest levels with 39% and 58% in food and machine and engineering respectively. Locally owned firms had 29% in food processing and 51% in the machine and engineering industry. The observation that foreign firms had a high proportion of skilled workers employed¹¹² was not surprising since according to the literature on MNCs, foreign firms have the resources to spread over heavy capital investment and to engage technically qualified manpower [Caves, 1974; Dunning (1973:1993); Aitken and Harrison, 1999]. For both local and foreign firms, machine and engineering industry had the highest levels of staff with university, technical and vocational training. This would be expected as machine and engineering industry requires engineering activities and thus skilled labour force would have to be engaged – engineers and vocationally trained technicians and craftsmen. This supports the argument that metal working activities in Kenya are more technologically exacting than other activities (Ikiara, Kimuyu, Manundu and Masai, 2002).

Technology gap was considered by taking the value of firm's core production machinery. A firm with the highest value of production machinery (obviously a foreign firm) was taken as the reference point. All the firms whose value of production machinery was below the reference point but above the industry average were considered to have a low technology gap while those below the industry average were considered to have a high technology gap. Although this conceptualisation of technology gap is narrow; the approach is the best placed for an empirical analysis particularly when examining issues pertaining to production capability and the associated spillovers. Table 5.16 shows that as expected the value of core production machinery used by foreign firms was higher than that of the local firms and thus the existence of technology gap between foreign and local firms. The existing difference in value of production machinery was higher in food processing than in machine and engineering industry. The value of production machinery for foreign firms in food industry was 4.16 e+08 Kenya Shillings while that of local firms was 7.74 e+07 Kenya Shillings. This is not surprising given that some of the largest MNCs with heavy capital investment in Kenya today can be traced in food processing.

¹¹² This observation is supported by the earlier findings in Chapter 4 that foreign firms employed more skilled staff than the locally owned firms.

Examples include Coca-Cola, Nestle, Unilever, Cadbury Schweppes, Del Monte, Unilever Limited, Brooke Bond and James Finlay. In the case of machine and engineering industry, the value of production machinery for the foreign firms was 3.10 e+08 Kenya Shillings while that of domestic firms was 1.35 e+08 Kenya Shillings. While the value of production machinery for foreign firms was higher in food processing than in machine and engineering industry, the converse was true with the local firms. This could be explained by the fact that while foreign firms got more attracted to the agro based industries and invested accordingly, locally owned firms mainly of Asian origin got more attracted to the machine and engineering industry [Swainson, (1978: 1980); Himbara, 1994].

A high proportion of foreign firms in food processing had a strategy of diversifying their products (56%) and process technology (63%) compared to those in the machine and engineering industry at (27%) for products and (31%) for process. The same trend was observed in the local firms. It is interesting however to note that a higher proportion of local firms in machine and engineering industry had a continuous strategy to change their products and processing technology than the foreign firms. This could be expected as the local firms try to introduce changes to match with those of foreign firms. As indicated elsewhere, local firms were observed to learn more from demonstration effects.

The proportion of firms offering technological training averaged 30% in the two industries. While the same proportion of locally owned firms (28%) offered training in both food and machine and engineering industry, foreign firms seemed to offer more training in food processing (37%) than in machine and engineering industry (26%). Interestingly, the difference between the proportion of local firms (28%) offering training in machine and engineering industry from that of foreign firms (26%) was not much. Although these figures show that firms in Kenya offer technological training to an extent, the proportions are however low but do compare to those obtained in the World Bank RPED study (Biggs, Shah and Srivastava, 1995). It was also noted that the kind of training offered differed substantially between firms while in the case of foreign firms training was routine, internal and often external including internationally, most of the local firms just offered simple in house training usually done on ad hoc basis.

On R&D, a high proportion of foreign firms conducted R&D in food processing (54%) and machine engineering industry (31%) compared to only (18%) of the local firms in the food industry and (15%) in the machine engineering industry. This is expected given that foreign firms have resources to spread over R&D and to engage skilled scientists and engineers. However as noted from the survey done, the kind of R&D done mainly involves simple activities such as quality control, materials and chemical analysis, reverse engineering, adaptive engineering and trouble shooting. This supports the argument that MNCs usually concentrate their R&D in their home countries – parent companies and conduct very little abroad [Lall, (1979: 1980); Cantwell, 1995; OECD, 1998; Patel and Vega, 1999; Amsden, Tschang and Goto, 2001; Rasiaah, 2003]¹¹³. The overall low levels of R&D for local firms could be explained by weak demand of high value added commodities as most of them just produced for local consumption compared to foreign firms. Nevertheless some of the processed products are exported in their raw form (low value added) in anticipation of further value addition in the export market as is often the case with tea or coffee.

¹¹³ Sunkel (1989), Furtado (1973) and Cardoso (1977: 1979) argued that TNCs stimulate manufacturing in Latin American Economies, but the nature of their operations tends to confine technological capabilities to low value added activities.

As expected a higher proportion of foreign firms participated in exports than the local firms. This supported the finding obtained in Chapter 4. While 20% and 18% of the local firms were exporters in the food and machine and engineering industry respectively, 55% and 22% of the foreign firms exported in food and machine and engineering industry respectively. The average of firms exporting in the food industry was about 38% and about 29% in machine and engineering industry. This is expected given that foreign firms are more endowed with export capabilities than the local firms. These results compare to those obtained by Graner and Isaksson (2002: p. 181-2) who using RPED time series data for three years 1993-5, found that 38% and 31% of firms in food processing and machine and engineering were exporting respectively.

The difference between local and foreign firms in import of raw materials was not significant. While 13% and 15% of the local firms in food and machine and engineering industry respectively imported their raw materials, a similar proportion of foreign firms (17%) imported their raw materials in both industries. This implied that apart from the machinery and equipment the rest of the raw materials are sourced domestically.

Under labour market conditions, wages were considered. Union was also taken into consideration but given that one of the main roles of such unions is to lobby for salary increases and better working conditions, wages was therefore considered to be the best indicator of labour market conditions. There was tremendous difference between the local and foreign firms in terms of annual wages paid per person. The data collected showed that the annual wages paid per person in foreign firms in food processing industry was 637.3 thousand Kenya Shillings annually compared to local firms which paid 132.4 thousand Kenya Shillings annually. Similarly, foreign firms in machine and engineering industry paid 279.2 thousand Kenya Shillings annually while local firms paid 194.0 thousand Kenya Shillings annually. This is not surprising as high salaries paid in foreign firms could be due to technologies used that are more skill biased than those used in local firms. It could also be due to the fact that skilled workers in foreign firms are equally skilled and effective in bargaining for high wages (Velde and Morrissey, 2001). The difference in wages between foreign and local firms was similarly noted in other studies: Aitken, Harrison and Lipsey (1996) for Venezuela and Mexico; Mazumdar (1995) for Cameroon and Zambia; Lipsey and Sjöholm (2001) for Indonesia; Velde and Morrissey (2001) for Cameroon, Ghana, Kenya, Zambia and Zimbabwe.

Table 5.16: Descriptive Statistics, by Industry and Firm Ownership, Kenya, 2004

Variables	Local Firms Food	Local Firms Machine	All Local Firms	Foreign Firms Food	Foreign Firms Machine	All Foreign Firms
Technological Spillover (Index)	3.3	3.4	3.4	3.1	3.3	3.2
Foreign Presence	9	18	14	62	27	45
Firm Characteristics						
Firm size (<i>Employment</i>)	117	102	109	456	113	285
Firm ownership (%)	52	63	58	48	37	43
Firm age (<i>absolute numbers</i>)						
Machine age (<i>absolute numbers</i>)	22	22	22	45	29	39
	15	18	17	24	19	22
Firm Performance						
Capacity Utilisation (%)	61	63	62	70	62	66
Infrastructural and Institutional support						
Infrastructure Support (%)	35	35	35	50	31	41
Institutional Support (%)	37	26	32	51	21	36
Business Associations (%)	15	20	18	33	24	29
		25		58		43
Firm Interactions (%)	31		28		27	
Absorptive Capacity						
Univtechvoc (%)	29	51	40	39	58	49
Technology Gap (<i>value of core mach</i>)	7.74e+07	1.35e+08	1.06e+08	4.16e+08	3.10e+08	3.63e+08
Firm Strategy						
Diversify products (%)	35	34	35	56	27	42
Process technology (%)	43	41	42	63	31	47
Broaden Knowledge base						
R&D	18	15	17	54	31	43
Human Resource Development						
Technological training (%)	28	28	28	37	26	32
Trade Orientation						
Exports (%)	20	18	19	55	22	39
Imports (%)	13	15	14	17	17	17
Labour Market Conditions						
Wages ('000 KShs)	132	194	163	637	279	458

Source: Tabulated from author's field survey 2003/2004

5.4.2 Econometric Setting: Binomial Logit Estimation for the Determinants of Spillover Occurrence

In determining spillover occurrence, a gradual way of measuring spillovers using an ordinal scale ranging from a minimum score of 0 to a maximum score of 5 where 0 represented "nothing – no spillovers" and 5 a "highest spillovers occurrence" was

adopted, see figure 5.1. The ordinal scale employed would require use of limited dependent variable estimation techniques – binomial and ordered logit estimation techniques.

Figure 5.1: An Ordered Structure of Technological Spillover Occurrence

As observed in Figure 5.1, the data can be put into two distinct categories. On the basis of SPO INDEX, enterprises rated above 3 score were classified as enterprises with strong spillover occurrence while those rated below 3 score were regarded as firms with weak spillover occurrence. Due to the dichotomous nature these responses then assumes a binary procedure: weak spillover occurrence (WSPO) and strong spillover occurrence (SSPO). In this case the empirical analysis will start with a simple dichotomous logit estimation of spillover determinants followed by multinomial ordered logit estimation. The use of two-stage estimation is important to check the consistency and robustness of the results. Moreover this approach would provide us with a wide set of results to examine spillovers in the context of a country that is technically backward.

The formulation of a logit binary model proceeds as follows: the dependent variable in the econometric model is taken as a single explanatory variable (Y) that is treated as a dichotomous variable taking discrete values 1 (for yes responses), otherwise 0. A binary qualitative response model that links the decision or outcome to a set of factors is constructed as:

$$Y_{ij} \quad = \quad \beta_0 + \sum_{i=1}^k \beta_i X_{ij} + v_i \tag{5.4}$$

Where Y_{ij} is taken as a latent variable since it is unobservable, v_i is an error term whose cumulative distribution is assumed to follow a logistic distribution. Hence in addition to the multinomial analysis, logit analysis will also be performed just to compare the results

to those obtained by multinomial analysis technique. Logit analysis is one of the limited dependent variable estimation procedures and is different from linear estimations. In dichotomous cases a linear model technique like the ordinary least squares technique is normally faced with several shortcomings. An obvious one is that of the complication, which arises because the residual is heteroscedastic in a way that depends on parameters (Gujarati, 1995; Green, 2002). Since Y_{*i} is not observable, what we therefore observe is a dummy variable Y_i defined as follows:

$$\begin{aligned} Y_i &= 1 && \text{if } Y_{*i} > 0 \text{ (Strong spillover occurs SSPO)} \\ Y_i &= 0 && \text{otherwise (Weak spillovers occurs WSPO)} \end{aligned}$$

From the above, we obtain the probability of spillover occurrence as follows:

$$\begin{aligned} \text{Pr ob(SSPO = occurs)} &= \text{Pr ob}(Y = 1) = F(\beta_0 + \sum_{i=1}^k \beta_i X_{ij}) \\ \text{Pr ob(WSPO = Ocuurs)} &= \text{Pr ob}(Y = 0) = 1 - F(\beta_0 + \sum_{i=1}^k \beta_i X_{ij}) \end{aligned}$$

- F is the cumulative distribution function
- X_{ij} is a vector of independent variables which determine spillover occurrence, see Table 5.17.
- β_0 is a constant parameter and β_i is the set of parameters reflects the impact of changes in X on the probability. These are the parameters to be estimated in the model.

As indicated earlier if the distribution of ϑ_i in equation 5.4 is symmetric¹¹⁴, then

$$P(Y_i) = F(\beta_0 + \sum_{i=1}^k \beta_i X_{ij}) \quad 5.5$$

If ϑ_i has a logistic cumulative distribution then it is regarded as a logit model. If the model is written in terms of log odds then direct impacts of β_i can be estimated as:

$$\text{Log} \frac{P(Y_i)}{1-P(Y_i)} = \beta_0 + \sum_{i=1}^k \beta_i X_{ij} \quad 5.6$$

From equation 5.6 above, it can be noted that log odds ratio becomes a linear function of the independent variables. The logit model was estimated with Stata version 8 using maximum likelihood estimation technique. The dependent variable is spillover occurrence index defined as a binary variable taking 1 when strong spillovers occurred (SSPO) and 0 if weak spillovers occurred (WSPO).

¹¹⁴ More details on this can be obtained in Maddala (1983); Gujarati (1995) and Green (2002).

5.4.3 Econometric Setting: Multinomial Ordered Logit Estimation for the Determinants of Spillover Occurrence

By categorising spillover occurrence into weak or strong spillover occurrence, determinants of spillover occurrence were examined using binomial logit estimation in the preceding section. Binomial logit can only be used when the dependent variable is a dichotomous variable. A polychotomous dependent variable requires a different approach – a polychotomous model (Multinomial ordered logit) to determine spillover occurrence. Use of a polychotomous model allows the full spectrum (ordinal setting) of spillover occurrence as shown in Figure 5.1 to be considered in the estimation. Note that the two lowest levels in the ordinal scale were dropped since on average none of the firms recorded spillover occurrence index below 2 – "low". In addition to providing a wide set of results from which conclusions for spillover occurrence can be drawn, the ordered logit approach is expected to be more illuminating since more information is included¹¹⁵ compared to the binary logit estimates.

Multinomial ordered logit technique is built around a latent regression in the same manner as the binomial logit model above. Assume that there are institutional factors defined by a vector I , structure factors defined by a vector S , conduct factors defined by a vector C , performance factors defined by a vector P and spillover occurrence defined by a vector SPO . For a given enterprise say i , the relationship between spillover occurrence and the factors can be formulated as:

$$SPO_i = SPO(I_i, S_i, C_i, P_i) + \vartheta_i \tag{5.7}$$

Where ϑ_i is the usual stochastic disturbance term assumed to be independent and normally distributed across observations. Supposing the subscript i in our model is dropped then we have:

$$SPO^* = \beta'x + \vartheta \tag{5.8}$$

In this expression, SPO^* is unobserved as in the case of binary logit or probit models. x is a vector containing all the independent variables I, S, C, P and β is a vector for the associated coefficients for all the independent variables.

¹¹⁵ Binary takes into consideration only two alternatives for the binary variable while polychotomous is designed to allow more than two dependent variables.

Subsequently, it can be observed that:

$$\begin{array}{lll}
 SPO = 0 & \text{if} & SPO^* \leq 0, \\
 SPO = 1 & \text{if} & 0 < SPO^* \leq \mu_1, \\
 SPO = 2 & \text{if} & \mu_1 < SPO^* \leq \mu_2, \\
 & & \cdot \\
 & & \cdot \\
 & & \cdot \\
 SPO = J & \text{if} & \mu_{J-1} < SPO^* .
 \end{array} \tag{5.9}$$

which in itself is equivalent to censoring with SPO observed in J ordered categories – in our case J is 5. μ_i are unknown parameters to be estimated with β , separating the specific adjacent SPO categories. With minor modification that allows us to make estimations with a logistically distributed disturbance, we obtain the following probabilities:

$$\begin{array}{ll}
 Prob(SPO = 0) = \Phi(-\beta' x), \\
 Prob(SPO = 1) = \Phi(\mu_1 - \beta' x) - \Phi(-\beta' x), \\
 Prob(SPO = 2) = \Phi(\mu_2 - \beta' x) - \Phi(\mu_1 - \beta' x), \\
 \cdot \\
 \cdot \\
 \cdot \\
 Prob(SPO = J) = 1 - \Phi(\mu_1 - \beta' x),
 \end{array} \tag{5.10}$$

Φ represents the cumulative logistic distribution function.

The condition required for all the probabilities to be positive is that they must have

$$0 < \mu_1 < \mu_2 < \mu_3 \dots \dots \dots < \mu_{J-1}$$

which is a generalisation of the logit/probit models. Under normal circumstances, the first parameter is normalised to zero hence reducing the number of parameters to be estimated by one.

An interesting phenomenon characterising limited dependent analysis is that it allows us to enrich our empirical analysis by computing the marginal effects. Usually marginal effects of the independent variables on the probabilities are not equal to the coefficients. The sum of marginal effects should equal to zero flowing from the requirement that under all circumstances the probabilities must add up to 1. It should however be emphasised that computation of marginal effects differs depending on the nature of independent variables and the level at which they are computed – the most common level being at the mean. We first consider the case of a continuous independent variable. A marginal change in the predicted probability of the outcome *m* (say in the interval

μ_{m-1} to μ_m) for a change in a particular independent variable x_k at its mean is determined as follows:

$$\frac{\partial \Pr(SPO = m | \bar{x})}{\partial x_k} = \beta_k [\Phi(\mu_m - \bar{x}'\beta)] \quad 5.11$$

In the lowest category the marginal effect would be:

$$\frac{\partial \Pr(SPO = 0 | \bar{x})}{\partial x_k} = -[\Phi(\beta'x)]\beta, \quad 5.12$$

and for the highest category the marginal effect would be:

$$\frac{\partial \Pr(SPO = j | \bar{x})}{\partial x_k} = \Phi(\mu - \beta'x)\beta_k, \quad 5.13$$

In the case of discrete explanatory variables, the approach is slightly different. The change in the predicted probability of outcome m as a particular explanatory variable x_k changes from μ_0 to μ_1 while the rest of the variables are sustained at $\mathbf{x}$ is determined by the following expression:

$$\frac{\Delta \Pr(SPO = m | \bar{x})}{\Delta x_k} = \Pr(SPO = m | \bar{x}, x_k = x_1) - \Pr(SPO = m | \bar{x}, x_k = x_0) \quad 5.14$$

The dependent variable is spillover occurrence index defined as a binary variable taking 1 when strong spillovers occurred and 0 if weak spillovers occurred. As discussed in Chapter 2, spillover occurrence was influenced by a variety of factors. Since one of the main objectives is to determine the influence of foreign presence on spillover occurrence, foreign presence was therefore regarded as an important independent variable among others considered. Other independent variables considered include firm characteristics (size, ownership, Asian, firm and machine age); firm performance (capacity utilisation); infrastructural and institutional (business, infrastructure and institution support); firm interaction (with support institutions). Additionally other independent variables included absorptive capacity (proportion of workers with university, technical and vocational education background and technology gap); firm strategy (diversification of products, acquisition of process technology and R&D); human resource development (technological training); trade orientation (exports and imports); labour market conditions (wages) and industry type. The hypothesised direction of influence on all these variables was extensively discussed in Chapter 2 and is once again shown in Table 5.17 which in addition provides detailed characteristics of all the variables.

Table 5.17: Variables Included in the Empirical Models and their Hypothesised Influence on Spillover Occurrence in Kenya's Manufacturing Industry

Variables	Variable Description	Variable Measurement	Hypothesized Influence
Technological spillover (SPO INDEX)	Spillover occurrence index	5 if highest, 0 if none	+
Foreign Presence (FORPS)	Foreign presence at firm level	Aitkens method	+
Firm Characteristics			
Firm size (SIZE)	Firm employment	1 if large, 0 otherwise	+ or -
Foreign ownership:			
(1) Foreign equity (PART)	Subscribed foreign equity	% Foreign equity	+
(2) Asian (KASIAN)	Firm owned by a Kenyan Asian	1 if Asian, 0 otherwise	+
Firm Age (FIRMAGE)	Age of a firm	Years in absolute numbers	+
Age square (AGESQRD)	Age of firm squared	Age ² / 100	+ or -
Machine age (MACHAGE)	Age of core production machinery	Years in absolute numbers	+ or -
Firm Performance			
Capacity Utilisation (CAPUTL)	Firm capacity utilisation	% Capacity utilised	Positive
Infrastructural and Institutional support			
Infrastructure (INFRSPT)	Infrastructure support to firm	1 Infrastructure, 0 otherwise	+
Institutional (INSTSPT)	Institutional support to firm	1 Institutional, 0 otherwise	+
Business (BUSASPT)	Support from business associations	1 Business, 0 otherwise	+
Firm Interactions (INTERACTIONS)	Presence of firms interactions	1 if interacts, 0 otherwise	+
Absorptive capacity			
Skilled intensity (SKILL)	Share of university & technical	% Share in total employment	+
Technology gap (TGAP)	Value of core production machinery	1 high tech. gap, 0 otherwise	+ or -
Firm Strategy			
Diversify products (STRTPDCT)	Diversify into new products	1 if to diversify, 0 otherwise	+
Process technology (STRTPRCS)	Acquire new process technology	1 if to acquire, 0 otherwise	+
Broaden Knowledge base (STRTRD)	Undertakes R&D	1 if to do R&D, 0 otherwise	+
Human Resource Development			
Technological training (TRAINING)	Undertakes training	1 if to train, 0 otherwise	+
Trade Orientation			
Exports (EXPORTS)	Exports of manufactured goods	1 if exports, 0 otherwise	+
Import (IMPORTS)	Imports raw materials	1 if imports, 0 otherwise	+
Labour Market Conditions			
Wages (WAGES)	Wages per person in a firm	Wages per person	+
Manufacturing industries	Industry type (industry dummy)	1 if food, 0 otherwise	+ or -

Source: Derived from author's survey 2003/2004

5.4.4 Binomial and Ordered Logit Model Estimation: Results and Discussion

Table 5.18 and 5.19 presents the results of the binomial and ordered model estimated respectively. To avoid the problem of multicollinearity, backward selection procedure was employed to select the independent variables to be included in the final models. Nevertheless, the results of correlation tests in Appendix 5.5 showed that none of the independent variables posted high and significant correlation and thus there was no multicollinearity problem. The two estimated models passed the White (1980) test for heteroscedasticity. The overall goodness-of-fit statistics – Log likelihood, Likelihood ratio LR-Test and Pseudo R^2 – indicated good overall performance of the two models. In comparison however, and based of the goodness-of-fit statistics, ordered logit model performed better than the binomial model estimated.

For the two models, estimated backward selection was done in such a way that only variables with probability values below 0.2 would be retained. Accordingly, only marginal effects of these variables were computed and reported. Results of full model with ordered logit are however included in the Appendix 5.6. With backward selection the independent variables dropped after failing the significance test included R&D, subscribed equity, firm performance, infrastructure, and firm's strategy to introduce product changes regularly.

Table 5.18 and 5.19 shows that as expected: most of the estimated coefficients had the a priori expected signs and were statistically significant at 1%, 5% and 10% levels. From the empirical analysis performed, foreign presence was positive and statistically significant at 5% in both binomial and ordered logit estimation. The data produced statistically significant results confirming our hypothesis that spillover occurrence in Kenya's manufacturing industry is stimulated by foreign presence. For example, an increase of foreign presence in the industry by 1 unit increased spillovers occurrence by 1.86 and 1.37 points for binomial and ordered logit models respectively. Moreover, an increase in foreign presence increased the probability of high and highest spillover occurrence levels by about 2.98% and 2.6e-05% respectively, Table 5.19. These findings are in accordance with the theoretical and conceptual framework formulated in Chapter 2 that MNCs in a host country are associated with knowledge spillovers. For instance, Teece (1977) had argued that introduction of new products and production processes by foreign firms may benefit domestic firms through the accelerated diffusion of technology. Further, these results are supported by other empirical studies, which found spillover occurrence due to the presence of MNC firms. Examples of such studies include detailed case studies by Rasiah (1994: 1995) and Lall (1985)¹¹⁶.

The size of the firm was statistically significant at 10% level. This implied that firm size had a positive influence on spillover occurrence. Spillovers were more likely to occur in large firms than in the small firms. If a firm changed in size from being small to large it was likely to increase its spillover occurrence by 3.62 points. The positive relationship between spillover occurrence and firm size could be based on a number of propositions. Besides enjoying greater economies of scale large firms are able to engage the services of skilled technical personnel. Large firms are favoured by the capital market imperfections,

¹¹⁶ These results compare to those of early contributors based on production function estimation of spillovers following Caves (1974). Such studies applying a similar approach were many [Globerman, 1979; Blomstrom and Pearson, 1983; Kokko, (1994: 1996); Blomstrom and Sjöholm, 1999] etc. Our results in this chapter contradict those studies that failed to arrive at technological spillovers.

which confer advantage on large firms in obtaining finance for technological activities [Tybout, (2000: p. 12)]. With these advantages (skilled labour, finance and extended knowledge networks etc) large firms are capable of undertaking more innovations than small firms, which results in knowledge generation and accumulation from learning by interaction and learning by doing effects. As a result of these learning processes over time, the accumulated stock of knowledge and experience increases a firm's absorptive capacity, which in turn enables the firm to assimilate, adapt and exploit external knowledge (spillovers). In the long run, the knowledge accumulated results in increased firm's technological capability and thus efficiency. It is not surprisingly therefore that empirical analysis using a variety of data from developing countries showed a positive relationship between firm size and technological capability (Wignaraja, 2001; Westphal, Kritayakirana, Petchsuwan, Sutabutr and Yuthavong, 1990; Romijn, 1999). In other studies large firms have been viewed as more efficient than small firms (Javonic, 1982; Little, Mazumdar and Page, 1987).

Two of the proxies of experience and knowledge accumulated were significant at 5% for the two models. Firm age and age-square had positive influence on spillover occurrence. However, based on the magnitude of their marginal effects, the two variables do not seem to have much influence on spillover occurrence. The age results imply that spillovers were more likely to occur in old firms than in young firms. The learning process in the firm could explain the age influence on spillover occurrence. Over time learning by doing effects results in experiential and tacit knowledge and consequently the accumulated stock of knowledge enhancing a firm's absorptive capacity, which in turn enables the firm to assimilate, adapt and exploit external knowledge spillovers (Cohen and Levinthal, 1990; Rasiah, 2002; Criscuolo and Narula, 2002). The results obtained in Table 5.19 showed that as the firm grows older, it increases its probability of high and highest spillover occurrence by 0.77% and 6.67e-06% respectively. The estimated marginal effect of age squared was negative in the two models and significant indicating that growth of spillover occurrence decreased with age "an inverted-U shaped relationship". Age of the core production machinery was also positive and highly significant in the two models estimated. The results showed that old production machinery was characterised by high levels of spillover occurrence compared to the relatively new production machinery. As an example, old production machinery increased the predicted probability of average level of spillover occurrence by 5.9%, Table 5.19.

The Kenyan Asian variable was significant at 5% and 1% level, with a strong marginal effect of 7.53 and 5.29 for binomial and ordered logit estimations respectively, Table 5.18 and 5.19. The implication of this result is that more spillovers are likely to occur in firms owned by Asians compared to non-Asian firms in Kenya. The multinomial ordered results showed that a firm changing ownership and becomes Asian owned it reduces its probability of low and average spillover occurrence by 4.55e-03% and 26% and at the same time increase its predicted probabilities of high and highest levels of spillover occurrence by 26% and 2.96e-04% respectively. These results were in support of our hypothesis as expected given that the Asian firms in Kenya are more dynamic, entrenched in high value added activities compared to the African firms. This argument was discussed in detail in Chapter 3. Similarly, it is supported by other studies (Chandaria, 1963; Leys, 1975; Murray, 1978; Himbara, 1994). Himbara (1994: p. 35) noted that in comparison to African, Asians firms were characterised by high entrepreneur and commercial skills; efficiency and competitive edge; hard working and survived with modest resources with family units and collective organisations playing a pivotal role in providing mechanisms to engender discipline and cohesion.

The data suggested that interaction was an important determinant of knowledge spillover occurrence. Although interaction was not statistically significant in the binomial estimation, multinomial ordered estimated a strong positive marginal effect that was statistically significant at 5% level. The results in Table 5.19 shows that a firm which interacts reduces its probability of low and average spillover occurrence levels by 7.79e-03% and 3.2% and increases the predicted probability of high and highest spillover occurrence by 3.3% and 2.85e-05% respectively. This finding is supported by the literature on learning and innovation, which emphasises the importance of interactions (with suppliers, customers, support institutions and industry business associations) in firm learning and new knowledge acquisition including accumulation of tacit knowledge. Such interactions are likely to provide information about technologies and new markets and other inputs to complement the internal learning process, such as external staff training, consulting services, and R&D grants [Lundvall, (1988: 1992); Freeman, (1991: 1995); Rothwell and Dodgson, 1991; Dodgson, 1993; Edquist, 1997].

Table 5.18 Marginal Effects: Determinants of Spillover Occurrence, Binomial Logit Estimation, Food Processing and Machine and Engineering Industries – Pooled

Variables	dy/dx	Std. Errors	Z-Values	P-Values
LFORPS	1.858	0.876	2.12	0.034
SIZE ^ψ	3.618	1.980	1.83	0.068
FIRMAGE	0.444	0.197	2.26	0.024
AGESQRD	-4.318	1.982	-2.18	0.029
MACHAGE	0.212	0.083	2.55	0.011
KASIAN ^ψ	7.530	3.007	2.50	0.012
SKILL	2.811	1.268	2.22	0.027
TGAP ^ψ	6.976	2.771	2.52	0.012
STRTPRCs ^ψ	7.613	3.695	2.06	0.039
TRAINING ^ψ	6.189	2.973	2.08	0.037
EXPORTS ^ψ	-6.330	3.036	-2.09	0.037
IMPORTS ^ψ	1.977	1.519	1.30	0.193
IWAGES	-2.088	0.754	-2.77	0.006
Cons	-25.566	12.397	-2.06	0.039
Industry dummies	Yes			
No. of observations	73			
Log Likelihood	-13.867			
LR-Test	61.620 (0.000)			
Pseudo R ²	0.6896			

Note: Spillover Index computed is taken as the dependent variable-proxy for spillover occurrence (ψ)
dy/dx is for discrete change of dummy variable from 0 to 1

Source: Computed from author's field survey 2003/2004

The variables for absorptive capacity had the expected results. The first one defined as proportion of staff with university, polytechnic and vocational education was important in explaining spillover occurrence. The direction of the estimated marginal effect was

positive and significant at 5% in the two models. If a firm increases the proportion of its staff with university, polytechnic and vocation graduates, it would increase its predicted probabilities for high and highest levels of spillover occurrence by 3.67% and 3.20e-05% respectively. The results supported our hypothesis that skilled personnel are important for spillover occurrence in the Kenyan firms. An adequate stock of technically qualified manpower is necessary to absorb new technologies, modify them, create and transfer new technological knowledge and information (Lall, 1992; Ernst, Ganiatsos and Mytelka, 1998). Adequate stock of knowledge in a firm is necessary if it has to recognise the value of new external information and knowledge, be able to assimilate and exploit it for various objectives [Cohen and Levinthal, (1989: 1990: p. 128); Benhabib and Spiegel, 1994].

The technology gap variable was positive and significant at 5% and 1% for binomial and ordered estimations respectively. From the results obtained, a change from high to low technology gap resulted in an increase of 6.98 and 7.44 points for binomial and ordered logit estimations respectively. This results supported our hypothesis that low technology gap had a positive influence on spillover occurrence in the Kenyan industry. For example, Table 5.19 shows that low technology gap reduces the probability of low and average levels of spillover occurrence by 1.47e-01% and 8.52% and at the same time increase the probability of high and highest levels by 8.67% and 7.90e-05% respectively. This is contradicted spillover literature part, which supports existence of a relatively large technology gap for spillover occurrence [Findlay, 1978; Abramovitz, 1986; Cohen and Levinthal, (1989: 1990); Benhabib and Spiegel, 1994; Gershenkron, 1962). The importance of available local skills and in-house technological capacity in adapting and using techniques developed elsewhere has been documented (Lall, 1992; Evenson and Westphal, 1994). This is the same if technological spillovers are to occur from foreign firms (Cantwell, 1989; Kokko 1994; Sjöholm, 1997).

A firm with a strong strategy of constant modification and upgrading of its processing technology was more likely to obtain high levels of spillover occurrence compared to a firm with no strategy on machine modification or upgrading. This variable had a strong positive marginal effect of 6.19 with binomial and 7.31 with ordered logit estimation, which significant at 5% and 1% respectively. Table 5.19 shows that a firm which engages in the process of upgrading and undertaking changes on its production machinery increases its predicted probability of high and highest levels of spillover occurrence by 3.99% and 3.46e-05% respectively. One of the ways in which technological capability is acquired is by undertaking continuous, incremental modifications that adapt new technologies to the firm to fit specific situations or production conditions (Katz and Ablin, 1979; Dahlman and Westphal, 1982; Bell, Scott-Kemmis and Satyarakwit, 1982; Dosi, 1988; Bell and Pavitt, 1993; Kim, 1997; Kline and Rosenberg, 1989). Once technological capability has been accumulated then it enables high spillovers to occur since absorption capacity is enhanced.

The training variable in the firm was also very important in explaining spillover occurrence. The estimated marginal effect was strong, positive and significant at 5% with binomial estimation and 1% with ordered logit estimations. This supported the hypothesis that the more a firm undertakes technological training in the Kenyan industry the more the spillovers were likely to occur. As observed in Table 5.19, firm training resulted in reduced probabilities of low and average spillover occurrence by 1.91e-04% and 12.34% and increased the probability of high and highest by 12.36% and 1.18e-04% respectively. The observed results of training on spillovers can be explained with regard

to accumulation of technological capability. Firm training results in accumulation of firm technological capability, which in turn determines the magnitude of potential knowledge spillovers (Pack and Westphal, 1995). Logically, a firm that offers training and also conducts R&D is better placed to detect new external knowledge and its value than a firm, which does not. Thus when a firm invests in training as well as R&D we can assume that in the process it increases its technological capability as well as absorptive capacity [Cohen and Levinthal, (1989: 1890); Lucas, 1988; Basant and Fikkert, 1996].

Interestingly and contrary to expectation, the results of exports obtained showed a negative influence of exports on spillover occurrence. The marginal effects estimated in the two models were negative and significant at 5%. This is possible given that exporting firms have already reached the threshold to export¹¹⁷. Non-exporting firms have a lot to learn and they are therefore likely to introduce many technological changes. Exporting increased the probability of low and average levels of spillover occurrence by 7.09e-04% and 42.11% and reduced the probability of high and highest levels of spillover occurrence by 42.11% and 6.25e-04 respectively, Table 5.19. This result contrasted those obtained in other studies which reiterated the importance of learning by exporting (Clerides, Lach and Tybout, 1998). The results also contrasted the widely acknowledged facts regarding East Asian miracle that exports contributed tremendously to development of technology capability building as a result of international spillovers occurring from interactions with more sophisticated foreign clients based abroad (Dahlman and Westphal, 1982; Westphal, 1990; Lall, 1990).

Although binomial logit estimation failed to produce significant results for imports, the marginal effect obtained with ordered logit was high, positive and significant at 5%. The implication of this result is that more spillovers occurred in importing firms than in firms that did not import. By participating in imports, a firm was likely to increase its predicted probability of high level of spillover occurrence by 9.75% and decrease its probability of low and average levels by 8.32e-04 and 9.74% respectively. These results are in support of the literature which views imports of new capital and differentiated intermediate goods as one of the main channels for international transmission of technology (Posner 1961, Vernon 1966; Romer, 1990; Feenstra, Markusen and Zeile, 1996; Grossman and Helpman, 1995).

The labour market conditions, which were proxied by firm wages, had a negative influence on spillover, which was statistically significant at 1% level. This was not surprising in that if a firm was paying efficiency wages then their workers were not expected to leave the companies. As an example, high wages boost workers morale and motivation and thus reduce workers mobility and the accompanying spillover [Manda, (2002: p. 60-79)]. The results obtained from the models estimated on labour market conditions were comparable. The labour market conditions, which were proxied by firm wages, had negative influence on spillover occurrence. The estimated marginal effect of log annual wages per person for the two models was negative and significant at 1% level showing that a high wage was not an important determinant of spillover occurrence. It implies that higher wages in a firm is likely to reduce spillover occurrence. For instance, as a firm increases its wages, say for instance by paying efficiency wages, the probability of high and highest levels of spillover occurrence reduces by 4.72% and 4.11e-05% and the predicted probability of low and average levels of spillover occurrence increases by 7.82e-04% and 4.72% respectively.

¹¹⁷ This would imply that an export threshold exists below which all spillovers matter to achieve export status. Nevertheless a clear direction of causality between learning and exporting is yet to be detected.

Table 5.19 Determinants of Spillover Occurrence, Ordered Logit Analysis, Food Processing and Machine and Engineering Industries Pooled

Variables	dy/dx	Change	Changes in Predicted Probabilities			
			Low	Average	High	Highest
LFORPS	1.366** (0.545)	<i>Marginal effect</i>	-4.93e-06	-0.0298	0.0298	2.60e-07
FIRIMAGE	0.351** (0.143)	<i>Marginal effect</i>	-1.27e-06	-0.0077	0.0077	6.67e-08
AGESQRD	-4.066** (1.660)	<i>Marginal effect</i>	1.47e-05	0.0886	-0.0886	-7.72e-07
MACHAGE	0.270*** (0.093)	<i>Marginal effect</i>	-9.74e-07	-0.0059	0.0059	5.12e-08
KASIAN ^ψ	5.293*** (1.823)	<i>None Asian to Asian</i>	-4.55e-05	-0.2621	0.2622	2.97e-06
INTERACTIONS ^ψ	3.537** (1.735)	<i>None interactive to interactive.</i>	-7.79e-05	-0.0323	0.0330	2.85e-07
SKILL	1.686** (0.847)	<i>Marginal effect</i>	-6.09e-06	-0.0367	0.0367	3.20e-07
TGAP ^ψ	7.438*** (2.590)	<i>High tech. gap to low tech. Gap</i>	-1.470e-03	-0.0852	0.0867	7.90e-07
STRTPRCs ^ψ	7.306** (3.205)	<i>No proc. Strat. to proc. Start.</i>	-2.94e-03	-0.0369	0.0399	3.46e-07
TRAINING ^ψ	5.797*** (2.038)	<i>No training to training</i>	-1.91e-04	-0.1234	0.1236	1.18e-06
EXPORTS ^ψ	-4.199** (1.834)	<i>None exporting to exporting</i>	7.09e-06	0.4211	-0.4211	-6.25e-06
IMPORTS ^ψ	2.569** (1.312)	<i>None importing to importing</i>	-8.32e-06	-0.0974	0.0975	9.17e-07
LWAGES	-2.166*** (0.644)	<i>Marginal effect</i>	7.82e-06	0.0472	-0.0472	-4.11e-07
_Cut1	1.756 (6.344)					
_Cut2	18.069 (8.501)					
_Cut3	29.764 (10.963)					
Industry dummies	Yes					
No. of observations	73					
Log Likelihood	-20.092					
LR-Test	98.100 (0.000)					
Pseudo R ²	0.7094					

Note: Spillover index computed is taken as the dependent variable-proxy for spillover occurrence
 (ψ) dy/dx is for discrete change of dummy variable from 0 to 1
 , * represent 5% and 1% levels of significance respectively

Source: Computed from author's field survey 2003/2004

5.5 Summary and Conclusion

This chapter used the analytical framework developed in Chapter 2 to examine the extent of spillover occurrence, kind of spillovers occurring and the mechanisms through which such spillovers occurred in Kenyan manufacturing industry. Binomial and multinomial ordered logit estimation techniques were used to examine the determinants of spillover occurrence. The data used in the analysis was collected from a survey undertaken in the Kenyan manufacturing industry, covering firms sampled from food processing and beverages, and machine and engineering industries. A sample size of 180 firms was used

with 105 firms in food processing and 75 firms in machine and engineering industry. Locally owned firms accounted for 56.7% of the total firms while foreign firms accounted for 43.3%.

The four mechanisms of spillover occurrence considered in the two industries were competition, linkage, labour mobility and demonstration effects. From the descriptive analysis done, a high proportion of locally owned firms faced very stiff competition compared to the foreign firms. Over 25% of the local firms and 50% of the foreign firms faced competition from wholly owned foreign firms or joint ventures. Defining linkages to include both pecuniary and non-pecuniary linkages, foreign firms had higher proportions of firms with both backward and forward linkages compared to locally owned firms. With regard to labour mobility, firms were observed to have gained and at the same time lost some of their professionals and managers, engineers and scientists, and other skilled and technically trained workers to other firms. Local firms employed more professionals and managers, engineers and scientists, and other skilled and technically trained workers than they lost to the foreign firms and joint ventures. This was an indication that locally owned firms benefited from spillovers associated with labour mobility. As an example, about 7.8% of the local firms lost their workers to wholly owned foreign firms and 8.8% to joint ventures. However, about 20.6% reported having employed workers from wholly owned foreign firms and 29.4% from joint ventures. A high proportion of workers left their jobs with foreign firms to start their own firms compared to that of the locally owned firms. The immediate implication of this observation is that foreign firms in Kenya's manufacturing industry serve as breeding grounds for local entrepreneurs. Demonstration effects also existed in the two industries. About 28% of the locally owned firms had demonstration effects from either wholly owned foreign or JV firms while about 67.9% and 43.6% of foreign firms had demonstration effects from wholly owned foreign firms and JV firms respectively.

To what extent do technological spillovers occur in Kenya's manufacturing industry?

The extent of technological spillover occurrence was determined using spillover index based on a gradual ordinal ranking developed in Chapter 2. The computed spillover index based on food and machine and engineering industries combined was approximately 3.30 indicating "average" spillover occurrence in Kenya's manufacturing industry – based on the two industries. These findings supported our hypothesis that in general knowledge spillovers do occur in Kenya's manufacturing industry. More spillovers appeared to occur in machine and engineering (3.36) than in food processing industry (3.25). The spillover index computed for the two industries from foreign firms was 3.48 indicating a relatively "high" spillover occurrence. The index computed for food processing was 3.45 while that of machine and engineering was 3.53 implying that more spillovers from foreign firms occurred in machine and engineering than in food processing. The spillover index computed for the two industries from local firms was 3.11, for food processing was 3.05 while that of machine and engineering was 3.19. This represented "average" spillover occurrence from local firms. A comparison done by T-Tests showed that the spillover indexes computed by ownership were different implying that foreign firms in general generated more spillovers compared to the local firms.

To what extent does the presence of foreign firms stimulate technological spillovers to locally owned manufacturing enterprises?

The analysis also investigated the extent to which foreign firms stimulated spillovers to the local manufacturing enterprises. Examination of spillover occurrence in the local firms from both foreign and local firms showed an average spillover index of 3.31 for the

two industries. Food processing and beverages had 3.27 while machine and engineering had 3.35. Although the spillover index for machine and engineering was slightly higher than that of food processing, the two industries have an average spillover occurrence. The index computed for spillovers occurring in local firms in the two industries from foreign firms only was 3.44. Food processing had 3.40 while machine and engineering industry had 3.46. The index computed for spillovers occurring in local firms in the two industries from local firms only was 3.19. Food processing had 3.14 while machine and engineering industry had 3.23. These results show that local firms in machine and engineering industry enjoyed more spillovers from foreign firms compared local firms in food processing. Moreover foreign firms generated more spillovers in the two industries in comparison to the local firms. Based on the new approach, considered in this study, the results obtained supported our hypothesis that knowledge spillovers occur in Kenya's manufacturing industry from foreign firms.

What kind of technological spillovers occur most?

By conceptualising spillovers in terms of technological changes, the results obtained showed that the kind of knowledge spillovers occurring most were in product changes followed closely by process changes and then changes in marketing strategy. Lowest spillovers seemed to be in management and organisation changes and in repairs and maintenance changes. These were interesting findings as they indicated that the existing spillovers were mainly in products and in process. Moreover, in all these kinds of spillovers, foreign firms generated higher spillovers compared to the local firms strongly supporting Teece (1977) argument that introduction of new products and production processes by foreign firms was likely to benefit domestic firms through accelerated diffusion of technology.

What are the mechanisms through which technological spillovers occur?

Examination of mechanisms through which technological spillovers occurred showed that competition and demonstration generated the highest level of spillover. Results of T-Tests showed significant differences between competition and demonstration and linkage and labour mobility implying that the first two mechanisms were important in spillover occurrence compared to the latter two. This is perhaps a clear indication of the weak linkage system and labour mobility as well as immature state (less supportive) of institutions in the manufacturing industry. T-Tests conducted by industry showed statistically significant differences in spillover occurrence by demonstration and backward linkage effects. The implication of this was that more spillovers occurred by demonstration effect in machine and engineering industry than in food processing.

The determinants of spillover occurrence are examined using binary and ordered logit technique.

In this chapter the determinants of spillover occurrence were examined using binary and ordered logit estimation techniques. Most of the determinants had the expected signs, were statistically significant and made intuitive sense. The data supported the hypothesis that spillover occurrence in Kenya's manufacturing industry was influenced by foreign presence implying that an increase in foreign presence increased spillover occurrence in firms. These findings are in accordance with the theoretical and conceptual framework formulated. The results are also supported by other empirical studies, which found foreign presence to be important in determining spillover occurrence.

The estimated results of firm characteristics had the expected results. Firm size, firm age and age of the machine had significant and positive influence on spillover occurrence. Spillovers were more likely to occur in large firms than in the small firms; in old firms

than in young firms and in firms with old production machinery than with young machinery. However, the firm age-squared had negative influence on spillover occurrence implying non-linear "inverted-U" spillover occurrence. Where maybe spillovers fail to occur in the young and in the old firms but occur in the middle aged firms. Results obtained on the Kenyan Asian firms showed that more spillovers occurred in firms owned by Asians compared to non-Asian firms in Kenya.

On infrastructure and institutional support, the data supported the hypothesis that interactions with business, private and public institutions were important for spillover occurrence. Although the variable interaction was not statistically significant in the binomial estimation, multinomial ordered estimated a strong positive marginal effect, which was statistically significant at 5%.

The variables for absorptive capacity had the expected results. The proportion of staff with university, polytechnic or vocational education, was important in explaining spillover occurrence. The results supported our hypothesis that skilled personnel are important for spillover absorption and assimilation. Low technology gap variable was also positive and significant in the two model estimations. This results supported our hypothesis strongly that low technology gap had a positive influence on spillover occurrence in the Kenyan industry. This is in accordance with spillover literature, which supports low technology gap – certain threshold, for spillover occurrence.

Results of firm strategy showed that a firm with strong strategy to constantly modify and upgrade its processing technology was more likely to obtain high levels of spillover occurrence compared to a firm without such a strategy. The training strategy in the firm was also important in explaining spillover occurrence. This supported the hypothesis that the more a firm undertakes technological training in the Kenyan industry the more the spillovers were likely to occur.

The results obtained with trade orientation were contrary to expectation. The marginal effects estimated for exports in the two models were negative and significant at 5% implying that exports had a negative influence on spillover occurrence. Spillovers seemed to occur to none-exporting firms. None exporting firms have a lot to learn and they are therefore likely to introduce many technological changes. Results of imports obtained with ordered logit were positive and significant meaning that spillovers were more likely to occur in importing firms than in non importing firms. By participating in imports, a firm was likely to increase its predicted probability of high level of spillover occurrence.

The results obtained from the two models estimated on labour market conditions were comparable. The labour market conditions, which were proxied by firm wages, had negative influence on spillover occurrence. These presented strong evidence that higher wages reduced spillover occurrence in Kenya.

As a conclusion, the findings in this chapter confirm occurrence of technological spillovers in the Kenyan manufacturing – at least based on food and machine, and engineering industries. The findings obtained motivate this study to attempt even a more comprehensive analysis of spillovers, their determinants and their effect on innovation by conducting in-depth analysis in a few selected case studies in the two industries studied here. By so doing we will clarify more concretely how the spillovers take place and most important why in some firms and not in others. This task is taken up in Chapter 6 and 7.

Appendix 5.1a: Labour Mobility: Analysis of Workers lost by Ownership and Industry

Local Firms	Number of cases Food	Number of cases Machine	Calibre of workers lost	Number of cases Food	Number of cases Machine	Workers lost to	Number of cases Food	Number of cases Machine
Lost workers to other firms	36 (65.5%)	35 (74.5%)	Managers and professionals	15 (27.3%)	6 (12.8%)	Foreign firms	3 (5.5%)	6 (12.8%)
			Engineers and technicians	26 (47.3%)	33 (70.2%)	Joint Ventures	3 (5.5%)	6 (12.8%)
						Local firms	36 (65.5%)	29 (61.7%)
						Start own firms	3 (5.5%)	10 (21.3%)
Foreign Firms	Number of cases Food	Machine	Calibre of workers lost	Number of cases Food	Machine	Workers lost to	Number of cases Food	Machine
Lost workers to other firm	45 (90.0%)	27 (96.4%)	Managers and professionals	38 (76.0%)	10 (35.7%)	Foreign firms	16 (32.0%)	4 (14.3%)
			Engineers and technicians	40 (80.0%)	25 (89.3%)	Joint Ventures	22 (44.0%)	8 (28.6%)
						Local firms	45 (90.0%)	25 (89.3%)
						Start own firms	21 (42.0%)	20 (71.4%)

Source: Tabulated from author's field survey 2003/2004

Appendix 5.1b: Labour Mobility: Analysis of Workers Employed by Ownership and Industry

Local Firms	Number of cases	Number of cases	Calibre of workers employed	Number of cases	Number of cases	Workers employed from	Number of cases	Number of cases
	Food	Machine		Food	Machine		Food	Machine
Employed workers from other firms	47 (85.5%)	46 (97.9%)	Managers and professionals	24 (43.6%)	12 (25.5%)	Foreign firms	7 (12.7%)	14 (29.8%)
			Scientists & Engineers	8 (14.5%)	10 (21.3%)	Joint Ventures	12 (21.8%)	18 (38.3%)
			Technicians & artisans	32 (58.2%)	37 (78.7%)	Local firms	44 (80.0%)	44 (93.6%)
			Others	2 (3.6%)	1 (2.1%)	Start own firms	-	-
Foreign Firms	Number of cases <i>Food</i>	<i>Machine</i>	Calibre of workers employed	Number of cases <i>Food</i>	<i>Machine</i>	Workers Employed from	Number of cases <i>Food</i>	<i>Machine</i>
Employed workers from other firms	49 (98.0%)	27 (96.4%)	Managers and professionals	40 (80.0%)	12 (42.9%)	Foreign firms	31 (62.0%)	11 (39.3%)
			Scientists & Engineers	24 (48.0%)	7 (25.0%)	Joint Ventures	20 (40.0%)	17 (60.7%)
			Technicians & artisans	42 (84.0%)	20 (71.4%)	Local firms	46 (92.0%)	24 (85.7%)
			Others	2 (4.0%)	0	Start own firms	-	-

Source: Tabulated from author's field survey 2003/2004

Appendix 5.2: Linkage Effects: Analysis by Ownership and Industry

Local Firms	Number of cases <i>Food</i>	Number of cases <i>Machine</i>	Kind of firms	Number of cases <i>Food</i>	Number of cases <i>Machine</i>
Has backward linkage	53 (96.4%)	47 (100%)	Foreign firms	22 (40.0%)	20 (42.6%)
			Joint Ventures	16 (29.1%)	13 (27.7%)
			Local firms	48 (87.3%)	39 (83.0%)
Has forward linkage	53 (96.4%)	45 (95.7%)	Foreign firms	13 (23.6%)	17 (36.2%)
			Joint Ventures	9 (16.4%)	9 (19.1%)
			Local firms	50 (90.9%)	44 (93.6%)
Foreign Firms	Number of cases <i>Food</i>	Number of cases <i>Machine</i>	Kind of firms	Number of cases <i>Food</i>	Number of cases <i>Machine</i>
Has backward linkage	50 (100%)	28 (100%)	Foreign firms	44 (88.0%)	16 (57.1%)
			Joint Ventures	28 (56.0%)	18 (64.3%)
			Local firms	48 (96.0%)	26 (92.9%)
Has forward linkage	50 (100%)	27 (96.4%)	Foreign firms	37 (74.0%)	12 (42.9%)
			Joint Ventures	20 (40.0%)	11 (39.3%)
			Local firms	48 (96.0%)	26 (92.9%)

Source: Tabulated from author's field survey 2003/2004

Appendix 5.3: Competition Effects: Analysis by Ownership and Industry

Local Firms					
Competition rating	Number of cases <i>Food</i>	Number of cases <i>Machine</i>	Competitor by kind of firm	Number of cases <i>Food</i>	Number of cases <i>Machine</i>
None	3 (5.5%)	-	Foreign firms	14 (25.5%)	12 (25.5%)
Moderate	6 (10.9%)	13 (27.7%)	Joint Ventures	19 (35.5%)	9 (19.1%)
Stiff	21 (38.2%)	22 (46.8%)	Local firms	52 (94.5%)	46 (97.9%)
Very stiff	25 (45.5%)	12 (25.5%)	Others	-	-
Foreign Firms					
Competition rating	Number of cases <i>Food</i>	Number of cases <i>Machine</i>	Competitor by kind of firm	Number of cases <i>Food</i>	Number of cases <i>Machine</i>
None	-	-	Foreign firms	33 (66.0%)	6 (21.4%)
Moderate	14 (28.0%)	7 (25.0%)	Joint Ventures	23 (46.0%)	16 (57.1%)
Stiff	29 (78.0%)	14 (50.0%)	Local firms	49 (78.0%)	28 (100%)
Very stiff	7 (14.0%)	7 (25.5%)	Others	-	-

Source: Tabulated from author's field survey 2003/2004

Appendix 5.4: Demonstration Effects: Analysis by Ownership and Industries

Food Processing					
Local Firms	Number of cases	Nature of firms	Number of cases	Kind of firms	Number of cases
With demonstration effect	36 (65.5%)	Competing firms	32 (58.2%)	Foreign firms	14 (25.5%)
		Ordinary firms	9 (16.4%)	Joint ventures	13 (23.6%)
		Supplying firms	7 (12.7%)	Local firms	33 (60.0%)
		Processing firms	6 (10.9%)	Others	-
		Distributing firms	2 (3.6%)		
Foreign Firms	Number of cases	Nature of firms	Number of cases	Kind of firms	Number of cases
With demonstration effect	47 (94.0%)	Competing firms	37 (74.0%)	Foreign firms	38 (76.0%)
		Ordinary firms	15 (30.0%)	Joint ventures	19 (38.0%)
		Supplying firms	17 (34.0%)	Local firms	38 (76.0%)
		Processing firms	32 (64.0%)	Others	-
		Distributing firms	9 (18.0%)		
Machine and engineering Industry					
Local Firms	Number of cases	Nature of firms	Number of cases	Kind of firms	Number of cases
With demonstration effect	42 (89.4%)	Competing firms	34 (81.0%)	Foreign firms	14 (29.8%)
		Ordinary firms	8 (17.0%)	Joint ventures	15 (31.9%)
		Supplying firms	10 (21.3%)	Local firms	38 (80.9%)
		Processing firms	8 (17.0%)	Others	-
		Distributing firms	4 (8.5%)		
Foreign Firms	Number of cases	Nature of firms	Number of cases	Kind of firms	Number of cases
With demonstration effect	27 (96.4%)	Competing firms	25 (92.6%)	Foreign firms	15 (55.6%)
		Ordinary firms	12 (42.9%)	Joint ventures	15 (55.6%)
		Supplying firms	10 (35.7%)	Local firms	22 (81.5%)
		Processing firms	9 (32.1%)	Others	-
		Distributing firms	2 (7.1%)		

Source: Tabulated from author's field survey 2003/2004

Appendix 5.5: Correlation Matrix of All the Independent Variables Used in the Analysis

	LFORPS	LPART	KASIAN	SIZE	AGE	MACHAGE	LCAPUTL	INFRSPT	INTERACTIONS	SKILL	TGAP	STRTPDCT	STRTPRCS	STRTRD	TRAINING	EXPORTS	IMPORTS	LWAGES	INDSTYPE
LFORPS	1.00																		
LPART	0.11	1.00																	
KASIAN	-0.35	-0.47	1.00																
SIZE	0.42	0.28	-0.49	1.00															
AGE	0.09	0.32	-0.46	0.35	1.00														
MACHAGE	-0.12	0.15	-0.19	0.22	0.55	1.00													
LCAPUTL	0.36	0.15	-0.21	0.41	0.32	0.04	1.00												
INFRSPT	0.002	-0.02	0.12	-0.13	-0.20	-0.45	-0.05	1.00											
INTERACTIONS	0.23	0.07	-0.14	0.25	0.14	0.09	0.15	0.24	1.00										
SKILL	0.08	-0.28	0.18	-0.25	-0.50	-0.47	-0.21	0.36	0.05	1.00									
TGAP	0.58	0.17	-0.43	0.42	0.16	0.09	0.27	-0.15	0.13	-0.17	1.00								
STRTPDCT	0.14	0.25	-0.24	-0.01	0.19	0.001	0.30	0.16	0.17	0.10	0.07	1.00							
STRTPRCS	-0.11	0.11	0.09	-0.18	0.12	-0.03	0.16	0.11	0.04	-0.16	-0.02	0.41	1.00						
STRTRD	0.31	0.32	-0.19	0.49	0.29	0.10	0.27	-0.06	0.27	-0.07	0.39	0.20	0.05	1.00					
TRAINING	0.22	0.007	0.12	-0.07	-0.46	-0.42	-0.02	0.19	-0.07	0.48	-0.03	0.02	-0.20	-0.05	1.00				
EXPORTS	0.38	0.29	-0.39	0.41	0.29	0.11	0.52	-0.12	0.28	-0.03	0.35	0.40	0.00	0.55	0.10	1.00			
IMPORTS	-0.16	-0.25	0.26	-0.15	-0.32	-0.11	-0.13	0.14	-0.24	0.18	-0.36	-0.06	-0.30	-0.29	0.07	-0.21	1.00		
LWAGES	0.32	0.24	-0.28	0.13	0.36	0.19	0.27	-0.06	0.19	-0.23	0.31	0.21	0.05	0.22	-0.22	0.31	-0.24	1.00	
INDSTYPE	-0.16	-0.45	0.46	-45	-0.43	-0.16	-0.22	0.01	-0.23	0.41	-0.20	-0.20	-0.29	-0.09	0.21	-0.20	0.26	-0.06	1.00

**Appendix 5.6: Determinants of Spillover Occurrence, Ordered Logit Analysis,
Food Processing and Machine and Engineering Industries Pooled**

Variables	Dy/dx	Change	Changes in Predicted Probabilities			
			Low	Average	High	Highest
LFORPS	1.678** (0.740)	<i>Marginal effect</i>	-1.07 e-07	-0.0130	0.0130	1.58 e-08
LPART	0.593 (1.092)	<i>Marginal effect</i>	-3.80 e-08	-0.0046	0.0046	5.59 e-09
KASIAN ^ψ	7.678** (3.156)	<i>None Asian to Asian</i>	-2.54 e-06	-0.2999	0.3000	5.14 e-07
SIZE ^ψ	3.448* (2.573)	<i>Small to large firm</i>	-7.95 e-07	-0.0184	0.0184	2.25 e-08
FIRIMAGE	0.440* (0.244)	<i>Marginal effect</i>	-2.82 e-08	-0.0034	0.0034	4.14 e-09
AGESQRD	-4.792** (2.779)	<i>Marginal effect</i>	-3.07 e-07	0.0372	-0.0372	-4.52 e-08
MACHAGE	0.307** (0.127)	<i>Marginal effect</i>	-1.97 e-08	-0.0024	0.0024	2.89 e-09
LCAPUTL	-4.610 (3.850)	<i>Marginal effect</i>	-2.95 e-07	0.0358	-0.0358	-4.35 e-08
INFRSPT ^ψ	0.370 (2.176)	<i>Poor to good infrastructure.</i>	-2.67 e-08	-0.0026	0.0026	3.14 e-09
INTERACTION S ^ψ	4.003* (2.273)	<i>None interactive to interactive.</i>	-2.10 e-06	-0.0125	0.0125	1.52 e-08
LSKILL	2.676* (1.645)	<i>Marginal effect</i>	-1.71 e-07	-0.0208	0.0208	2.52 e-08
TGAP ^ψ	8.937** (3.905)	<i>High tech. gap to low tech. Gap</i>	-8.78 e-05	-0.0418	0.0419	5.25 e-08
STRTPDCT ^ψ	-1.086 (1.923)	<i>No prod. Strat. to prod. Start</i>	5.07 e-08	0.0126	-0.0126	-1.55 e-08
STRTPRCs ^ψ	10.985** (5.068)	<i>No proc. Strat. to proc. Start</i>	-1.53 e-03	-0.0175	0.0191	2.33 e-08
STRTRD ^ψ	-3.284 (3.288)	<i>From no R&D To R&D</i>	8.83 e-08	0.1225	-0.1225	-1.69 e-07
TRAINING ^ψ	7.416** (3.144)	<i>No training to training</i>	-1.03 e-05	-0.0754	0.0754	9.78 e-08
EXPORTS ^ψ	-2.933 (2.205)	<i>None exporting to exporting</i>	-9.82 e-08	0.0789	-0.0789	-1.04 e-07
IMPORTS ^ψ	3.163* (1.659)	<i>None importing to importing</i>	-1.89 e-07	-0.0544	0.0544	-6.94 e-08
LWAGES	-2.640** (1.047)	<i>Marginal effect</i>	-1.69 e-07	0.0205	-0.0205	-2.49 e-08
_Cut1	-8.295					
_Cut2	13.111					
_Cut3	26.745					
Industry dummies	Yes					
No. of observations	73					
Log Likelihood	-18.008					
LR-Test	102.27 (0.000)					
Pseudo R ²	0.7396					

Note: Spillover index computed is taken as the dependent variable-proxy for spillover occurrence

(^ψ) dy/dx is for discrete change of dummy variable from 0 to 1

**, * represent 5% and 10% levels of significance respectively

Source: Computed from author's field survey 2003/2004

TECHNOLOGICAL CHANGE FROM FOREIGN FIRMS IN KENYA

6.1 Introduction

Chapter 6 presents ten detailed firm level case studies of foreign firms operating in the Kenyan manufacturing industry to illustrate the spillover process. This is intended to make a more comprehensive and qualitative examination of spillovers and thus supplement the empirical findings obtained in Chapter 4 and 5. The ten case studies selected included both wholly owned foreign firms and joint ventures (JVs). The case study firms were drawn from food and beverages, and machine and engineering industries. In Chapter 4, the two industries were shown to be the most dynamic with regard to high growth rate performance, VAD, contribution to GDP, FDI presence etc. In food and beverages industry, 6 firms were studied while only 4 firms were considered in machine and engineering industry. This chapter will attempt to provide individual firm level accounts based on the selected case study firms to illustrate the spillover process in the two industries chosen. This is done by examining the role played by foreign firms in stimulating learning and technological change in the locally owned firms with a possible accumulation of technological capability. The chapter is divided into six sections. Section 6.2 presents framework of analysis. In section 6.3, a brief analysis of foreign firms is presented. Section 6.4 presents the case studies in food and beverages industry while section 6.5 presents the case study illustrations in machine and engineering industry. Section 6.6 presents summary and conclusions of the chapter.

6.2 Framework of Analysis

In Chapter 2, we criticised the productivity technique due to its inherent weaknesses in examining the spillover process. An alternative analytical framework was used in Chapter 5 which enabled a rich examination of spillovers on the basis of occurrence mechanism, kinds and determinants. Taking a more qualitative approach, this chapter intends to illustrate the spillover process in order to improve our understanding of the actual spillover process on the basis of individual firm level accounts. However, before we proceed, it is important to point out some general and well known problems in dealing with spillovers. Although most of these problems will be explained in the relevant sections, we would like to provide an example in the context of food and beverages industry. The point we want to raise here is that spillovers from MNCs should not be assumed to always be good. Here, we have in mind a situation where domestic firms simply copy MNC products especially in food and beverages where high fat content, hormone and chemically based products are known for their negative health impact etc.

We now outline the framework to be followed in this section. On the basis of the analytical approach in Chapter 2 and 5, the spillover process involves activities (e.g. technological and innovation) in both foreign and local firms. Hence, it is extremely important to examine the spillover process from both sides. In this chapter, we will provide individual accounts of foreign firms while that of locally owned firms will be presented in Chapter 7. It should be pointed out from the onset that this exercise is not meant to quantify the amount of spillovers occurring nor is it meant to determine who generates more spillovers than the other with regard to foreign or locally owned firms.

Since that was done in Chapter 5, this chapter will only provide a qualitative illustration of the spillover process – e.g. by looking at the ways in which presence of foreign firms opens opportunities for technological spillovers¹¹⁸. A new analytical method introduced here, therefore, takes into consideration four conceptual elements extensively discussed in Chapter 2 and 5. A combination of these elements is expected to improve our understanding of the less understood spillover process in the context of least developed countries particularly so in sub Saharan Africa. This is expected to have wide ramifications for policy.

We look at each of the conceptual elements at a time. *First*, the case study makes an intensive examination of human resource development (training) undertaken in foreign firms. This is important due to the direct relationship it has with spillover occurrence. For instance, we can only expect spillovers due to mobility of staff from foreign firms if foreign firms have strong measures in place on human resources development. Hence, we try to examine the kind of training offered to the local personnel and its usefulness to their firms. Foreign firms are claimed to offer more training than locally owned firms. We equally attempted to understand the extent to which the training done, including other forms of skill enrichment programmes offered, might have resulted in accumulation of capability necessary to manage and operate production technology in the firm. Additionally, we also investigated whether the acquired experiential and tacit knowledge resulted in any hierarchical or upward mobility with regard to the local personnel. In order to understand whether technological skills and experiential knowledge acquired in foreign firms were transferred to the locally owned firms, considerable effort and time was put to examine labour mobility in foreign firms. Cases of mobility have been identified to result in technological spillovers (Gerschenberg, 1987; Behrman and Wallender, 1976; Pack, 1993; Ernst, Mytelka and Ganiatsos, 1998; Fosfuri, Massimo and Ronde, 2001; Lin and Rasiah, 2003). All these investigations were intended to provide insight as to whether foreign firms participated in the human capital development effort in manufacturing.

Second, we studied extensively various kinds of linkages formed by foreign firms. Linkages between MNCs and domestic firms are believed to be a strong mechanism of spillover occurrence (Hirschman, 1958; Lall, 1980; Rasiah 1995; Rodriguez-Clare, 1996; UNCTAD, 2002; Belderbos, Capannelli and Fukao, 2001; Smarzynska, 2003). We investigated and mapped out the linkages and networks that existed between firms and indigenous firms, institutions and business associations. The two classifications of linkages known to exist include pecuniary and non-pecuniary linkages. In both cases, forward and backward linkages can be traced. Pecuniary linkages differ from non-pecuniary linkages in that the former is considered to be purely monetary in nature. We examine the extent to which pecuniary linkages are formed. Further to the business advantages, pecuniary linkages are likely to be useful to the foreign firms in view of the feedback obtained which helps them make improvements on their products, processes, organisation and marketing approach. We also attempted to find out how pecuniary linkages formed with locally owned firms might have helped the growth and development of locally owned firms by providing them with capital to finance

¹¹⁸ However, in the context of long time series data this is a difficult exercise and one that is almost impossible due to limitation of the appropriate data. For instance few firms had time series data on human resource, labour mobility or linkages (e.g. domestic purchases). Time series data on training and even where it was done was impossible to get. More so it is extremely difficult to know where staff joined from or which firms they left to join. Similarly, it is difficult to know who the suppliers are over time.

technology, machinery and equipment etc. The demand or supply created by these MNCs sometimes creates new opportunities for locally owned firms to make improvements and/or introduce new investments. Non-pecuniary linkages were also studied. They included machine and engineering linkages (user-supplier relationships) and technical assistance through interactions with the local support systems such as business associations and institutions such as R&D/academic and financing institutions.

Third, competition between foreign firms and local firms was also extensively examined. This was done by investigating foreign firms in industrial sectors where MNCs were in competition with locally owned firms either for raw materials or markets. This is important in order to investigate the sources, intensity and effect of competition pressure. Competition between foreign and domestic firms creates pressure, which forces local firms to learn and build capabilities (Caves, 1982; Das, 1987; Wang and Blomstrom, 1992; Glass and Saggi, 2002). We examined technological changes undertaken by foreign firms as a result of this competition. This also helps us understand how local firms react to competition pressure from foreign firms in such industrial sectors making them survive. This could serve as a trigger effect to both kinds of firms reflecting occurrence of spillovers of knowledge, learning and capability building. In Chapter 7, we will explore this aspect by investigating whether locally owned firms are forced to learn something from MNCs and if so what and how? Do they introduce any technological changes? And if so what kinds of technological capabilities have been built as a result of these spillovers in the form of trigger effect? Competition pressure however, can also have some negative effects on the domestic firms such as crowding out of domestic firms. Also when competition shifts to advertising there can be a problem in that resources tend to be mis-allocated away from learning to compete and innovation (Chudnovsky, 1988). These issues will be examined in Chapter 7.

Fourth, in weak developing countries, locally owned firms have been known to benefit from substantial demonstration effects from foreign firms or imported machinery and technology as witnessed in the Newly Industrialised Countries in East Asian countries [see Fransman, 1985; Amsden, (1989: 1994); Lall, 1996; Kim, (1988: 1997); Ernst, Mytelka and Ganiatsos, 1998]. This was unlikely to be absent and had not received any attention in the Kenyan industry. Thus as a fourth element, we examined the extent to which foreign firms offered directly or indirectly to demonstrate their products, processes, marketing skills, management and organisation etc to the locally owned firms. We will attempt to find out from them whether their processes or products have been copied and/or imitated by the locally owned firms and if so to what extent that had resulted in learning, capability building and innovation. Note however that imitation can also have a negative impact when firms simply try to copy goods with no real competitive advantage apart from lower wages and this does not last if not accompanied by learning to innovate. This will be investigated in detail in Chapter 7.

The foreign firms included in the case study were selected on the basis of the descriptive and empirical analysis done based on the data collected from the firm level survey. 10 firms were selected; 6 wholly owned firms and 4 joint ventures. As noted in Table 6.1, six firms were selected in food and beverages while four were selected in machine and engineering industry. The firm selection criterion in the two industries was based on the nature of production technology as well as learning and innovation observed in the firms during the survey phase – the selection and technological characteristics of the firms considered are discussed extensively in sections 6.4 and 6.5. The case study involved face-to-face interviews with production managers and general scientists & engineers

[mechanics, technicians, artisans, craftsmen & maintenance crew] using semi-structured questionnaires comprising both closed and open-ended questions. The engineers provided information on technology while managers provided information on how prevailing government policies and incentive systems in Kenya influenced company's strategies.

In most cases, the MNCs allowed us at least a day to view their production processes and acquaint ourselves with the machinery and technology utilised right from raw material reception, processing line to warehousing. This created an opportunity to discuss openly with a wide cross-section of staff. At the end of such visits, firms' books, magazines and annual reports would be collected to beef up our analysis. In some of the firms, detailed interviews were conducted during the international trade fairs and agricultural shows¹¹⁹ where they often exhibited (demonstrated their products and processing techniques). If enough information was obtained for a particular firm then an organised firm visit was not requested. Similarly, useful information was obtained during marketing campaigns and promotions done by these firms in supermarkets, in restaurants and bars etc¹²⁰. We maintained active contacts with most firms during the analysis phase for two reasons: *First*, to clarify any queries that arose during the analysis phase. *Second*, to provide any extra information becoming available – which may have been missed during the case study period. Clarifications were sought regularly even for the details posted in the firms' Internet Websites. An equally important link was maintained with the Central Bureau of Statistics and investment promotion council to provide base line information for some of the firms¹²¹.

6.3 Brief Analysis of the Firms: Background and General Information

6.3.1 Food and Beverages Industry

Six foreign owned firms were interviewed in the food and beverages industry. **FBF2**, **FBF3** and **FBF5** firms were relatively old firms having been established in Kenya before her independence in 1963. **FBF1** and **FBF4** were established in 1970s while **FBF6** was established in 1980s. All the six firms are classified as large scale firms by Kenya's manufacturing industry standard. **FBF1** is a vertically integrated company involved with mass production of a wide range of consumer items ranging from cooking fats to versatile cooking oils, from laundry bar soaps to glycerine and from baking powder to detergent powder. **FBF2** manufactures a wide range of foods, home and personal care products. **FBF3** is involved in the production and distribution of alcoholic beverages, malt and glass while **FBF4** manufactures beverages, infant food products and culinary products. **FBF5** deals with extensive farming and agro-processing of fruits mainly

¹¹⁹ Two of such international trade exhibitions and agricultural fairs were attended in Nairobi and Mombasa.

¹²⁰ More information for some of the companies was obtained from friends of my friends. Organised drinks and functions were utilised e.g. churches and weddings and it was amazing how useful and informative such links and networks were.

¹²¹ Since most of the firms were not comfortable with their details being disclosed, confidentiality was assured. It is for this reason that the names of the firms studied during the case study could not be disclosed. However to people familiar with the manufacturing statistics (or involved with Kenya's manufacturing industry study) it is possible to make a right guess of some of the firms discussed. In such unfortunate and unlikely cases, the information taken from this research must be cited and must be used only for academic purposes.

pineapples and passion fruits for exports. **FBF6** manufactures and distributes carbonated brands of Cola, packages mineral water and a variety of fresh fruit juices.

FBF2, **FBF4** and **FBF5** are wholly owned affiliates of foreign MNCs. **FBF1** is 99.9% British owned with only 0.1% share remaining locally owned by a Kenyan of Asian origin¹²². **FBF2** is an affiliate of a European MNC conglomerate, which has over 529 companies worldwide with interests in mining, farming and manufacturing activities. The decision by the European MNC to invest in Kenya was prompted by the effects of Second World War which resulted in Britain encouraging its firms to invest in its colonies. As discussed in Chapter 3, the risks involved during the war made it impossible to ship essential goods from Europe to Kenya resulting in their scarce supply in the country as well as the East African region as a whole. To counteract this problem, the colonial government encouraged local industry to start manufacturing of the required goods. Kenya Industrial Management Board Organisation (KIMBO) was established to encourage and manage the establishment of start up manufacturing firms. Under its management, **FBF2** was established in 1949 to commence immediate manufacture of the needed goods. However, due to a lack of adequate local management and technical skills, the colonial government decided to invite the MNC into Kenya through the establishment of a subsidiary **FBF2** and as a strategic partner owning 50% equity share in 1953. Through **FBF2**, the European MNC was expected to bring in, its product and processing technology, management and organisation techniques as well as its marketing experience to the newly formed partnership. This supported the argument of MNCs ownership advantages [Caves, (1974: 1982); Hymer, 1976; Dunning (1973: 1993)]. After Kenya's independence, the shares initially owned by the colonial government were shared between the Kenya government and **FBF2**. By 1978, **FBF2** had bought and controlled 66% of the total shares while the Kenya government had sold and controlled the remaining 34% through its investment organ ICDC¹²³. In 2000, **FBF2** purchased the remaining government minority stake in **FBF2** from ICDC becoming a 100% wholly foreign owned subsidiary¹²⁴ of the European MNC. **FBF4** belongs to another European group of companies whose parent company headquarters are based in Switzerland. It has an extended branch of affiliates in Africa including South Africa, Ghana, Ivory Coast and Nigeria. The MNC was founded in Switzerland over 130 years ago following a successful search for infant formula.

FBF5 is one of the most successful large scale agro-processing subsidiaries of MNC in Kenya. Its history and evolution dates back to 1948, when a local canning firm, Kenya Cannery Limited (KCL), was established in Kenya to produce, process and supply tropical fruits to the growing demand in the European market. One of such tropical fruits whose demand was extremely high at the time in Europe was pineapple. The local firm was the main pineapple processing and exporting firm in Kenya. In 1965, an American based MNC was invited to assist in processing and management of pineapple operations. The two firms entered into an agreement in that the American MNC through its formed affiliate – **FBF5** would assist in the processing and management of the

¹²² **FBF1** had no parent affiliate and was thus a stand alone foreign firm in the Kenyan industry.

¹²³ ICDC was noted earlier to have been instrumental in facilitating joint partnership between locally owned firm and government with MNCs.

¹²⁴ As a result of its in-house R&D supported by the parent company and through mergers and acquisition, **FBF2** recorded tremendous expansion over time. For instance in 1987 **FBF2** acquired two firms, which were involved in the manufacture of fast moving personal care products in the region. In 2002 **FBF2** also acquired Bestfoods affiliate firm in Kenya after its parent firm acquired Bestfoods worldwide operations in 2000.

pineapple operations for KCL. However, three years later, **FBF5** acquired majority shares in KCL and assumed full control and management of all the operations.

FBF3 and **FBF6** were joint venture firms. At its inception, **FBF3** was a 100% foreign owned firm but with no foreign affiliate. The public was however, invited for the first time to become shareholders, when the firm was declared a public company in 1934. **FBF3** ownership structure by 2002, was 54.0% Kenyan owned and 46.0% foreign owned by Guinness international/Diageo – an Irish based MNC. Local firm employees and members of the general public in Kenya held the remaining stake, 54%. As a result, **FBF3** is therefore a publicly quoted firm on the Nairobi stock exchange with an impressive market capitalisation of approximately KShs 50.0 billions and over 110 million shareholders¹²⁵. The Irish MNC partners, Guinness International provided **FBF3** with technical advice on production technology, management and organisation expertise, marketing skills and human resource development as will be shown at a later stage. **FBF6** is jointly owned by South African Beverages Company (SABCO – 73% and Industrial and Credit Development Corporation (ICDC – 27%). SABCO and ICDC acquired the firm from its American owners in 1995¹²⁶. SABCO contribution to the joint venture was mainly in technology, distribution and market development and staff training. The firm produces under license from the USA owners of the soft drink brands, which are among the world's most well known beverages.

With regard to performance, **FBF3** had the highest turn over of KShs 27.7 billion in 2002, Tables 6.1 and 6.2. The firm was also among the highest contributor to the exchequer in Kenya with KShs 13.29 billion payment in the form of indirect taxes and KShs 1.10 billion as income corporate tax, Table 6.7. According to the annual company reports, **FBF3**'s total assets were in excess of KShs 17.99 billion. **FBF2** had a turnover of KShs 8.04 billion making it also one of the largest firms in fast moving consumer goods in East Africa. Its revenue contribution to government exchequer was in excess of KShs 1.5 billion. This reflects the participatory role the firms play in Kenya's economic development. **FBF4** had approximately KShs 5.97 billion while **FBF1** had KShs 5.79 billion with fixed assets worth over KShs 1.5 billion. **FBF6** had annual turn over of about KShs 6.30 billion with total fixed assets amounting to KShs 1.50 billion. **FBF5** had more than KShs 10.0 billion invested in fixed assets but had an annual average turnover sale of KShs 4.97 billion (See Table 6.1 for more details).

With regard to product market orientation and exporting experience, **FBF5** had the longest export experience spanning over 60 years. With over 90% of its processed pineapples meant for export mainly to Europe, **FBF5** enjoyed being one of the Africa's largest exporters of pineapples to the European market. It ranked among top five exporting firms in Kenya – in this case one of the largest foreign exchange earners to the country. **FBF5**'s biggest export markets are the United Kingdom, Italy, Germany, Belgium and France. Other markets include Spain, Netherlands, and the rest of Europe. This was expected to increase with the accession of the new members from the Eastern Europe block to the European Union. The regional market (that includes Kenya and COMESA region) accounted for approximately 10% of the firm's total sales. **FBF2** had equally a long history of exporting spanning over 40 years. The firm's products enjoyed a

¹²⁵ In 2004, **FBF3** ranked as the second fastest growing company on the Nairobi stock Exchange (NSE) after Kenya Oil Company (According to the Kenya Daily Nation of 30-8-2004).

¹²⁶ During apartheid in the 1980s, SABCO as was the case with other companies, was prevented from investing abroad and thus grew by acquiring businesses domestically.

strong dominance in the regions major export destinations that included East Africa and the Central African region. Limited quantities of some of **FBF2** manufactured products were exported to the European Union market. **FBF3** exported approximately 34% of its products to both the immediate region and African market as well as in the international market – this included new export destinations such as USA, Europe and Canada. **FBF1** has been exporting for about 14 years. The firm exported 15% of its total sales. Their main export destination is the COMESA regional market and throughout the East and Central Africa Region. **FBF4** products are sold in Kenya where it has a relatively high market share for its products and in the immediate region (within East Africa region). The firm also exports some of its products beyond East Africa to other countries of the COMESA region. Export markets outside Africa included Middle East and Britain. **FBF6** has an export experience of over 10 years to the COMESA region.

Firm Code	Year Established	% of Capacity Utilised	Number of Employees & (Expatriates)	Professional & Technicians	MNC Affiliate	% Foreign Ownership	Main Product(s) Manufactured	Appr. Sales Turnover (Mn KShs)	% of Sales Exported	Main Export Destination	R&D (% of Sales)
Food and Beverages											
BBF1	1976	65	606(8)	10	Stand Alone	99.9 <i>Britain</i>	Edible oils & cooking fats, baking powder, laundry soap & detergents	5,790	15	COMESA Countries	0.20
BBF2	1953	82	1,265(15)	53	Yes	100 <i>Britain/Dutch</i>	Food; Homecare and Personal care products	8,035	25	East & Central Africa, Europe	0.26
BBF3	1922	80	1474(20)	28	Joint Venture	54 <i>Ireland</i>	Beer, Wines and Spirits, Malt and Glass	27,700	34	COMESA, (Africa), Europe, USA, Canada	0.80
BBF4	1970	80	430(4)	30	Yes	100 <i>Switzerland</i>	Milo, Chilli, Milk Products (Culinary products)	5,968	48	COMESA Countries, Europe	0.23
BBF5	1948	70	2,720(20)	15	Yes	100 <i>Italy</i>	Pineapples, fruit juice e.g. passion	4,968	98	Europe & USA	0.46
BBF6	1987	80	714(40)	10	Joint Venture	72 <i>USA/J.S. Africa</i>	Soft Drinks, mineral water, fruit juice	6,300	40	COMESA countries	0.37
Machine and Engineering											
MCEF1	1967	65	521(28)	24	Yes	100 <i>USA/J.S. Africa</i>	Metal cans, seals, bottles tops	3,200	5	COMESA	0.36
MCEF2	1965	65	110(10)	55	Joint Venture	60 <i>Britain</i>	Cooking line products, dish washing sanitary products	1,100	3	East Africa Region	0.89
MCEF3	1975	60	284(3)	38	Joint Venture	62.3 <i>USA/Japan</i>	Motor vehicle assembly, parts and accessories, vehicle service	3,879	7	Uganda, Tanzania, Rwanda	0.17
MCEF4	1952	70	106(1)	13	Yes	100 <i>USA</i>	Metallic drums, plastic drums	1,000	9	East and Central African Region	1.55

Table 6.1: Basic Data and Information on Foreign Firms Interviewed, Kenya, 2002-2004

Table 6.2: FBF3's Comparative Yearly Accounts (Figures provided in Millions KShs)

	1996	1997	1998	1999	2000	2001	2002	% Change
Gross Turnover	22,351	22,953	25,778	25,249	25,448	26,813	27,734	3.43
Indirect Taxes	12,005	12,103	12,905	12,409	12,534	12,844	13,290	3.47
Net Turnover	10,346	10,850	12,873	12,840	12,914	13,969	14,444	3.4
Operating Profit	1,651	1,374	2,219	2,361	1,974	2,512	3,256	29.62
Interest Rec'ble	23	37	153	8	14			
Interest Payable	(401)	(386)	(398)	(254)	-190			
Profit Before Taxation	934	1,158	494	1,507	1,798	2,499	3,400	36.05
Taxation	(429)	(251)	(166)	(379)	(623)	(947)	(1,100)	16.32
Profit After Taxation	506	907	327	1,128	1,175	1,552	2,300	48.20
Minority interest	(88)	(36)	96	52	59			
Profit attrib to S/holders	418	871	231	1,076	1,234	1,500		
Dividends	(328)	(393)	(562)	(655)	(717)			
Retained Profit	90	478	-331	421	517			
Net Sales (Bn)	10.35	10.85	12.87	12.84	12.91	13.96	14.97	3.43
O/Profit (Bn)		1.51	0.74	1.75	1.97	2.51	3.31	
PBT (Bn)		1.16	0.49	1.51	1.79	2.49	3.16	42.94
EPS	6.45	13.29	2.82	11.49	12.91	14.88	21.27	27.78
DPS		6	6	7	7.5	9	11.5	

Source: Compiled by the author from groups annual reports for various years.

6.3.2 Machine and Engineering Industry

Four large scale foreign firms were considered for our case studies in machine and engineering industry. Out of the four, three of them (**MCEF4**, **MCEF2** and **MCEF1**) were established before 1970. **MCEF4** was actually established in Kenya in 1951 but began its actual processing operations in 1952. **MCEF2** was established in 1965 while **MCEF1** was established in Kenya in 1967. **MCEF3** was relatively younger having been established in mid 1970s. Upon establishment, a **MCEF4** core business was to manufacture steel drums using steel rolls sourced both locally and externally. During the period 1970s-80s, the firm diversified its operations to include plastic drum manufacture. Nevertheless, the manufacture of steel drums accounts for 60% of the total production while manufacture of plastic drums accounts for 40%. While **MCEF3** was established with the sole aim of procuring, assembling and selling motor vehicles, **MCEF1** production activities included making of metal cans (53%), seals (25%) and making of bottle tops (22%). Products manufactured by **MCEF2** included cooking line products, dishwashing products, sanitary products etc.

Two of the firms studied (**MCEF1** and **MCEF4**) were wholly owned subsidiaries of foreign firms. **MCEF1** was established in Kenya as a 100% affiliate of a British owned MNC. However, in 2002-3, **MCEF1** was acquired by South African MNC firm itself an affiliate of a world-wide conglomerate with interest in a wide array of manufacturing interest. **MCETF1**, a wholly foreign owned firm, is jointly owned by Europe and South Africa. **MCEF4** was established as a 100% owned affiliate of an American MNC. In 1998 the firm merged with a Finnish company but broke up after two and a half years. A North American company with interests spread worldwide, acquired **MCEF4** parent company with all its group companies worldwide. Thus, since 2003 **MCEF4** started its operations under the new North American owners. The remaining firms **MCEF2** and **MCEF3** were joint venture firms. **MCEF2** was a joint venture with local equity 40% and

foreign equity of 60%. **MCEF3** was a joint venture with approximately 52% local equity shares and 48% foreign equity shares. However, in 1998 there was a change in the ownership status when the foreign shares increased to 60%. Official secondary sources indicated that in the period before 1998, the government sold a substantial amount of its shares to **MCEF3** retaining a local equity share of 37.7% and foreign equity share of 62.3%. The foreign equities are shared between USA and Japan as follows: The American MNC owns the majority equity interest at 57.7% and undertakes the management and technical responsibilities of the joint venture company. A Japanese MNC owns 4.5% of the equity interest. The rest of the equity shares are locally owned as follows: the government of Kenya owns 20% through an investment organ, the Industrial and Commercial Development Corporation (ICDC). The remaining 17.8% are owned by the industrial and commercial Development Company, Investment Company (ICDCIC), a publicly owned company and an affiliate of ICDC.

Assessing performance in terms of sales turnover, it is noted that in 2002, **MCEF1** and **MCEF3** had turnover in excess of KShs 3.0 billion with total fixed assets of KShs 6.5 billion and KShs 0.65 billion respectively. **MCEF4** had a higher turnover than **MCEF2** and had fixed assets of about KShs 12.0 million. With regard to exporting experience, all the firms had export experience spanning over 20 years with the exception of **MCEF4** whose export experience by 2002 was below 15 years. Interestingly, all these firms targeted the regional market for their export products. The markets included the East African countries, COMESA and sometimes the SADAC region.

6.4 The Case Studies of Foreign Firms in the Food and Beverage Industry

In this section, we present the case study illustrations of the spillover process in the food and beverages industry following the framework of analysis outlined in section 6.2 above. Presence of foreign firms was observed to have stimulated spillover occurrence to domestic firms supporting our theoretical and empirical approach in Chapter 2 and 5. This section starts by outlining in detail the selection procedure of each of the firms considered.

6.4.1 Firm Selection and Justification: Emphasis on Production Technology, Learning and Innovation

As indicated above, the choice of firms to be included in the case studies was based on production technology, learning and innovation. We therefore targeted specific firms whose production technology appeared important in human capital development. Similarly, we targeted foreign firms that seemed to have the mechanisms which stimulated locals employed to accumulate tacit and experiential knowledge – that is normally acquired through on-the-job training and learning by performing. If the locals are observed to have acquired tacit and experiential knowledge from foreign firms, we can then argue concretely that learning by participating in the firm's production activities does contribute to the development of human capital in the industry. The tacit and experiential knowledge accumulated could benefit local firms in the form of knowledge spillovers when such workers leave their jobs with foreign firms to join locally owned firms – or when they leave to become own entrepreneurs. The extent to which this phenomenon takes place is examined from the perspective of local firms in Chapter 7.

We now turn to individual firms and offer explanation as to why they were selected. **FBF1** was selected as it utilised the most sophisticated technology in its sector. However

all of it was acquired from abroad – mainly from Europe. As a result of its state-of-the-art production technology and the scale of operation, **FBF1** posed stiff competition to the locally owned firms in its sector. Another interesting factor that influenced the choice of this firm was the need to have at least one stand alone firm in our case study – stand alone in the sense that it did not have a foreign affiliate. The analysis done in Chapter 5 showed that many stand alone firms operated in the Kenyan manufacturing industry. Hence, consideration of **FBF1** in our case study would enable us to compare stand alone firms and MNC affiliates with regard to opportunities they create for spillover occurrence.

FBF2 was the most advanced firm in its sector. It uses completely foreign technology, machinery and equipment for its manufacturing activities. Given its wide set of manufactured products, **FBF2** operated many processing lines and had several refineries located in different cities. The firm utilised over 80% of the total capacity installed. Since the firm is considered to be one of the leading MNC firms in its sector, we provide a brief discussion of its processing technology which we observed. In 1989, **FBF2** installed a major edible-oil refinery sourced from Germany. The installation was done by the suppliers – a German company known as LURGI – who are among the world leaders in the supply and installation of edible oil refineries. This was a sophisticated plant whose processing technology was computer controlled and as explained, comparable to those used in Europe. The plant consisted of three main components: a continuous deodorising – stripping plant, pre-treatment equipment and an oil blending system. The continuous deodorising/stripping plant was the most innovative component process introduced in the new plant. It enabled **FBF2** to operate a continuous process as opposed to the conventional batch type used before. With the innovation introduced, **FBF2** was capable of deodorising different types of vegetable oils at high quality level. The second component of the plant serves to pre-treat oil by removing unwanted colour and any traces of metal ions present before it was fed through the deodorising column. This process innovation had actually been patented by the parent company. At the time of installation, **FBF2** was among the first subsidiaries to utilise it. The third innovation was a sophisticated oil-blending component that enabled **FBF2** to produce many blends of oil. The advantage of production technology introduced was capacity expansion and flexibility enhancement. The flexibility of the process enabled rapid introduction of product changes as dictated by dynamics in the market – changing consumer tastes and preferences such as changes in shape, sizes and packaging. Products of meeting international quality standards could be produced.

Turning to the training and learning acquired from the refinery process, the firm indicated that both training and learning commenced with the installation of the refinery and were a continuous process. Locals were involved in the entire process from plant installation to commissioning. The local personnel involved included senior managers, production and machine operators, and engineers and technicians from the engineering and maintenance department. Note also that earlier, a few engineers had been sent for training abroad to acquire experience with the machine suppliers. The engineers from the suppliers spent several weeks introducing locals to all the stages through formal trainings and in the form of discussion forums. A lot of emphasis was attached to production operations and routine maintenance. Much time was therefore spent with the production operators (machine operators) and the engineers and technicians who would later ensure that the operations of the installed machinery and equipment were smooth and efficient. Tremendous production capability has been built. Over time the engineering and maintenance department had accumulated capability and could handle most types of trouble shootings, make minor modifications, undertake major overhaul and do

maintenance and repair most of the plant components. An international link is maintained with machinery suppliers for consultations and technical support in cases of major breakdown.

The product technologies used in this firm were also fully foreign. The firm does not involve itself with serious search of product technology. The search activities to introduce new or improve the products are left with the parent company abroad. In actual fact, the firm confirmed that the parent company was the main driver of product technological knowledge and innovation. Nevertheless, the firm spends a substantial amount of money on R&D which is only in quality control, materials and chemical analysis. This money is spent adopting¹²⁷ the international products to the local conditions, tastes and preferences. Therefore, the local workers are trained on how to manufacture the products following the innovations done abroad. Unfortunately, much of this training was on know-how but not know-why. There was also technological learning from quality control practices. The quality control department was very strong and well equipped for analytical purposes. The firm had adopted Total Productive Maintenance (TPM), a Japanese model that allows continuous improvement in quality and management aspects. TPM ensures, total employee involvement, total equipment effectiveness and total absence of wastage. **FBF2** was awarded ISO 9001 certification in 2000 for quality management, ISO 14001 certification in 2001 for strict adherence to environmental management and Occupational Health and Safety Assessment Series (OHSAS)¹²⁸ 18001 in 2003.

FBF3 was also selected as it utilised processing technologies that were quite sophisticated despite being completely foreign. The implication of this is that the firm does not undertake major process innovation as foreign technical partners are maintained as the sole sources of core processing technology. As a result of high technology used, scale of operation and human capacity possessed, this firm poses stiff competition to the other firms in its sector. The firm enjoyed several bottling lines due to its wide portfolio of alcohol products. We provide an example of a processing technology used in one of **FBF3's** subsidiaries which manufactures beer. At the time of this research, the firm launched its fourth and the newest investment in quality and capacity. This was a KShs 1.4 billion state-of-the-art bottling line with a filling capacity of 66,000 bottles per hour, making it 200% more efficient than previous lines. The bottling line manufactured by KHS in Germany was the most modern and according to the production manager only a few breweries in Africa enjoyed such technology in bottling. Accordingly, this process innovation enhanced quality of beer, improved packaging efficiency, reduced beer loss and was more energy conserving. The Germany firm was involved in the installation of the ultra modern bottling line including all the civil work.

The firm contended that investment was not only made in the line and equipment installation, but also on staff training for the new line. Given that the line was more technically advanced than all the previous lines, staff training was extremely inevitable. The plant comprised a highly integrated computer controlled process that required a thorough mastery by local staff in order to operate it. The firm therefore lacked the

¹²⁷ This supports the fact that foreign firms do not conduct much R&D in developing countries [Lall, (1979: 1980); Patel and Vega, 1999; Amsden, Tschang and Goto, 2001; Rasiah, 2003].

¹²⁸ Through OHSAS, the firm had reduced the consumption of fuel oil, water and electricity by over 50 % per ton of production in the last five years. At the time of receiving this certificate the firm had recorded over 500 days accident free.

required skills at the onset to operate it. Experts from KHS¹²⁹ Germany were engaged in training the local production staff for several months. The KHS engineers left after the local staff had acquired skills and accumulated the necessary technological capability to manage and operate the bottling line. As explained during the interviews, the production staff spent an estimated 40,000 man-hours training sessions for the bottling new line. The firm contended that the training was aligned to international standards of best practice and once trained; the staff was capable of operating any world-class bottling lines. Locals were introduced to the entire process management (machine operations, trouble shooting procedures, maintenance and safety procedures). This indicates that technological spillovers pertaining to process technology occurred as a result of tremendous training offered by the foreign expatriates. This discussion supports the argument that spillovers of technological learning in firms could equally result from imported technology and machinery as it does from mobility of workers internationally. If these workers later left their jobs with **FBF3** to join locally owned firms, the locally owned firms would then benefit spillovers as well.

As far as product technology is concerned, the firm acknowledged the importance of innovation and thus undertakes R&D. As a result of in-house R&D the firm had acquired enormous product technology that enabled it to manufacture its own brands of alcoholic beverages. As far as product technology is concerned, the staff had learnt and accumulated experience over time as a result of continuous training.

FBF5 was selected as it utilised the most advanced technology to process its products in the fruit processing and packaging sector. Although most of the production technology utilised by **FBF5** was fully foreign, some of it was a combination of local and foreign. The firm was operating over 70% of the total installed capacity. The firm uses a large electronic 'Ginaca' machine for efficient processing of pineapple fruits. Local personnel had been trained and were operating the machinery. The locals had also been trained to operate the sugar recovery plant that was used to extract high-grade refined sugar from waste pineapple skins. At the time of this research, **FBF5** had just acquired two new machines, Moeller MCCS, for pineapple processing sourced from South Africa. These machines were capable of removing the fruit skins, wash, slice and can the fruits¹³⁰.

FBF5 has a well-equipped engineering unit (technical workshops) capable of making simple to complicated fabrications. This department was also the custodian of technical equipment used for technical training, which this firm offers. Virtually all the technical operators were Kenyans who had either been trained in-house or externally and had accumulated engineering experience over time while on the job through learning by doing or through interaction either formerly or informally. One of the remarkable innovations of this unit was a massive 120-feet-span boom harvester. Another significant innovation was that of manufacturing fumigants that were more adapted to the local terrain among other local conditions. The department had also introduced many other minor innovations that included mechanical slicers, crushers and sterilizers/coolers. Every modification introduced was tailored to fit the equipment to the local needs. The fabricated equipment were usually more reliable, cost effective and were easily serviceable. A second workshop is also maintained to deal with maintenance and regular servicing of the firm's fleet of motor vehicles and tractors used in the firm. These

¹²⁹ KHS Kisters was a German firm involved in the manufacture of processing lines for foods, beverages etc.

¹³⁰ Locals had to be trained not only to operate the machinery but also to manage it. For hygiene purposes and to comply with international requirements the MCCS are housed in specially constructed cabinets of stainless steel to prevent corrosion.

examples support the argument that locals learnt from the technology and machinery used in the foreign firms. The firm maintains an R&D unit partly maintained as a laboratory for conducting agronomic tests and as quality control laboratory. The firm had acquired an ISO 9002 quality certification as part of its quality assurance strategy.

FBF6 also utilised quite sophisticated and state-of-the-art bottling lines that were fully foreign for its soft drink production. Most of the machines and technology were sourced from Europe (Germany-France) and partly from South Africa. At the time of this interview, the firm was installing a newly acquired machine equipment expected to improve the production efficiency. Engineers from South Africa were involved in collaboration with the firm engineers, supervisors and technicians. This indicated that with respect to process innovation, the firm does not undertake any innovation. The firm relied on foreign technical partner for the supply of machinery and equipment with guidance from the brand suppliers. Although the firm had a strong foreign technical arrangement for regular maintenance of machinery and technology, it however maintained a separate engineering unit responsible for ensuring smooth processing operations and for undertaking routine repairs and maintenance.

The firm maintains three major sections for the purpose of soft drink manufacture: bottling unit, syrup preparation unit and water treatment unit. The firm enjoyed four fully operational bottling lines. Operations in one of the lines were highly sophisticated with its activities coordinated by a computer-programmed robot. The Robot could load empty bottles from their crates and place them on the washing line and at the same time remove filled bottles from the filling line and place them into emptied crates for dispatch to the warehouse. In each of these sections different kinds of learning existed. With regard to bottling, locals were trained on all the bottling stages¹³¹. The staff in the syrup preparation and water treatment section had also learnt a lot by doing and from formal training. The implication of this is that should staff leave in future to join domestic firms, they would share skills and other forms of spillovers of knowledge they have acquired from these trainings.

The firm has no R&D department. Whenever new products have to be launched, **FBF6** relied on the brand suppliers for product innovation and technology. Product R&D was done abroad, mainly from the MNCs home country. The R&D done involved improvement of the existing flavours or development of new ones which are then licensed to **FBF6**. **FBF6** however, maintains a well-equipped laboratory with modern analytical capabilities to make sure that the quality of the brands was maintained. The brand suppliers audit the performance of this laboratory, a process that has made the firm improve its production and quality control capability tremendously. Quality control management was monitored through out the entire value added chain. This included standard laboratory for performing normal analytical tests and monitoring efficiency of the entire process. The laboratory was therefore manned by highly qualified staff most of whom held degrees in food science, biochemistry or micro-biology. Employees in this department are intensively trained and are all local staff. To ensure quality standards, the department makes sure that the raw materials received are of the expected quality by subjecting them to tests. The ingredients, syrup and microbial tests are done. The bottles are randomly sampled for analysis from the process, filling lines and taken to the laboratory for analysis and examination. The products are also followed in the market for

¹³¹ The process begins with washing and rinsing of the bottles. This is followed by filling the bottles with the soft drink. This is done after the syrup is mixed with purified water and then carbon dioxide added using a machine called carbonator. The bottles are then capped using metal caps. Then there is a final inspection before storage in the warehouse awaiting delivery to the market.

analysis (market survey) just to make sure that they reach the intended customers in the right and expected quality. This also ensures that locational variation in, say weather, handling during and after transportation does not affect the initial quality. Although the firm did not have ISO standard they claimed to follow standards set by the brand suppliers, which were higher than ISO standards. Nevertheless, the firm had quality assurance certification from KEBS.

6.4.2 Human Resources Development and Labour Mobility

This section examines firm level training and labour mobility in the case study firms selected in the food and beverages industry. Firm training has positive and direct correlation with spillover occurrence. Technological training leads to human capital accumulation which in itself enhances firms' absorptive capacity necessary to absorb and assimilate knowledge, skills and ideas. Interesting cases of firm training and labour mobility which resulted in spillover occurrence were found. This supported our theoretical arguments in Chapter 2 and our empirical finding in Chapter 5 that training and labour mobility stimulated spillover occurrence to the locally owned firms.

6.4.2.1 Human Resources Development (Firm Training)

All the foreign firms emphasised the importance of human capital development in their operations. The firms contended that rapidly changing technologies, competition and continuously changing quality control requirements forced them to be conscious of human resources development particularly staff trainings. The firms had created human resources department with budgets set aside for training purposes including other forms of self-enrichment programmes. The firms studied devoted approximately 10% of their annual payroll for training purposes. We highlight a few examples of how firms viewed technological training. **FBF2** reiterated the importance of continuous improvement of employees if it had to keep up the pace of a sustained improvement of its quality management systems, effective marketing and efficient delivery of products to the market. **FBF3** contended that strong human capital was the driving force behind its steady productivity and performance. It was therefore committed to continuous staff training and up-skilling particularly due to the complexity of technology and machinery used for its operations, rigorous marketing operations needed and high management and organisation standard required. Similarly, both **FBF4** and **FBF5** acknowledged the importance of strong human capacity for their production operations, organisation and co-ordination. Both firms therefore place much emphasis on human capability development through trainings and through offering other forms of human resource enrichment programmes. The firms' employees were assessed annually for their training needs (capacity development needs) and in line with their career/promotional expectations. Due to its large workforce, **FBF5** operated a diverse training programme meant to cater for everybody from field worker in the firm's plantations, technical and processing personnel to managers and professionals.

Four forms of trainings were identified during the interviews. In the *first* case, staff benefited on-the-job training. *Secondly*, the training was offered in-house but in a training department. *Third*, the training was offered externally, either in an external training department/institute or in the local training institutes. *Finally*, training involved external trainings done outside the country (abroad and/or overseas). The firms studied depicted at least more than two of the four forms of training outlined. As observed in Box 6.4.1, **FBF2** is a good example of a foreign firm with training policy that reflected all the four forms of trainings outlined. We address each one of them at a time. The on-the-job training was the most common form of training witnessed in all the firms studied. It

involved all kinds of staff training and differed from firm to firm. However some kind of trainings were notable: training on machinery operation and maintenance, safety precautions, how to diagnose trouble shootings, cost and energy saving measures, quality control management.

The *second* form referred to training done in house and in the firm's own training department. While **FBF1** had a rather simple training unit, all the other firms (**FBF2**, **FBF3**, **FBF4**, **FBF5** and **FBF6**) had well-established in-house training departments where employees underwent staff training. For instance, **FBF2** had a separate department for human resource development and training headed by a full director. The department was responsible for identifying the needed capacities and then organise training and other forms of human development needed. This way, the firm offered continuous training at all employment levels with a policy that each employee must attend some form of training at least three times in a year. **FBF3** had a human resources department for human development purposes. The employees were therefore subjected to intensive in-house training. External trainers and subject matter specialists were regularly invited to offer trainings in-house. The trainings offered were diverse and could range from quality to process control and management or from individual attitude towards work to market labour conditions and trade disputes. Managers and professionals also attended regular courses on good corporate governance principles and code of best practice. **FBF4** and **FBF6** had their training designed and supported by their parent companies. **FBF6** has a human resources department headed by a human resources manager. Each department has capability heads and section heads below them. By involving the capability heads and section heads, each section conducts skill gap analysis to assess capability needs of the staff. On the basis of the skills gap analysis, appropriate training is then recommended. The human resource department then takes over and organises for the required training to fill in the required capabilities and to improve existing capabilities. In-house, the firm has a routine schedule of training. Every member of staff must go through such trainings a few times in a year.

The *third* form of training identified involved sending staff to the firms' external training departments or to the local training institutions. **FBF2** had an organised external training with the local training institutes and business associations. The firm also organises intensive training seminars in secluded places where full board hotel accommodations are organised in different locations from the firm and away from the cities so that everyone fully concentrates in the training conducted without having to leave the premises. This was commonly done with marketing. Due to **FBF3** commitment to staff technological training and up-skilling, if certain skills are required, the employees are sent for training, sometimes externally in the local technical training institutions. **FBF5** sends its employees for training in some of the local training institutions such as Kenya or Mombasa polytechnic. At the time of this interview the firm had over 50 of its staff taking such courses with Kenya Polytechnic. **FBF6** sponsors staff to go for external training such as science and technical training courses with national polytechnics. In all the cases studied the staff were allowed to attend regular staff enrichment programmes organised externally say with KAM, KEBs or KIM.

Box 6.4.1

Human Resource Development: The Case of FBF2

FBF2 is a wholly owned subsidiary of a European MNC. It was established in Kenya in 1953 for the manufacture of food, home and personal care products. With regard to training, **FBF2** reiterates the importance of continuous improvement of employees if it has to keep up the pace of a sustained continuous improvement of its quality management systems. From the interviews, the firm is fully aware of the fact that skilled labour force is the driving force of its innovative activities, manufacture of high quality products and their efficient delivery to the market.

In this light, the firm advocates for critical on-the-job learning. It has a special induction programme for new employees. The experienced staff train by demonstration to the new ones and the less experienced. **FBF2** has separate department for human resource development and training headed by a full director. This department is involved with identifying the needed capacities and then organises training including other forms of human development needed. This way, the firm offers continuous training at all levels where each employee must attend some form of training at least three times each year. The training is either done in an in-house training department or externally in one of the local training institutes. Intensive training seminars are also offered in secluded places where full board hotel accommodation are organised far away from the cities so that everyone fully concentrates to the training without having to leave the premises.

FBF2 also attempts to tap into international resources by offering trainings internationally. This is done in liaison with the parent company, which proposes and often provides additional and advanced training programmes. It is important to mention that technical and other professional managers who are Kenyans are among those who have benefited in this programme as they are periodically sent on international training courses, which take place at the parent company. Similarly, under the management of the parent firm, the subsidiaries have an international exchange programme that serves as a means of training as well as providing other forms of human capacity building at other affiliates of the MNC (parent company's subsidiaries). Many Kenyans including senior managers have and are still regularly sent for international exchange programmes. For example between 2000 and 2002 about 10 managers had attended an exchange programme in other countries such as England and Netherlands in Europe and South Africa, Ghana, Ethiopia and Uganda in sub Saharan Africa.

Through these trainings and long experience garnered at work, Kenyans have acquired the necessary technical and managerial capabilities and have risen to become departmental managers and in some cases full directors. For instance, the corporate affairs director was a Kenyan who had acquired tremendous experience after having worked with the parent group of companies for over 27 years in different countries. He had worked and undergone training with other subsidiary of this MNC in Europe. The marketing and sales manager was also an indigenous Kenyan who had spent most of her career in commercial functions in **FBF2** and its parent company in Kenya and in Europe respectively for over 16 years. The supply chain director and human resource development and training manager were also Kenyans who had risen through the ranks to their current positions as a result of immense training offered to them as well as experience gathered after many years working with **FBF2**.

The *fourth* form of training also included external trainings but this time in the immediate region (regional training institutions) or abroad. Regional training occurred mainly when the parent company decided to have a regional training institute for all its subsidiaries for instance in East and Southern Africa. Exchange programmes also occurred regularly where staff would be sent to the group branches to spend some time for training purposes. All the firms studied sent their staff abroad – mainly technical personnel and professionals for specialized courses or to attend exchange programmes. However, **FBF2**, **FBF4**, **FBF5** and **FBF6** attempted to tap into international resources more prudently by offering trainings internationally with their parent companies as well as through organised exchange programmes (between 2000-2002 about 10 managers from **FBF2** attended such exchange programmes – see the Box 6.4.1). **FBF4** had a very elaborate training that included overseas training and regionally coordinated training. In the region, employees are trained within the countries in the region like Zimbabwe and South Africa. Overseas training involved taking staff to Europe and mostly in the groups' headquarters in Switzerland. Senior professionals interviewed (Human resources manager and the Production manager) claimed to have undergone multiple specialised trainings abroad, often Europe (mainly Switzerland, Britain, Germany and Netherlands).

The firm had also an organised exchange programme, where professionals would remain in a different country for sometime ranging from a few weeks to several months undergoing training. For instance, during the interviews, the firm had a visiting production manager from South Africa who would remain there for some months. Experienced engineers and professionals from the firm would even go to train in other countries in the region. The production manager was reported to have traveled to Zimbabwe to conduct technical training. As an exporter, **FBF5** asserts a lot of importance in tapping into the global knowledge pool by sending staff for training overseas. Additionally, employees are sent abroad to other affiliates/subsidiaries of the parent MNC firm to acquire practical experience or undertake further training. This is done on a regular basis and every year about five employees are selected to attend the programme. **FBF6** employees are also sent for trainings outside the country e.g. with regional training headquarters in Africa. Fortunately, when South African Brewing Company (SABCO) acquired this firm, training and development of all staff was one of the major priorities. This resulted in the establishment of a regional learning centre in Nairobi, which was officially opened in 2001 with complete conference centre fully equipped with lecture theatres and a separate unit where business simulations could be conducted as part of experiential learning. The regional training centre is supposed to cater for the East African Division that comprises Ethiopia, Kenya, Mozambique, Tanzania and Uganda. This is expected to build entrepreneurial skills for both staff and customers.

This discussion indicates that all these firms recognise the importance of human resources development in which case they reciprocated by offering training and other forms of staff enrichment programmes. Secondly and perhaps the most important is that the foreign firms offered training to the locals (Kenyans). This has for instance enabled them to operate sophisticated machinery; manage production and other logistics including marketing. In all the companies, local staff had even assumed higher ranks in the management levels in some cases becoming full directors. As an example, **FBF5** had an annual assessment policy for human resources and skill development needs that enabled Kenyans to take up senior management posts in the firm. The training programmes offered in this firm had resulted in tremendous human capability development. It is important to emphasise that trainings have often been awarded in line

with career development or promotional expectations. The local personnel in this firm have accumulated enough experience over time in profession and in technical aspects. Some of them have become professionals and technical experts with good mastery of their work. In the past two years, the number of expatriate employees has dropped from 20 to 9, all of whom held highly technical or senior management positions. The firm's management generally saw this as an indication of effective transfer of technology by the MNC. **FBF6** had a similar policy to groom in-house senior workers. The seniors are supposed to take charge of that. As an example, two of the main departments were headed by Kenyans who had undergone in house training. There were indications that more senior positions were going to be occupied by Kenyans. A good example is that of assistant planner who joined after finishing his A-level studies in 1983. After having worked with them for 20 years he had been trained, acquired experience and then promoted to the present position of senior assistant planner. As a planner, he had been trained on many things ranging from raw material planning to production scheduling. The direct implication of training offered in foreign firms is that when staff leave their jobs and later join local firms, spillovers are likely to occur. The next section attempts to examine labour mobility and opportunities created for spillovers to the domestic firms.

6.4.2.2 Labour Mobility

In the above section, we examined the trainings offered in the firms studied. Next we examine the labour mobility in the same firms. However, we must point out from the onset that details of workers mobility were scarce, as firms did not document such information. Hence, in addition to information obtained from the human resources personnel we had to rely on production managers and other old members of staff in the service for any information and cases they were aware of. We asked them to recall if the firms had lost or received any professionals, scientists, engineers and technicians. This was important to us as this would indicate the level of spillovers through mobility of staff. From the interviews, labour mobility was detected to be substantial from the firms' studies. The firms had lost and at the same time received workers from other firms¹³². The workers who left could be classified as productive with long standing experience; such included managers and professionals, scientists, engineers and technicians. This was interesting since this category of workers is normally the one associated with generation and diffusion of knowledge¹³³. Among the staff that left, many examples were cited where staff had left to join locally owned firms. It was also noted that these firms had acted as breeding grounds for local entrepreneurs. Local people having acquired work experience and training left the firms to start their own firms. We now look at outward and inward mobility of workers separately.

With regard to outward mobility, all the firms studied had lost staff to other firms. For instance, **FBF1** had lost a professional to a local competitor in edible oil industry. **FBF4** also indicated to us that it had lost multiple workers to other companies before which included locally as well as foreign owned firms. Some of the key-manufacturing firms, which benefited skilled employees from **FBF4**, included **FBF3** which benefited engineers from **FBF4**. Other manufacturing companies included Unga group and **FBF2** where they have many workers who joined having worked with **FBF4** for several years. Such professionals included marketing and management executives. Once again the recipient firms included not only the manufacturing firms but also firms in the services industry. **FBF4** had cases of personnel who equally left but to join the service industry.

¹³² The firms had lost and received workers from both computing and non computing firms in both manufacturing and service industry.

¹³³ The skilled personnel including professionals are believed to have accumulated experiential and tacit knowledge and would thus be instrumental in carrying and diffusing knowledge and skills.

Nevertheless, the examples provided were of staff that left to join firms in the service industry like Safaricom and Kencell¹³⁴ at the managerial and professional levels. At the time of interview these firms were foreign firms. This observation was interesting as it indicated mobility of workers between foreign firms and thus labour mobility can not therefore be restricted only to the movement of employees from foreign firms to the locally owned firms.

Turning to inward mobility, these firms also received professionals and skilled workers from other firms in the economy – the caliber of these employees included mainly technicians, craftsmen and artisans. For instance, **FBF3** had received a few professional workers and skilled engineers from subsidiaries of MNC firms operating in the country. When SABCO closed its operations in Kenya, **FBF3** inherited professionals and most of the technically skilled staff. Similarly, **FBF3** received staff from other firms in the service industry. As an example, the group-managing director in 2004 had worked for Standard Chattered Bank Limited, a British owned bank in Kenya, as the Executive Director of Finance responsible for Kenya, Uganda and Tanzania. Having served in this position and in addition to other senior positions in finance department had enabled him to acquire and accumulate invaluable experience in finance and management. He had enjoyed various specialised trainings organised both locally and abroad. He joined **FBF3** as the finance and strategy director before being appointed to become the overall group-managing director.

FBF3 also received staff from Guinness International. An example was cited where the previous group manager was from Guinness International. The group finance and strategy director joined from Irish Life PLC where he was the director and chief financial officer. Another example was that of a professional from Guinness UDV who sat in the board of directors and held the group deputy chairman portfolio. As a result of tacit and experiential knowledge acquired while working with MNC, all the people referred to were instrumental in introducing valuable changes pertaining to production, marketing, organisation and management. This example also supports the argument that at least foreign firms in Kenya serve as a 'supply' source of professional expatriates to the local labour market.

FBF5 had equally received staff from other firms. An interesting example was provided of the firm's chief executive who was an Italian born but had lived in Kenya since 1972. He was a Ph.D. holder in Business Administration from Florence University and had a degree in agribusiness marketing and management from Harvard Business School, USA. He established an edible oil-processing firm, which was later bought by a locally owned firm, **FBL1** discussed in Chapter 7. He also helped establish another branch of a MNC dealing with production of breakfast products. When he left this MNC in 1993 he worked as a consultant for private and government agro-industrial developments in the East African region. This continued until he was appointed as **FBF5's** chief executive in 2000. This example demonstrates knowledge spillovers from mobility of workers in the Kenyan manufacturing industry.

These examples support the argument that labour mobility exists from and within the Kenyan manufacturing industry. The examples also support the argument that mobility of workers leaving their jobs with MNC affiliates can result in spillovers of knowledge given that the staff considered here are managers and professionals and technically skilled personnel¹³⁵. Many firms indeed contended that as a result of immense training offered

¹³⁴ Safaricom and Kencel were two key companies in the mobile phone industry – service industry.

¹³⁵ This category of staff is generally regarded as the carrier of skills and knowledge.

and experiential tacit knowledge accumulated on-the-job, such workers resulted to spillovers of knowledge to the firms hiring them with possible accumulation of technological capability. Nevertheless, this will further be investigated from the angle of the local firms in Chapter 7. It was noted that those who left their jobs were attracted by high salaries offered to them by the receiving firms in other sectors of the economy or competing firms in the manufacturing industry.

In Box 6.4.2 and 6.4.3 we present individual and fascinating accounts of mobility of workers from **FBF2** and **FBF6**. With regard to inward mobility of workers, both firms received professional and highly skilled personnel who helped introduce technological changes including training of the locals. Outward mobility had also interesting cases of professionals and other skilled personnel leaving to join the local labour market with potential implications of spillover occurrence.

Box 6.4.2

Labour Mobility: The Case of FBF2

Inward Mobility of Workers

With regard to employment of workers from other firms, **FBF2** contended that it only employs workers from other firms only in rare cases when certain skills or specified professionals were needed. In this case, the firm confirmed that a few highly skilled workers and professionals had joined **FBF2** from affiliates of other MNCs in the country such as **FBF6**. The low absorption of professionals from other firms could be explained by the fact that when specific skills are needed they are usually contracted from the parent company in Europe or from subsidiaries of the parent company in other countries. For instance, in 2002 **FBF2** had over 15 non-Kenyan technical and other professional employees who included those on full time employment as well as those on international exchange programme from subsidiaries of the parent company in other countries. Out of the 15 non-Kenyan employees in the managerial category, 10 were technical while 5 were non-technical. In addition to learning from **FBF2** most of the technical and other professional managers under the international exchange programme in turn shared their skills by offering training on lacking skills in-house or provided other forms of human resource development.

Examples of non-Kenyans who were highly qualified technical and non-technical professionals were noted during the interviews. In 2000, the affiliate's chairman was from Germany who had a wealth of experience for over 30 years in sales and customer service positions acquired from the parent firm in Europe and from its subsidiaries in South East Asia. The chief executive was a Nigerian who had also worked and acquired immense experience working with the parent company in many countries where the MNC has subsidiaries. The technical director was also a German, a doctorate and a diploma holder in chemistry and chemical engineering respectively with over 22 years experience as factory manager in various countries in Europe. The commercial director responsible for finance was a British with equally long-standing career in Europe and Africa working with subsidiaries of the parent company. Apart from these senior positions other technical levels also benefited professionals from other countries e.g. Europe, South Africa and India. The most important thing here is that in all the cases the professionals concerned shared their experiences and skills with **FBF2** local staff. The foregoing confirms that **FBF2** enjoyed skills, trainings and knowledge acquired from local and international mobility of workers.

Outward Mobility of Workers

With regard to workers leaving **FBF2**, several examples were cited where trained and experienced workers had left to join other firms including competing firms or had opted to become entrepreneurs by opening up their own businesses. As explained, experience and tacit knowledge acquired while working in the **FBF2's** marketing department had enabled many people to become distributors with this firm, open up retail shops or supermarkets while others had started simple products manufacture. This showed that **FBF2** had acted as a breeding ground for local entrepreneurs by a way of providing entrepreneurial skills. A technical person involved in soap production had also left the firm to join a competing locally owned firm. When he joined the local firm, the firm started producing soap very close to **FBF2's** own. He was the brain behind the product as well as the process technology. This example confirmed that training and experience is usually gathered while working with MNCs and that knowledge spillovers do occur through mobility of workers.

Similarly, it was confirmed that over 10 senior employees in the marketing department (well trained and highly experienced marketing managers and sales representatives) had in the past left **FBF2** to join other firms locally and in the region. A marketing manager had left to join British American Tobacco (B.A.T – a USA based MNC) to take up a senior position as the head of East and Central Africa region. The managing director of one of the leading supermarkets in the country at the time (Uchumi Super Market) was a former professional employee of **FBF2**. He was behind the re-organisation and management changes at the supermarket. A sales manager had also left to join a cigarette firm in Tanzania and was in charge of two East African countries – Tanzania and Uganda. The sales managers' of Reckitt and Colman, and Unga were former employees of **FBF2**. Mobility of workers from this firm was not only restricted to the manufacturing industry as many staff had also left to join other services like banking such as Citi bank or telephone companies such as (Safaricom and Kencell companies). A senior sale representative claimed that "experience acquired in **FBF2** was second to none making it obvious that most of the staff would only leave when destined for high salary and better fridge benefits, which would often be the case given that firms looking for them were after their skills".

Box 6.4.3

Labour Mobility: The Case of FBF6

Inward Mobility of Workers

FBF6 has a strong policy of employing fresh graduates from universities or polytechnics who often joined as graduate management trainees. Lower and semi skilled workers were employed from high school. The firm only preferred employing staff from other firms only when there were specific skills or professionals they were looking for. In this case, therefore, staff employed from such firms must be highly experienced, and thus most of them could come from other subsidiaries of MNCs in the country. Such professionals would then be paid high salaries accompanied with better fridge benefits.

Outward Mobility of Workers

FBF6 confirmed that it had lost many of its workers in the past to other firms in manufacturing as well as service industries. The workers lost mainly included professionals and managers as well as engineers and technicians – skilled and experienced workers. The firm contended that those who left their jobs were attracted by high salaries offered to them by the competing firms in the manufacturing industry or in other industries such as the service industry. The firm contended that as a result of immense training offered and experiential tacit knowledge accumulated on-the-job, such workers resulted in spillovers of knowledge to the firms hiring them.

Several examples were provided of staff who had previously worked in the firm but later on left to join other firms in other sectors of the economy. A sales representative, who had worked, trained and acquired experience while working with the firm left to join a local competing firm in the soft drinks industry (**FBL2**). When he joined this firm, he was promoted to become the marketing manager in-charge of all the distribution and marketing activities (this will further be explained in Chapter 7). Another sales representative left to join a competing joint venture firm in a beer brewing company¹³⁶ (**FBF3**). At **FBF3** he supported the marketing activities – he organised very successful beer promotion campaigns at a time when **FBF3** was facing stiff competition from a subsidiary of South African MNC. He was rewarded for his marketing innovativeness. A senior professional who was a group finance manager had also left to join a local Kenya Bus Company in the local transport industry. A channel manager had also left to join a local telephone company (service industry) as a marketing manager. The list of examples was endless including companies like Firestone, Standard Newspaper and many firms in the first moving consumer goods (FMCG) industries.

6.4.3 Linkage Effects

We attempted to map out and examine linkages formed by each of our case study firms. We also examined interactions between these firms and other systems of innovation such as business associations, public and private institutions. We identified both pecuniary and non-pecuniary forms of linkages. Pecuniary linkages seemed more dominant than the non-pecuniary linkages. This is however expected given that most of the subsidiaries in food and beverages industries were technology users.

The firms considered in our case studies contended that demand created and purchases made helped spur growth, investment and expansion to locally owned firms as it provided them with capital. To the foreign firms the feed back obtained through these linkages were important in that they helped them introduce changes on their processes, products and even marketing techniques. For example, **FBF5**¹³⁷ has developed good backward linkages with some sectors of the economy. Metal cans for pineapple packaging, for instance, are produced at an adjacent company (**MCEF1**), while cartons,

¹³⁶ Although this firm is in the beer industry, it is referred to as a competing firm since it started producing Malta Guinness which eats into the non-alcoholic market.

¹³⁷ **FBF5** is located 500 Km inland from the Indian Ocean. It is approximately 1,500 m above sea level with an average temperature range between 12 and 13 degrees centigrade and an average annual rainfall of 900 mm. The firm has considerable backward and forward linkage system. Of the total leased area, 5,250 ha is under pineapple cultivation, irrigated from dams and rivers and yielding an average of 270, 000 tonnes of fruit annually.

labels, spare parts and provisions for the cannery and plantation are purchased from various domestic manufacturers. With over 5,000 employees, **FBF5** was a major economic force within Thika, one of Kenya's major industrial towns. The economy of the town is closely tied to the performance of **FBF5**.

Non-pecuniary linkages identified included linkages with the firms in the machine and engineering industry (user-supplier relationships). However, given that the firms relied on foreign suppliers for their core production technology, local technical links with locally owned firms were only limited to maintenance, repairs and sale of simplified machine and engineering equipment. An appropriate analysis of the two kinds of linkages could not be undertaken due to data constraint. Firms did not have or did not want to disclose data, which would enable us to examine trends in any kind of linkages and thus we just present a general discussion. We make no effort to separate the two kinds of linkage in our discussion. From the angle of foreign firms, local firms seemed to have acquired skills and spillovers of knowledge through the linkages formed and existing interactions. They audit their local suppliers (**NBF4**) regularly. They are involved in offering training to appointed co-packers of their products especially in food safety and marketing operations and advertising services. They are also involved in fixing prices for the co-packers. **FBF5** has a local company, which does packaging for it. The firm stations some of its experienced personnel there to oversee the operations. These personnel have offered training in the locally owned firm, quality control and production management. However, the extent to which these might have resulted in accumulation of technological capability in the locally owned firms is investigated in Chapter 7 from the angle of local firms.

In addition to the linkages mapped, we also identified interactions with the local support systems such as business associations, private and public institutions such as R&D/academic, financing institutions and government regulatory organisations and enforcement agencies. Through these interactions, skills and knowledge were shared, including technical assistance. We provide a few examples here. All the firms (**FBF1**, **FBF2**, **FBF3**, **FBF4**, **FBF5** and **FBF6**) in our case studies were very active members of KAM. For instance, the chief executives of **FBF2** and **FBF5** were board members of KAM where they shared their expertise. The executive committee members of the KAM comprised chief executive officers from some of these firms (**FBF4**, **FBF2** and **FBF5**). The managing director of **FBF4** was the chairman of food and beverages sector. The chief executive officer of **FBF2** was the chairman of the social, legal and regulatory committee while the chief executive of **FBF5** was the chairman of the industrial linkages committee charged with stimulating collaboration, linkages and strategic alliances in the industry. It is interesting to note that all the chief executives were foreigners who in their capacities definitely shared their wide experience through their participation. This could include labour ethics, corporate governance, policy lobbying technique, intellectual property rights etc.

Some of the firms also interacted with the MSK. The mission of MSK is to "project, promote and uphold marketing as a vital ingredient for success and prosperity." Two of MSK's council members were drawn from **FBF2** and **FBF6**. Through MSK, annual competitions open to firms in the industry or services are free to enter. The competition categories involve best launch for new products or services, marketing effort and strategies, best innovation of product brands or services, best development of existing product brands etc. Through these competitions firms exchanged skills and ideas. Another institution that firms interacted with was Kenya Institute of Management (KIM). Firms participated in their annually organised company of the year award

(COYA). Firms compete in various categories such as sound financial management, innovativeness and creativity, quality management, environmental management and information management and marketing management. **FBF3** was a several times winner of the COYA award. Similarly, all firms interacted with government regulatory bodies such as Kenya Bureau of Standard (KEBS), Federation of Kenya Employees (FKE) and Monopolies and Prices Department. For instance, all the firms interacted with FKE for labour issues and disputes. Also, all firms participated in the development of standards with KEBS. They needed to achieve Kenya Quality Award (KQA) as well as Diamond Mark of Quality all awarded by KEBS. KEBS in collaboration with SGS awards ISO 900 series for implementation of Quality Management Systems (QMS) and ISO 14000 certification for implementation of Environmental Management Systems (EMS). KEBS also organises for quality competitions for the award of Kenya Quality Award (KQA) – **FBF2** was a winner of KQA. Other memberships included KIRDI (**FBF2**), with Kenya Dairy Processors Association (**FBF4**), KIPI (**FBF3**) and local micro financial institutions (**FBF6**) etc.

On technology development the country lacks strong R&D to support industry innovation and technology development, as there was little involvement of universities research work in industrial activities. The firm has to rely on external sources for innovation and technology development. Nevertheless, the firms participate in human capital development in the country. Firms (e.g. **FBF3**) offer competitive academic scholarship to students pursuing higher education. The firms offer industrial attachment annually where graduates from local universities and polytechnics can have their industrial attachment. The firms sometimes offer jobs to the best candidates after completion of their industrial attachment and degree programmes. **NBF4** contended that it worked closely with the University of Nairobi by offering internship and later absorbed some graduates in food science technology. **FBF5** offers technical assistance in a unique way. It works closely with the Government's Management Training and Advisory Centre, the Directorate of Industrial Training and Kenya Polytechnic in developing its training programmes. The firm's full-time training manager organises internal courses, which are supplemented by the on-going local management programmes conducted by reputable local firms. At any time, about 40 students are enrolled in trade and technical apprenticeship programmes. The company is usually able to retain about 80% of its apprentices, with the rest being absorbed by other industries.

In addition to the above discussion, we provide some detailed accounts of linkages and interactions in **FBF2** and **FBF3**. This is done in Box 6.4.4 and 6.4.5 below.

Box 6.4.4

Linkage Effects: The case of **FBF2**

FBF2 integrated production process is supported by good forward and backward linkages. With regard to backward linkages **FBF2** has economic relationships with enterprises engaged in primary processing, farming, packaging, electrical/electronic, machine and engineering and chemical industries. Given the innovativeness of **FBF2**, it means that its suppliers must not be left behind. As a requirement in the ISO certification, the entire supply chain must be considered. **FBF2** therefore encourages all its suppliers to introduce appropriate changes such as quality control and safety measures. **FBF2** also encourages its suppliers to develop environmentally sound processes and materials. Whenever possible; **FBF2** sends staff to train the staff in the

local supply firms. Local firms have also benefited from demand created by **FBF2** that has enabled most of them to grow and expand.

On the side of forward linkages, the company deals with local distributors and retailers, food manufacturing industries and service industry (hotels, insurance and business promotion companies). It is important to mention that **FBF2** offers special training to all of them that cuts across a number of issues: customer relations, safety, handling of goods and efficiency at services delivery. When new products are being introduced, several demonstrations and trainings must be held. These are wide ranging and include demonstrations on how to prepare recipes using the new products or how to do laundry using new soap products. Specifically, the training introduces them to ISO, OHSAS and TPM requirements with main focus being quality standards and management, safety, services and production. All the trainings must be adhered to at all times, levels and inspection are conducted routinely including ad hoc spot checks using cameras, just to make sure that the training provided are complied with. The distributors, managers and supermarket attendant confirmed having received intensive marketing training from **FB1** personnel.

The firm also engages the services of specialised international firms that deal with logistics and distribution. As an example, the firm contracted the distribution services of a MNC firm in 1996 following the recommendation of its parent company in Britain. The parent company had entered into a contract to have this logistics MNC deal with distribution activities of all its subsidiaries worldwide. The MNC was a UK-based international company that provides physical distribution and logistical support services for major retailers and MNC manufacturers. With regard to **FBF2**, its activities involve purchasing **FBF2**'s products, and delivering them to the major retailers such as the big leading supermarkets in the country. In simple terms, the firm acts just like the warehouse for the **FBF2** and does all the dispatch of the products. It transports the products to the distributors and this is supposed to be within 24 hours time. Distributors are many and the firm has an extensive network of trained distributors located all over the country. **FBF2** pioneered in engaging the distribution services of this firm in Kenya as it did in engaging a promotion company to advertise its products. This has had demonstration effects as other firms in food and beverages and machine and engineering industries engaging the services.

With regard to interactions, **FBF2** interacts with R&D institutions, universities/polytechnics and business associations. The R&D institutes that interact with **FBF2** include KEBS, KIRDI and SGS. Personnel from **FBF2** have been very instrumental in setting standard with KEBS and KIRDI. The firm participates in preparation of training modules for other firms in certain trainings organised by local institutes in things like quality management. The firm also interacts with business associations such as KAM, FKE, EPZA, CMA and KNCCI. It is also a member of MSK. Some of the employees serve as the resource persons during seminars organised by either business or trade associations. It is also a member of Agricultural Society of Kenya (ASK) and regularly exhibits its products on the show ground. Other firms benefits the skills demonstrated by **FBF2** while lobbying for certain policies. Through these interactions, **FBF2** shares with other firms its experience in lobbying for certain policies from the government, corporate policy, quality management programmes. It urges them to work towards a clean and sustainable environment for future generation. It co-operates with other stake holders for the purpose of improving overall environmental performance.

Linkage Effects: The Case of FBF3

FBF3 also maintains both backward and forward linkage system. **FBF3** maintains a strong international linkage with the suppliers of the machinery and equipment. Nevertheless, **FBF3** also maintains backward linkages with the local machine and engineering industry from which it out-sources the procurement/storage/delivery of a large number of engineering spares parts that fall in the following categories: mechanical and hardware, electrical items, bearing and seals, conveyor belts and chains. Usually **FBF3** invites expressions of interests from interested firms who feel capable of offering this service. Then the firms submit documentations clearly indicating stocks held, financial data over the last 3 years, management structure, information technology (IT) capability, experience in outsourcing etc. Based on the information submitted a few firms are selected and invited to submit detailed proposals for consideration of the spares outsourcing contract. This process helps the local firm to engage in the process of technological capability building.

FBF3 (through its maling firm) maintains a strong link with barley farmers. For instance, the firm's agricultural officers have introduced a new certified barley variety that was more capable of resisting barley related diseases and required less dressings compared to the other varieties grown in Kenya. The variety was resistant to barley yellow dwarf virus, which usually wipes entire barley. The variety had 20% more yield than other barley varieties. The firm produces enough barley for the Kenyan market. It also exports to Seychelles, Uganda and Tanzania. The firm spent KShs 1.2 billion on promoting and facilitating the growing of malt barley to its contracted growers with 63% being paid to the barley farmers.

With regard to forward linkages, **FBF3** maintains very strong links with buyers of its products. Beer distribution is a kind of three-tier beginning with brewers and importers, wholesalers, retailers – retailers include supermarkets, retail shops and pubs, hotels and lodges. **FBF3** organises training at various levels. The bar attendants are as well trained. These linkages are equally beneficial to **FBF3** for their knowledge feedback, which has enabled it to maintain a continuous improvement of its products. **FBF3** has also established strategic marketing linkage (international distribution channels) distributors in Europe, Canada and United States. Participation especially in the international export market has offered the group new learning effects (global exposure). The kind of learning got from this firm includes international marketing logistics, gathering market intelligence etc.

As far as interactions are concerned, **FBF3** is a member of KAM. Through this membership forum, the firm lobbies for certain industrial policies to be implemented such as tax reduction on soft drink sales and imported machinery etc. It interacts with KEBS and KIRDI both of which offer technical and professional assistance. KEBS regularly audits quality control and offers recommendations. **FBF3** also interacts with KIPi. **FBF3** sends its staff to participate in trainings offered by KEBS or KIRDI for instance on quality control or ISO requirements. **FBF3** participates in competitions organised by KIM to determine innovativeness and firms exercise good corporate governance. **FBF3** has won company of the year award two years in row and most respected company organised by Price water house and Nation Media group. **FBF3** allows students from local universities and polytechnics to have industrial attachment with them. In this regard, **FBF3** supports human capital development in the country. **FBF3** offers education support more directly by maintaining scholarship programs.

FBF3 runs a project in which it offers computers (enhance computer literacy) to high schools and trainings teacher on IT. This is organised with the firm's computer partners Computer Point and Micro Soft, which supplies all the licensing for the software at no cost. The schools are selected on the basis that they would be in a position to offer training to the students.

The firm also participates at international level competitions. Some of the **FBF3** beer products have won gold medal award at an international competition organised by "Monde Selection International Institute for Quality Selection" – an official institution established in 1961 in Belgium for universally maintaining high standards of beverage and foods produced for human consumption. All products are subjected to exhaustive laboratory test and analyses by leading experts in the field. **FBF3** success was based on frequent staff training, continued investment in state-of-the-art equipment for the brewing process and use of fine beer ingredients obtained in Kenya.

6.4.4 Competition Effects

In this section, we analyse the existing competition between foreign firms and locally owned firms. Most importantly, we examine the intensity of competition pressure exerted by foreign presence. In the sectors considered, foreign and locally owned firms competed fiercely with each other. Nevertheless, due to the dominant position of foreign firms with regard to their scale of operation and technological capability, foreign firms often out-competed the domestic firms often triggering them to upgrade by introducing necessary changes in order to achieve technical and allocative efficiency. Specifically, foreign firms triggered learning processes and technological changes in the locally owned firms. The extent to which locally owned firms have been able to learn and accumulate technological capability is evaluated in Chapter 7. This will enable us to understand how locally owned firms reacted and/or survived competition from foreign presence. However as this section will show, locally owned firms were not the only ones forced to introduce changes due to competition pressure, foreign firms also reacted to the competition pressure by introducing technological changes, training among other forms of human resources development etc.

In order to appreciate how competition from foreign presence might have forced the locally owned firms to engage in the learning process, our discussion in this section will border four observations made in the course of doing these research. These were: mode of entry by some of the locally owned firms, formation of joint venture, international competition and high technology and capital equipment investment. All the firms (both foreign and domestic) faced stiff competition from imported goods into the country. The open market operations following liberalisation opened up doors to all kinds of imported goods resulting in an influx of imports particularly from COMESA¹³⁸ and SADAC region e.g. South Africa. The firms claimed that "an assortment of food product importers existed who did their business behind the back of the government and went tax free. The biggest problem to them was lack of facilitation by the government and the tax paid was extremely high."

¹³⁸ As the firms claimed there was severe influx of foreign goods into the market and in some cases with severe violation of the rule of origin.

In order to understand how mode of entry led to increased competition we discuss experience of **FBF2** and **FBF4**. The two firms were among the most competitive MNC subsidiaries in food and beverages processing industry. The two firms also competed for market in certain goods such as margarine. **FBF2**'s competitiveness was largely attributed to a large pool of skilled workers backed up by strong human resource development, innovation backed up by in-house R&D and in-turn supported by the parent company, adherence to strict quality, environment and safety management systems, Total Preventive Maintenance (TPM) and efficient delivery of services. Similarly, **FBF4** source of competitiveness was due to more or less the same attributes: economies of scale, strict quality management systems, human resources development, process and product technology with support from the parent company. Consequently, the two firms had an absolute edge over local firms. However, since the introduction of structural adjustments (SAPS) in Kenya in the late 1980s, **FBF2** and **FBF4** have continued to face severe competition from new entrants as well as from new products resulting in a substantial decline of the two firms' market shares.

The competition has been based on innovation with regard to new market, products and services delivery. The locally owned firms capitalised on an existing window of opportunity in the domestic and regional market. Based on their local market intelligence, they learnt that the MNCs products were expensive and thus targeted for high-income group. The entry strategy by the locals in the sector therefore targeted the middle level group with relatively cheap brands and thus captured a big share of these firms' market. **FBL1** is an example of a locally owned firm that made its entry targeting the middle income level group. As will be shown in Chapter 7, this firm has made a major boost, has started exporting and has recorded further expansion by acquiring another firm in the industry and has made new investment in Uganda and Tanzania.

Many changes took place in this sector, apart from introduction of cheap brands, the sector for the first time changed containers used in packaging cooking fat and margarine to plastic containers. This happened when **FBF2**, for instance, was still using metal tin containers. **FBF2** was forced to adopt the Kenyan version of its parent company's global strategy aimed at reducing its brands worldwide¹³⁹. Following this strategy, **FBF2** whose brand portfolio was over 30 brands had to reduce them to only 10 leading brands that are well known in the domestic and the immediate regional market. Interestingly, this strategy resulted in **FBF2** selling its edible oil and cooking fat product line to its local rival, **FBL1**. This product which was one of the **FBF2**'s flagship brand, with an annual turnover of US \$ 25.0 million was acquired together with other brands of cooking fat, and laundry soap. The selling of product and processing technology to the local firm represented a typical example of technological spillover as a result of foreign presence. This was so since the domestic firm did not have to engage in any search effort through R&D. On their side, both firms (**FBF2** and **FBF4**) have increased their advertisement levels. **FBF2** has since increased its advertisement level to an annual expenditure of about US \$ 1.2 million making the company rank among the top in the country with the highest advertising expenditure. The firm has launched a strong campaign of re-launching its products to create awareness and attract more customers. It has intensified its trainings and adoption of quality management systems and occupational health and safety analysis system (OHSAS). All these are done with the facilitation by the parent company.

¹³⁹ The parent company's global strategy launched in 1999 was aimed at reducing its 1600 brands worldwide to only 400.

Similarly, due to competition pressure, **FBF4** has adopted various techniques particularly in marketing. As in **FBF2**, this firm has started re-launching its flagships products done in line with and following a major international re-launch policy of parent firm products organised from the headquarters in Switzerland. The re-launching is innovatively done to contain a particular theme for instance illustrated by competitive sports depicting its uniqueness of the product as an energy giving drink. To further product promotion campaigns, **FBF4** holds a corporate horse racing day in Kenya with an objective to create exposure for the firm's products and to interact with its product consumers, business partners and colleagues. It also involves itself in physical education (PE) lessons of some schools similarly meant to promote the firm's products to the youth. Other skills employed in the marketing include branding policy where small promotional items such as caps, mugs, T-shirts, pens, pencils etc, are offered for sale or given out. This, however, must comply with the parent company's marketing and safety policy requirements. From the information gathered, the firm can invest up to an average of KShs 0.5 million for the purpose of a single product re-launch. As the production personnel claimed, **FBF4** was still a leader virtually in all aspects of production in its sector and locally owned firms were followers with lots of things to learn from **FBF4**. The firm claimed that the quality management system were above ISO quality standards.

Another interesting point to illuminate here is that the changes implemented by the foreign firms' in-turn created intensive competition to the locally owned firms. Following the foreign firms' strategies to regain or expand their market the domestic firms loses their market. Hence the domestic firms would have to equally undertake strategies to counteract the competition pressure from the foreign presence. The bottom line of this discussion is that competition in this sector headed by the foreign firms' presence serves as a trigger for the learning process and introduction of technological changes. This supports our approach in Chapter 2 and 5.

Next we consider a unique case where entry by a MNC subsidiary from South Africa into the beer processing industry created stiff competition for the incumbents who had enjoyed monopoly for several decades. As expected, the incoming MNC subsidiary was characterised by high product and state-of-the-art processing technology. Had high skills in corporate management coupled with international exposure with well-established links. This firm's entry into the sector recorded one of the highest capital investment to have ever been made in the brewing industry. What makes this case particularly fascinating is the fact the pressure introduced forced the one of the local incumbents to form a joint venture. As discussed in Box 6.4.6, the formation of a joint venture in-turn helped transform the firm from loss making to profit making and becoming one of the most efficient firms with sound management and employing state-of-the-art machinery. Subsequently, the firm created intense competition to the other locals especially in the wines and spirits sectors such **FPL2**. This helped them to engage in the learning process.

Competition Effects: The Case of FBF3

FBF3 was established in 1922 as a beer manufacturing firm. This firm operated as a monopoly for many years. However, in 1990s the firm was faced with stiff competition. In addition to the competition **FBF3** faces from beer manufacturers, the firm faces stiff competition from the manufacturers of carbonated and non-carbonated soft drinks. **FBF3** faced competition from imports following a huge influx of products in the sector with the liberalisation of the economy in the 1990s. Interestingly, other sectors like the service industry posed indirect competition to **FBF3**. As an example, the onset of the mobile phones in Kenya saw a dramatic reduction in the alcohol consumption and at one point the demand had declined by about 4% due to slumping purchasing power coupled with the emergence of alternative drinks.

The competition faced by **FBF3** was as a consequence of several episodes. To **FBF3**, things started changing in the late 1980s and the whole of 1990s due to the effects of SAP and globalisation coupled with political and economic uncertainty in Kenya at the time. Another change was that of joint venture (JV) formation between Tanzanian government and South African Breweries (SAB) limited to run Tanzania Breweries in 1993. The JV resulted in enhanced efficiency in brewing resulting in tremendous increase in Tanzania Breweries Limited (TBL) productivity and marketing capability etc. This resulted in severe loss of **FBF3's** significant market in the region, which it had controlled in the 1970s and 1980s to the Tanzanian Breweries. In addition to this, South African Breweries entered into partnership with a brewery in Uganda in 1997, in competition with **FBF3**. These changes culminated in stiff competition for **FBF3** that was further intensified in 1998 when the SAB opened a subsidiary (brewery) in Kenya in partnership with a Kenyan businessman.

In light of the prevailing changes in the industry and the intensive competition pressure created, **FBF3** decided to form a joint venture with an Irish MNC – Guinness International who acquired 46% of the equity stake in **FBF3**. Guinness International has wide experience in international brewing and was expected to bring into the venture technical advice on production technology (processing and product), corporate governance and management, marketing etc. As a result, **FBF3** launched a radical corporate restructuring. Guinness International helped **FBF3** to improve productivity by cutting staff costs, embracing intensive training and changing techniques. Employment was drastically cut to reduce redundancy and stimulate efficiency. Guinness International injected capital in **FBF3**. New state-of-the-art bottling lines were installed to improve the firm's efficiency while old machinery and equipment were rehabilitated. An example was provided where one of the factories had a sophisticated bottling inspector machine installed to increase efficiency and enhance product quality. Some of its associated factories which were inefficient in their production were closed down while in others operations were scaled down. The firm witnessed a radical transformation in its processing operations. It was estimated that the restructuring process cost was in excess of KShs 1.4 billion.

Additionally, the firm introduced new products. A non-alcoholic Guinness brand was for the first time introduced in the Kenyan market. This was an entry to non-alcoholic carbonated soft drinks which in-turn created stiff competition to the locally owned firms in the non-alcoholic soft drinks sector. **FBF3** in conjunction with its major international shareholder Guinness International also launched itself into production of wines and

spirits through an affiliate company – UDV Kenya. Similarly, this also created intensive competition to locally owned manufacturers of wines and spirits. The firm launched a very prominent advertising campaign. As explained, the firm was spending over KShs 1.0 billion for its annual marketing expenditure. The marketing strategy cut across a very wide spectrum: on billboards, on TV, on radios, on hats and T-shirts and calendars, painted on the sides of commuter buses etc.

The restructuring process that resulted in massive rehabilitation and modernization of technology coupled with strong marketing, training and use of the state-of-the-art technology enabled **FBF3** to re-capture the market it had lost. However, as part of the restructuring process **FBF3**, decided to sell its business operations in TBL. This happened at a time when the South African MNC was conceding defeat and was intending to withdraw from the Kenyan market. The two competitors decided to make pact-sharing deal. **FBF3** signed a license agreement with SAB in Kenya and TBL and agrees terms for share exchange in **FBF3** and Tanzania Breweries Limited. According to the terms of the agreement, SAB would close all its brewing operation in Kenya but would retain an investment by taking a 20% shareholding in **FBF3**. In that case, **FBF3** would have to undertake all the past operations of SAB subsidiary in Kenya that comprised brewing and distribution of certain SAB brands under license from SAB for the local market. Similarly, **FBF3** would close its brewery operations in Tanzania but retain a similar shareholding of 20% in Tanzania Breweries which is in JV with SAB in Tanzania. SAB would then undertake all the operations there: brew and distribute **FBF3** and Guinness UDV brands under license for the Tanzanian market. In this regard, and as a part of this agreement, **FBF3** would acquire 100% share of SAB subsidiary in Kenya, and TBL would acquire 100% of the share capital of **FBF3** subsidiary in Tanzania.

In yet another form of restructuring **FBF3** started sourcing for new contracts for barley growing in the country. A primary backward linkage was established with local barley farming community. **FBF3** malting plant purchases barley directly from farmers.

FBF3 entered into a Full Maintenance Lease hire agreement with a Motor company in Kenya. The lease included a fleet management deal that covered lease hire of 260 vehicles for **FBF3**'s subsidiaries in East Africa, technological support to vehicle performance and fuel efficiency. The strategy would allow the firm to focus on its core business. Some benefits included improved cash flow. The lease hire would help keep the money in motion by investing in areas such as marketing and improvement of the breweries.

This focus on core activities and process re-engineering culminated in a close look at the way in which the divisions of the group communicate, transact and co-ordinate with each other. There was duplication of many operations and activities. For the purposes of group-level co-ordination, inter-division comparisons needed to be available promptly. In 2000, **FBF3** approved a project to set up a Shared Services Centre mandated to establish best practice and standard business processing division capable of providing requirements of individual group companies. Replicated common practices would be removed. The physical distance between the group offices was bridged. For this purpose a state-of-the-art information technology to facilitate communications between the groups was invested. This would be done by mounting very small aperture terminals (VSAT) that enabled real-time satellite links between the countries. The VSAT offers centralised processing of transactions such as payments to suppliers, irrespective of location. It also enables online verification, checking and approval of such transactions from linked offices. Accounting and procurement transactions, banking and financial

reporting as well as human resources records have been electronically processed. The staff manning the unit would benefit from the flexibility and challenges of adapting to the unique requirements of each division. The security and verification systems are expectedly rigorous and advanced.

To-date the effort by this firm to learn as a result of reacting to competition pressure makes it one of the most advanced and with the highest turnover. It has won the most respected company of the year award. Its competitiveness is due to price – due to low overhead costs. It has increased its product diversity maintaining strict quality control. It has acquired enormous capability and experience in marketing – the quality of services to customers, advertisement, promotion campaigns and distribution. The volume capacity and scale of production has equally increased. The firm has become more efficient and flexible (Speed of delivery, ability to accommodate changes in customer tastes and preferences).

The future strategies include further diversification of products and services delivery. Another important strategy includes continuous acquisition of new processing techniques, machinery and equipment. In the pipe line, was a strategy to invest in new manufacturing machinery and equipment for its brew house at a cost of KShs 0.60 billion. The machinery would be more automated, improved energy utilisation through heat recovery and energy storage. **FBF3** plans to undertake expanded forms of human resources development and mainly in the form of training. Improve marketing strategies; maintain a continuous search and penetration into international market for exported beer. Maintain a process of continuous improvement in organisation and management structure maintaining a sound form of corporate governance observing rule of law.

Another interesting case, which we discovered, involved effect of international competition in the fruit-processing industry. **FBF5** was involved in processing and export of canned fruits to the European market for a long time. This created a window of opportunity in the local and regional market, which locally owned firms were exploiting. Unfortunately, due to international business cycles, there was a decline in international demand that resulted in stiff international competition for the European market. **FBF5** faced stiff competition from Asian countries that were able to offer cheap products to Europe. Due to the increased international competition, **FBF5** decided to look for alternative market domestically and in the immediate regional trading blocks, see Box 6.4.7. Consequently, this created intensive domestic competition for the market, which has forced locally owned firms to learn, introduce drastic changes in mechanization to their processes and adoption of quality systems.

Box 6.4.7

Competition Effects: The Case of FBF5

FBF5 processes and export canned fruits to the European market. Less than 5-10% of total production is marketed locally or in the immediate region. **FBF5** success in the export market was based on its high quality control and ability to fulfill international orders on time. Production and export orders were computerized and closely monitored to ensure timely delivery. Additionally, the firm's distribution system to export destinations is well organised and efficient.

Unfortunately, due to global economic recession there was a decline in international demand, which culminated in stiff competition in the international market. **FBF5** faced stiff competition from Asian countries such as Philippines and Thailand that were able to offer their products at a cheaper price to the European market. This was possible due to lower costs of production compared to **FBF5**, which has to transport their products to the seaport 500 Kilometers away and their production is done without irrigation. Note that while **FBF5** concentrated on the international market, the locally owned firms capitalised on an existing window of opportunity in the domestic and regional market. In that case **FBF5** and domestic firms served two different markets.

Faced with intense competition internationally, **FBF5** had decided to retreat and seek an alternative market locally as well as in the regional trading blocks. As indicated, "COMESA has provided increased marketing opportunities for existing and new products from pineapples as well as from other fruits and vegetables." There has been an increase of new start-ups that targeted an existing window of opportunity in the local and regional market. **FBF5** requested parent company headquarters to approve his strategy to develop the local and regional market. The granting of the go ahead coincided with the appointment of an African regional director to coordinate the efforts to build markets in East, West and South Africa.

Having been granted an opportunity to develop local products for the local and regional market but with an international blend, **FBF5** set up a full-fledged regional and marketing department in order to launch itself forcefully into the African regional market. The firm therefore initiated an "industrial and commercial programme of diversification and expansion of locally processed food consumer products and regional markets."

We should not lose sight of the fact that, although **FBF5** was turning to the domestic and regional market and build on its local presence, locally owned firms had already ventured there earlier. There was a large number of new start-ups that started processing products targeted at the existing window of opportunity in the local and regional market. Subsequently, **FBF5** entry created intensive domestic competition, which has forced locally owned firms to learn, introduce drastic changes in mechanization to their processes and adoption of quality systems. The **FBF5** products were now in the market: wide range of fruit juices, canned and fresh pineapples have been introduced.

In order to exercise effective and efficient delivery of services, **FBF5** has been forced to set up systems where it can reach their final consumers. **FBF5** set up Strategic Sales Depot (SSD) distribution system in Kenya by placing branded shipping containers along busy highways and near densely populated residential areas to directly sell their products to consumers at wholesale prices. This is a popular approach that has also been adopted by other firms including domestic firms.

The firms planned strategies included embarking on packaging of pineapple juices. In line with the current firm owners, who are renown worldwide for their tomato products, **FBF5** intends to embark on processing of tomato among other food products. **FBF5** therefore next strategy is to invest in an advanced technology for processing tomatoes. **FBF5** plans to continue with an aggressive capital expenditure programme with the hope of increasing its efficiency continuously.

So far the firm has intensified competition in the sector. Its source of competitiveness is based on its high quality heritage for all the new products as well. The firm is ISO 9002 certified as part of its quality assurance strategy.

Finally, we discuss a case where MNC subsidiaries in the soft drink industry creates intensive competition by making huge investment in capital machinery and equipment coupled with vast product diversification with strong support by the parent company. For more details on this, see Box 6.4.8. The emanating competition pressure forced the locals in the sector to look for alternatives means of survival some resulting to establishment of international linkages for support in product and process technology. These will be taken up in more detail in the next chapter.

Box 6.4.8

Competition Effects: The Case of FBF6

FBF6 was among the pioneers in the soft drink industry with a subsidiary of an American MNC, which exited the market after intense competition in the sector. Therefore, in the entire period before liberalisation, in 1982, **FBF6** had monopolised the soft drinks (carbonated) market. There were basically no other firms in the soft drinks industry. The firms enjoyed over 90% of soft drink market in the country. Unfortunately in the late 1980s and 90s the firm faced lean times following stiff competition from new entrants into the industry. In particular, stiff competition was posed by several domestic firms, which joined the industry introducing products that were more or less similar to those of **FBF6** but relatively cheap. The local firm's price-competitive strategy was very effective as they made sure that they priced their products always lower than the **FBF6**. The competition was further exacerbated by the re-orientation of production modes by existing major firms operating in other industries that included local, joint venture firms and subsidiaries of MNCs operating in the country. As an example, a few of these companies such as **FBF5** and **FBL4** started producing, packaging and distributing juice products that offered an alternative to the carbonated drinks produced by **FBF6**. Also, one of the leading breweries in the region started producing, packaging and distributing Malta Guinness, new non-alcoholic which also penetrated into the **FBF6** (non-alcoholic market) market in a significant way. The Malta Guinness is a non-alcoholic drink made of malted barley, hops and water.

To deal with the increased competition, **FBF6** has restructured most of its operations ranging from production to marketing in a bid to reduce cost in the face of diminishing returns. **FBF6** had withdrawn a large share of its operations. All those factors led to a decline in **FBF6** sales and thus profit earnings. In the face of the ensuing competition, **FBF6** has undertaken to maintain and improve quality standards. Undertake more human resource development. The firm has advanced technology and it is a part of global network of companies with wide experience in the field. The new strategy is to diversify into other products, acquire new processing techniques and training.

FBF6 under the parent company from US introduced new products in the non-carbonated products in the soft drinks (beverages) market to augment its carbonated soft drinks portfolio. The soft drinks were targeted for consumers below 12 years. As explained, this was a part of a large strategy targeting the young consumer market

without affected carbonated soft drinks market category. This market had largely been unexploited. The distribution of these products is done through the existing network.

The firm has also started packaging mineral water and other plastic-bottled packaged drinks. This has intensified the non-alcoholic beverages wars. The **FBF6** with the support from the soft drinks giant, that has strong culture of internationally-enforced quality control and marketing savvy, makes a stab at the present dominance of locally owned firms. **FBF6** will however have introduced healthy competition in the mineral water industry and in the packaged fruits juice industry.

Another form of strategy executed by **FBF6** was to launch a smaller version of its flagship brands. In addition to 300 ml already in existence, **FBF6** introduced a 200-ml bottle, which was priced at a lower price and thus increase affordability. (The move was meant to widen its market niche by reaching out to low and middle-income earners). It was also seen as countervailing measure to out compete one of the local firm's soft drinks which were trading at that price, KShs 10. This move was also seen as a preparation for another US subsidiary which was preparing to rejoin the market; it was already operating in Uganda and Tanzania warming up to join the Kenyan market again. **FBF6** had also introduced the 500-ml, 1 litre, 2 litre bottles. Prices were reduced. The 300-ml and 500 ml prices were lowered by 15% and 17% respectively.

FBF6 launched a new distribution system known as Manual Distribution Centres (MDC's) that had a positive impact on efficiency and in addition created new jobs in the value chain. **FBF6** added new coolers improving the availability of cold products in the market. **FBF6** also introduced a depot concept to sell case lots to consumers. The firm also replaced all the old wooden firm kiosks with new metal ones units. These provided business opportunities to over 1000 kiosks operators (entrepreneurs).

FBF6 has also decided to concentrate more on the way its products are distributed and marketed. In doing so, it has re-organised the distribution pattern so as to meet more customers and at the same time satisfying their needs. **FBF6** has decided to allocate a defined area to each of their key distributors. **FBF6** has invested significantly in a fleet of vehicles, which transport the beverages to various distributors who would in turn do the delivery to all the customers in their regions. **FBF6** supplied their key distributors with new vehicles to improve their efficiency in service delivery. The distributors were then allowed to pay for the vehicles over time and once they completed paying for the vehicles they become the owners. As indicated to us during the interviews, this part of marketing re-organisation improved tremendously the reliability and consistent of services offered to the retailers and had a positive bearing towards sales improvement.

The effect of competition from **FBF6** has caused severe competition ripples in soft drinks and beverages, beer, wines and spirits. Directly and indirectly, it has forced rivals in the industry to invest in new plants (machinery and equipment) for example **FBL2** who argue that the competitive process has enabled them to go regional, export and expand.

6.4.5 Demonstration Effects

Investigation of demonstration effects indicated that all the foreign firms studied had demonstration effects which created opportunities for spillover occurrence to the locally owned firms. Foreign firms indicated that locally owned firms had copied, imitated products and techniques from them. These findings supported our thesis that foreign presence can stimulate spillovers – Chapter 2. They further support our findings in Chapter 5 where demonstration effect was observed to be one of the strong mechanisms through which spillovers occurred after competition. However, the extent to which demonstration effects results in learning, capability building and innovation in locally owned firms will be explored in detail in Chapter 7.

We now present individual firm accounts of demonstration effects, which stimulated technological spillovers. **FBF1** and **FBF2** claimed that domestic firms had introduced new products and techniques taken after them. The domestic firms were able to make similar but own products implying they had learnt and accumulated the necessary capabilities. As an example, **FBF2** were the pioneers in the mechanised production and supply of cooking fat and edible oil, margarine, and finally washing soaps and detergent in the country. **FBF2** started its operations in the country before independence. Local firms used to make hand made soap but in the course of time they introduced and adopted mechanised process of making soap. This was confirmed by Langdon (1978) study which noted that local firms adopted mechanised soap production techniques similar to that used by the MNC subsidiaries in the country. Similarly, local firms have started producing cooking fat, edible oils and margarine in a similar way to **FBF2**. The case of margarine was particularly exciting in that a domestic firm also covered in Chapter 7 used the same model and technique as in **FBF2** in its processing, promotion and marketing. In actual fact, **FBF2** had a case in court with this particular domestic firm claiming that it had imitated and used a component of its margarine trademark. According to **FBF2**, the local firm was packaging its margarine using the "same shape and colour, configuration, design and general appearance that had an integral part of its trade mark". **FBF2** has therefore served to increase the portfolio of products and has thus reduced the product search process for the local firm. **FBF2** was also the first company to engage the services of a separate promotion, logistics and delivery. This served as demonstration to other firms both local and foreign who started using similar services. Use of such services triggered organisational, management and marketing changes. This case supports the argument that MNCs can bring new knowledge, management and marketing skills where local firms observe them and imitate them. Some of the firms have started exporting.

Another area in which locally owned firms were observed to have enjoyed demonstration effects was in staff training. As a result of ensuing competition, the locally owned firms have been stimulated to embrace firm training as done in most foreign firms. Another demonstration effect comes in the area of quality management. The foreign firms were usually the first in acquiring quality assurance standards after which the locally owned firms followed. As an example, **FBF2** and **FBF4** were among the first foreign firms to have obtained an ISO. **FBF4** was explained to have the best quality control in Africa in culinary industry. **FBF2** was also the first to achieve OHSAS. When the foreign firms acquired international quality standard they also enjoyed expanded export market as a result of high quality assurance. In this case we can argue that foreign firms demonstrates not only quality standards but also export market. Examples will be presented in Chapter 7.

FBF6 claims to have many demonstration effects to the local firms. Similarly, **FBF6** has also enjoyed from demonstration effects from competing firms. As an example, the firm started a strong campaign to diversify. For instance, the firm ventured into the manufacture of non-carbonated drinks and started bottling of mineral water and fruit juices. Demonstrations enjoyed by the domestic firms from **FBF6** included processing techniques, product technology, organisation and marketing strategies. Let us provide a few examples. The first example includes use of micro-finance programme to support distributors. The domestic competing firms have now imitated this programme and have initiated similar programmes backed by strong campaigns to solicit for funding from various sources. **FBF6** also contended that local competitors had also copied the use of container method used by their distributors. **FBF6** claimed to have been the pioneers of this process as a marketing strategy. We provide another example of how demonstration effects can stimulate spillovers in domestic firms. Since **FBF6** follows marketing strategies designed by the brand owners (USA soft drink MNC), it therefore changes the style of its marketing and advertising often. At the time of this research, **FBF6** was venturing into a new advertising campaign following the new marketing strategy launched by the brand owners in the United States. It would include new advertising campaign, strong music and digital components, promotions, properties, one-to-one marketing initiatives and new packaging and graphics. The advertising component featured radio, television, on line, print, cinema and outdoor executions. From time to time it would also include participation in sponsorship of certain activities. Such marketing strategies present a lot of learning to the domestic firms. However, this is only useful if it does not re-allocate resources away from learning to innovate in the local firms. Chapter 7 will attempt to examine this phenomenon.

Finally we provide an example from **FBF5**. This firm has had demonstration effects to local firms such as **FBL4** studied in Chapter 7. As will be shown the local firms started manufacturing and packaging of fruit juices in the same style as **FBF5**. Other local firms have even started packaging other wide ranging juices such as passions, orange, mangoes etc. Learning from **FBF5**, a few domestic firms including **FBL4** have started exporting in the region.

6.5 The Case Studies of Foreign Firms in the Machine and Engineering Industry

This section presents the case study illustrations of the spillover process in machine and engineering industry using the framework of analysis outlined in section 6.2. Interesting cases of how presence of foreign firms created opportunities for spillover occurrence to the domestic firms were observed which also supported our theoretical arguments and empirical findings in Chapter 2 and 5 respectively. This section begins with an outline of the firms' technological characteristics which enables us to understand production technology, learning and innovation in the case study firms. This is also intended to provide a justification of the firms selected.

6.5.1 Firm Selection and Justification: Emphasis on Production Technology, Learning and Innovation

Case study firms in machine and engineering industry were also selected on the basis of production technology, learning and innovation. The role of production technology in learning – human capital development was taken into consideration. In this regard, only foreign firms where local personnel seemed to acquire tacit and experiential knowledge

from the production technology utilised were selected. Subsequently, this was important in that knowledge and experience accumulated could benefit local firms in the form of knowledge spillovers when experienced workers leave their jobs with foreign firms in future to join locally owned firms or to set-up own jobs. This phenomenon is further investigated in Chapter 7 from the angle of local firms.

We now outline reasons and justification why each firm was selected. **MCEF1** was obviously the most sophisticated firm in its sector. Its core production machinery and technology comes from Britain. At the time of this research the firm utilised 65% of the total installed capacity. It had many machines of different sizes, ages and complexities. Nevertheless, the firm does not undertake any serious search for processing machinery and technology and thus relies on foreign suppliers for the supply of production technology and for major technical support. The firm, however, has the capacity to make major in-house modifications on most of its machinery. The firm had seven major sections, each of which presented some form of technological learning to the locals. The first section was the *Raw Material Section*. The raw materials used are imported from Germany and Japan and comprise steel coated with tin. Here local employees are trained to examine and verify that the received raw materials are of the expected specifications and standards. They are also trained in planning operations and process scheduling in order to know how much and when to procure raw materials or how much and when to use in the processing lines.

The second section was the *press shop section* that comprises a proof print shop and a printing¹⁴⁰ shop. According to the technical director, all the printing operations were complex and required rigorous training of the personnel. This notwithstanding, he confirmed that well-trained locals who had acquired tremendous experience over time handled all the activities of the press shop. For instance, the locals had mastered the right chemical combinations, preparation of printing plates and operations of the complex printing machines. Technicians from the engineering department who were equally trained ensured that operations were smooth and efficient. As a result of capabilities accumulated over time, local technicians in this department were capable of undertaking major renovations.

The third section was the *crown cork section* equipped with two kinds of crown machines – the press machine and a lining machine. Similarly, local technicians from the machinery workshop had acquired the necessary capability over time and were responsible for all the repairs and maintenance work. Three years ago the firm acquired another machine from Italy which was quite sophisticated and locals needed intensive training to handle production with these machines. At the time of this project, the employees were still mastering the full operations of the machine including routine maintenance procedures and possible adaptations in the future.

The fourth section was the *general line section*. This section was perhaps the most interesting one. It was equipped with different kinds of machines such as lathe machines, press and punching machines, shapers, bending and folding machines etc. From observations, this section presented tremendous practical learning to the locals. There was a lot of learning by doing, by using and by interacting. The skills and experience acquired here were very useful, practical and most people found them relevant if they wanted to become own

¹⁴⁰ The printing shop enjoys five sophisticated printing lines: The first one was a two-colour printer. The second one was a coating line. The third one was single colour printer while the fifth was a coating line. The last one was a complex double colour printer with a vanishing machine.

entrepreneurs in the jua kali sector. Many products were designed and/or fabricated in this section. Skills acquired in this section are in demand outside in other firms.

The fifth section was *tin can manufacturing line* equipped with over five different processing lines for metal cans manufacture. Three of the lines manufacture tins for **FBF5** who consume 60% of the firm's production output. **FBF4** orders also occupy some lines. All the tin can manufacturing lines were foreign and comprised complicated processing machines and technology. The process of tin manufacture was tedious, ranging from metal sheet levelling, folding, rolling and welding, corrugation, seaming and so on. In this regard, organised training was offered to all the machine operators – about 12 local personnel manned each tin can manufacturing line. As observed, locals had acquired good mastery of all the machine operations. Machine suppliers imparted the initial skills to the local production operators and the engineers and technicians through training.

The last section was a well-equipped *machinery workshop-engineering department*, with seven units (referred to as cells) each headed by a full manager. The seven cells included a tool-reconditioning cell where machine equipment, tools and other components from various departments were reconditioned and tested. There is a control system to monitor the frequency of breakages for each tool. The customer service cell provided technical services to the customers. In the calibration cell, master gauges from KEBS and Germany were used for calibration to international standards. Computer Numerical Control (CNC) programmes are also used for drilling and cutting of tools used in workshop. The spare manufacturing cell was responsible for fabricating required spares parts for various machines used. The electrical cell handled motors and other electrical equipment. The heat treatment cell provided heating whenever needed in the workshop. Finally, all the general repairs were conducted in the general-purpose cell. Similar to the general line section, the machinery workshop presented tremendous learning to the locals. In fact some of the engineering and technical trainings were done in this department. The multiple skills and experience acquired here enabled personnel leaving the firm to get jobs easily in other firms or become own entrepreneurs in the jua kali sector. The firm was reputable for producing skilled personnel – generate local entrepreneurs.

With respect to product technology, the firm utilised a combination of foreign and local product technology. Tin and seals making were foreign product technologies as was crown cork. The firm involves itself with some local search for product technology. In the last five years the firm introduced new products for a local MNC. Clients usually present a rough idea of what the equipment they want. The firm then designs the equipment with feedback from the client and then manufactures them. In addition, the firm makes continuous improvement of its existing products. This process makes the local employees learn and accumulate experiential tacit knowledge. The locals also acquired skills from quality control systems, which the firm follows strictly. The firm follows World Class Performance – WCP. It is ISO 9001.2000 accredited and it has also quality assurance certification with KEBS.

MCEF3 was the leading firm in motor vehicle assembling – from completely knocked down kits (CKDs) mainly imported from Japan. The main activity of this firm is motor vehicle assembly, 84%. The first section therefore deals with un-boxing and sorting out CKDs. This is important to ensure that all the parts are received in good condition and in the required specifications. Nuts and bolts that come in hundreds of thousands were also sorted out in a different section. This is one of the most complicated tasks to check all the bolts and nuts, identify them, certify that they are of the required specification,

sort them out and put them in to specific categories awaiting their use in the assembly line. A lot of skill and experience is required in the sort process. The local technicians have been trained and have also garnered experience from learning by doing over time - most of the technicians were diploma holders in automotive, mechanical or electrical engineering from the local polytechnics. Whenever a new model was being introduced, the engineers would first demonstrate all the accessories to the local technicians. The engineers themselves will have spent several months abroad also undergoing similar training from the suppliers. The last section that dealt with raw materials was involved with the local procurement and storage of auto parts. As will be shown, training trickles down to the supplier of auto parts.

The assembly line begins with simple joinery of the body parts done in the firm's body shop section using sophisticated Japanese technology - for spot welding and soldering. Well-trained local technicians were in full control of the operations. They had mastered the technology in use and easily assembled various body kits (parts), which formed the body of the vehicle. Only body parts for pick-ups and the light buses were assembled in-house - that included the carrier and the body cabin. The body building process entailed three stages starting with assembly of various parts. Metal finishing was also done to ensure no dents existed on the metal surface before paint was sprayed on it. Qualified engineers ensured no faults existed on the body surface by making a thorough inspection. The body is then taken for spraying (body painting). In the spray room, the body is washed to remove any ashes and traces of oil. The body is then dried in a special oven for 5-15 minutes. Then the body is sprayed underneath first to prevent rusting followed afterwards by rest of the body. Each of these steps is manned by specially trained personnel.

Once the body has been sprayed it is then taken to the trim line where the body moves gradually from one stage to another with accessories such as brakes, linings, belts seats etc being fitted. Once all these accessories have been fitted, the body is then ready for mounting on to the chassis. Each of these stages presented learning opportunities for the locals. The chassis assembly on the other side involved a number of steps. This is so because the chassis also comes in the form of completely knocked down kits and must therefore be assembled. Chassis assembly starts from a layout known as jig - fabricated in house using firm's own machine and equipment in the engineering unit. The jig helps put the chassis pieces together and holds them firmly as they get mounted and welded in position¹⁴¹. The jig reduces faults while assembling. It was interesting to learn that the local engineers and technicians in the firm had acquired enough capability to fabricate the jig equipment. Once the chassis layout is done then the parts are welded together using another Japanese Mig-welding machine. The body of the vehicle is then mounted on the assembled chassis. At this time the wheels are mounted, petrol tank is affixed, lamps are fitted and the process comes to an end. The vehicle is finally inspected and then dispatched to the owner or the body building firms mainly for big trucks and buses.

Since the firm does not conduct in-house R&D, it relies on foreign supply of product technology with the main supplier being Japan. The firm also relies on the parent company in America for product technology. At the time of this project, all the vehicles assembled in the firm followed a set platform standard from Japan and the main task was only to understand the assembling manuals. As indicated earlier, the assembling parts come in the form of completely knocked down kits. Fully built units came mainly from Germany and USA. This somehow limited the knowledge that could be acquired by the local staff since the knowledge acquired by employees is only limited to assembling. For

¹⁴¹ Note that the jig is also used to make for other companies-contracted out.

instance, the engine came intact and thus little know-how as to how an engine is built would be acquired. Nevertheless, the locals have accumulated tremendous skills in assembly given that the firm introduces new products (new vehicle models) regularly at least 1-2 years. The vehicle models introduced are often new in the local and regional market. The firm maintains strict and international quality control management systems. Although the firm claimed to incur expenditure on in-house R&D, only quality control could be observed and some substantial in-house innovations. **MCEF3** is ISO 9000 and ISO 1400 for quality and environment management systems. The important point here is that locals have acquired experience by participating in quality control management systems.

MCEF4, was selected as it was the most advanced in steel drum making. The machines and technology used were mainly obtained from Germany. Manufacture of steel drums and plastic drums accounted for 60% and 40% respectively. At the time of this research, the firm had a capacity to make about 3000 small drums and about 1500 big drums per day.

With regard to drums manufacture the production director contended that locals had accumulated enormous technological capability. This was confirmed to be true after examining how the locals acquired skills by following the drum making process. The process was long and for each stage a different technology was used and thus it's mastery. Locals had been trained and were in charge of the production activities. The production manager cited a few examples where the locals had even introduced some innovations on the drums all by themselves. An example was cited where new drums had been introduced with special rings making them easy to pack. Locals had also introduced safety jackets to all the machines for safety purposes. These were introduced in such a way that the machines would only work if fitted with the specified jackets otherwise they wouldn't. This was in compliance with firm's quality management systems and safety standards by KEBS.

The product technology comes from the parent company. The firm does not do R&D for product technology. At best the firm observes strict quality control management systems. This has to be strict as their customers who include MNC subsidiaries in the countries and United Nations (UN) agencies audit them. The quality control management systems provide a lot of learning to the locals. Quality control spreads across the whole value added chain. When the raw materials are received they must be checked for quality, rust, oil and gauge. Problems with quality control were noted to occasionally serve as sources of learning to the locals in the firm. For instance, steel coils imported from Egypt had a problem at one time. There was a lot of breakage during processing and this was a big constraint. They had learnt that treating the steel with oil helped overcome the problem. This skill was acquired after several trials. This was an example of a constraint creating an opportunity to learn. Similarly, for all the raw materials obtained two tests must be performed. The first one is known as erichneer test. This involves application of a very strong force slowly on the steel to test the malleability strength. The second test involves use of a strong force suddenly so that the force lands on the steel suddenly. This is meant to test reverse impact. When the first test can be regarded as slow the second one can be regarded as major. The steel would then break. Then a certificate of conformity is issued.

6.5.2 Human Resource Development and Labour Mobility

In this section we examine firm level training and labour mobility in machine and engineering firms selected. As in food and beverages section, interesting cases of how firm level training and labour mobility created opportunities for spillover occurrence were observed. Once again this was in support of our theoretical arguments in Chapter 2 and empirical findings in Chapter 5.

6.5.2.1 Human Resources Development (Firm Training)

As noted in food and beverages industry all the foreign firms in machine and engineering were observed to attach a lot of importance to human resources development through training. In fact three of these firms (**MCEF1**, **MCEF2** and **MCEF3**) had set aside 10-15% of their total payroll for training purposes while the remaining firm (**MCEF4**) had set aside 5%. The discussion held here is done in the same line as in the food and beverages sector since the same kinds of trainings were identified during the interviews in the machine and engineering industry. All the firms studied conducted on-the-job training to their employees but differed on intensity depending on the activities being undertaken.

All the firms studied had an in-house training department but by observation **MCEF1** and **MCEF3** had well-established in-house training departments in comparison to **MCEF2** and **MCEF4**. **MCEF1** maintained World Class Performance (WCP) level that required rigorous technological training to the local personnel. In some of its sections, the firm offered multi skilling training. The firm also offered small group activities meant to improve the locals' understanding of some technical aspects. In this light, the firm maintains a training department under a human resources manager. It is a requirement that each department in this firm does a capacity building audit to identify who needs what kind of skills and what skills are needed. This phenomenon came out clearly during the firm interview conducted at the firm. In the workshop and maintenance department, the managers had worked out clear training programme, training "skill matrix". In this matrix, it depicted which courses were being offered, who was to offer them and who had attended certain courses and who was to attend the next. Note that the firm has technical training coordinator. Usually the trainers would come from in house and quite often from outside the firm. From outside the firm, the trainers could be obtained locally or from abroad. **MCEF1** was therefore a very good example of a firm that realises the importance of firm technological training (particularly to the locals), sets a budget for training and has a training department and a programme design for the purpose. It should be emphasised that through the trainings offered, the machine operators are able to control the machinery and equipment and so are the engineers who are trained on how to maintain the machinery. It was emphasised that the kind of training the employees obtain is in line with World Class Performance (WCP), Statistical Process Control (SPC) and total preventive maintenance (TPM).

Similarly, **MCEF3** had a separate department for human resource development and training headed by a full manager. This department catered for all the trainings and other forms of human development needed. In order to have a pool of well-trained workers, **MCEF3** has made the in-house training a continuous process to all the staff at all levels. In house training can range from simple things like first aid applications to computer applications and marketing. It also includes training on both the management and the technical side of operations i.e. engineers, technicians and machine operators. Qualified engineers, who will have obtained a similar training abroad, often conduct these trainings in-house and on the job. From time to time, external trainers and subject matter

specialists are also invited to offer in-house training. The trainings offered by subject matter specialists can equally be extensive ranging from safety standards and quality management systems to labour ethics such as attitude and commitment towards work.

On the side of trainings undertaken external to the firm but within the country, literally all the firms did it. From the interviews conducted **MCEF3**, **MCEF3** and **MCEF4** were observed to have excellent training programmes for all their employees. The programmes included sending employees for training in the local training institutions to study professional and engineering courses. Such courses included: (1) Electrical and electronics engineering, which can include things, like computer packages, computer maintenance and servicing and electrical installations. (2) Mechanical engineering that includes: general fitting, lathe tuning, welding and fabrication. (3) Automotive engineering: motor vehicle mechanic, and motor vehicle systems. (4) Computer maintenance and servicing, computer packages and electrical installations. (5) Others would include; sales and marketing.

The firms also sent their professionals and technical staff for specialized courses abroad. Several examples were noted. **MCEF3** seemed to send staff abroad regularly for training in motor vehicle assembling and draught (vehicle body designing). While abroad, the engineer would undergo a trainers training so that he can come and do a similar kind of training at **MCEF3**. Several engineers have been sent for training in Japan, Europe and America. Japan was preferred as it was the main country from where the raw materials (CKDs) were obtained. As a way of assessing the staff training, the trained workers had to be monitored strictly after training.

A number of factors served as a trigger for trainings in this firm. The main factor in **MCEF3** was the need to introduce new motor vehicles. Given the increased level of competition, there is a need to increase the rate at which new products are introduced in the market. It is the introduction of these new vehicles, which act as the compelling force for technological training. As an example, when a new vehicle (a new model) is being introduced into the country the automotive mechanical engineer is trained first in the country where the CKDs are sourced from. The engineer would then transfer the acquired skills by offering training to the rest of the staff (other supportive engineers and the technicians in **MCEF3**) in the firm. Since the CKDs are sourced from Japan, it therefore happens that most of the trainings take place there. Since the main production mode involves the ability to assemble the motor vehicles, the major training requires acquisition of skills to be able to do the vehicle assembly. The training offered is therefore geared towards understanding the motor vehicle assembly manuals and acquiring skills on how to translate the contents of these manuals into fully built motor vehicle units. When the engineer fully masters the assembling procedures of the new models, he then comes back to **MCEF3** where he performs demonstrations to the other staff. The trained engineer would have to demonstrate the assembly process before the other staff, engineers and technicians, in most cases this would involve taking all the activities from the body shop, metal finishing, trim line and chassis. In each stage there would be presentation by the engineer followed by brainstorming session, questions would be raised on anything pertaining the assembly of the new model. The other thing would be how to adapt the car to the Kenyan standards in the course of doing the assembly. When all these are tackled together and the technicians have demonstrated ability to do the assembly on their own they would then be left but with substantial supervision until their capabilities are fully polished.

The analysis done in this section draws a similar conclusion to the one arrived at in the food and beverages analysis. All the firms in machine and engineering industry recognised the importance of human resources development in their production processes and other operations. Firms therefore endeavoured to offer training among other forms of learning. In the process the locals were among those who benefited training locally and sometimes abroad. This has enabled them to build technological capability to operate machinery and manage production. Skills and experience acquired have enabled some locals to get promotion and become section heads or managers. In some cases training offered were geared towards promotion but only through merit. As an example, **MCEF4** had a strong policy of conducting in house training meant to groom a successor in most technical aspects. The firm had good training for junior staff to assume senior positions – a “succession plan” based on specified criterion. This was meant to ensure smooth transition at all times in case of labour mobility, retrenchment, retirement or otherwise. For instance, the quality control manager had trained for a very long time under senior technical managers. He had joined the firm about 35 years ago as a technical trainee and had climbed the ladder to become a full technician. During this time he had participated in the stripping of most of the machines and equipment used in the firm. This process of stripping and adapting some of them made him learn a lot technically. After having been trained on several occasions both locally and abroad, he was then appointed to become the quality controls manager. In his capacity as the quality control manager, he was in charge of all the quality control aspects including trainings on quality matters and in liaison with institutions that deal with quality matters such as KEBS and SGS.

6.5.2.2 Labour Mobility

The interviews conducted revealed that foreign firms studied in machine and engineering industry had interesting cases of labour mobility that could be associated with spillovers of knowledge to the domestic firms. Note that due to lack of data documentation on labour mobility in the firms, we relied on people with long experience to reveal to us any interesting cases of professionals and skilled staff they were aware of. All the firms studied had at least lost a few professionals or a skilled worker at one time or another to other firms – either a locally owned or foreign firm. **MCEF4** presented a very good example where one of the senior technical managers left the firm to join a locally owned competing firm. The competing firm manufactures the same products as **MCEF4** but utilised a relatively less sophisticated technology than that used at **MCEF4**. In another example, the quality control manager explained that when the business and the logistics controller units were phased out, the managers and some skilled workers left and joined other firms. The firm claimed that a few staff had decided to set their own entrepreneurship. The important thing to be stressed here is that these were well-trained managers in this firm and definitely where they went they would utilise the skills acquired while on the job. **MCEF3** reported similar cases where staff had left to become own entrepreneurs.

MCEF2 contended that as far as labour turnover was concerned it had lost several of its staff in the past mainly to other firms in machine and engineering industry. The firm confirmed that among those who left were some engineers and many technicians. Some left after they were offered high salaries by competing firms. Since these staff had been trained and had also acquired experience on-the-job, the receiving firms must have benefited spillovers of knowledge. Such staff went to join locally owned firms.

In the case of **MCEF1**, the story was rather different. According to the interviews conducted with plant manager and the quality control manager, it was made clear that

very few people had left this firm to join other firms. As they claimed, outward mobility was minimal especially with the professionals and engineers. Only a handful of professionals and engineers had left but primarily went to join other foreign firms. The explanation offered was that very few firms actually needed the kind of skills that an individual from this firm had accumulated, and particularly more so when it comes to the engineers and highly qualified technicians. This is explained by the fact that the technology and machinery used by this company were quite sophisticated and expensive to the extent that domestic firms would not afford to acquire them. It was contended to us that even when the workers proceeded for retirement or decided to become own entrepreneurs (by joining the Jua kali industry) they still would not be in a position to do anything like they ever did before since they would not be in a position to raise enough capital to acquire such machines and technology involved.

This is a very good example of a foreign firm that offers tremendous trainings to its employees and most of who are Kenyans. This implied immense firm contribution to the learning process and technological capability building. The kind of technological learning offered is expected to match with the WCP practiced in the firm. Turnover is very low in this firm. Employees generally regard this as a relatively good firm. Not possible to get anywhere to utilise the skills acquired in the firm. Unless in Nairobi industrial area. According to the plant manager the firm wants to come up with a policy, which will initiate labour turnover.

With regard to inward mobility of workers, the firms claimed to have strong policies of recruiting fresh graduates from the local universities and poly-techniques/vocational institutions. According to the interviews conducted, the firm does not view lack of skilled workers as a severe problem. However, not all firms were interested in employing fresh graduates. **MCEF2's** employment policy was not in favour of employing fresh graduates from universities or polytechnics or employ from local firms. The firm preferred to employ professionals and technically skilled workers from other firms mainly from foreign firms or from outside the country and to a lesser extent from domestic firms. As expected, staff employed from foreign firms were highly technical and from their experience, they would be in much better position to strengthen **MCEF2's** production capability. It can then be noted that this firm also benefits knowledge spillovers associated with labour mobility from other foreign firms.

MCEF4 had received only a few workers from other firms. The best example provided was that of the managing director who had joined a foreign company bringing in tremendous organisational changes in the management and organisation of the entire firm. For **MCEF1**, it received a huge junk of workers when it acquired a subsidiary of an American firm. It retained most of the engineers who were initially working with the acquired subsidiary. These engineers were the ones who were directly involved with the production processes. Here we observe a direct mobility of workers as a result of the acquisition, which can be translated to mean direct transfer of skills required for manufacturing activities.

6.5.3 Linkage Effects

As in the case of firms in food and beverages industry, both pecuniary and non-pecuniary linkages were identified. However, with regard to machine and engineering industry, non-pecuniary linkages were more dominant than pecuniary linkages. This is not unexpected given that firms in machine and engineering industry usually offer

technical support. Backward linkages were identified with manufacturing and services – such as utility providers, construction, finance, transport and communication. Within manufacturing, firms had established backward linkages with machinery, wood and furniture, paper and packaging, food and beverages and transport equipment industries. Forward linkages were formed with services industry such as supermarkets, distributors etc. These firms considered themselves large, with more physical and human capital than the domestic firms. They confided that purchases and contractual jobs availed finance and capital to the domestic firms and that in their opinion helped them to grow and expand. Once again due to the firms' reliance on foreign suppliers of machinery and technology, local technical links with locally owned firms were only limited to maintenance, repairs and sale of simplified machine and engineering equipment. Due to data constraints it will be impossible to analyse trends of linkages. So, we shall just present a general discussion of all the firms (**MCEF1**, **MCEF2**, **MCEF3** and **MCEF4**). From the angle of foreign firms, local firms seemed to have acquired skills and spillovers of knowledge through the linkages formed and existing interactions. The extent to which these might have resulted in accumulation of technological capability in the locally owned firms will be investigated in Chapter 7.

We now turn to individual firm level cases. **MCEF2** maintains both backward and forward linkages. Backward linkages were maintained with suppliers of some of the raw material providers. Over 40% of the raw materials used in the firm were imported. This can only be regarded as pecuniary linkages without much learning from them. The firm also maintains international links with the suppliers of machinery, technology and equipment. It also maintains links with local firms which sometimes offer repair and maintenance services. The firm contended that the local suppliers of some of the machinery and equipment procured locally have been able to grow, expand and build technological capability as a result of learning from the orders placed from this foreign firm. Firm interactions during machine repairs and maintenance or during negotiation on the equipment to be supplied, enabled engineers from the firm to benefit spillovers of knowledge. The forward linkages formed with buyers provided feedback to **MCEF2**, which also served as a source of learning and thus improvement in the production capability.

On its side, **MCEF1** claimed to maintain a strong backward relationship with raw material suppliers. The firm maintained diverse and strong backward relationship. It had strict requirement for all its suppliers. Some of the requirements to be observed by the suppliers included:

- ❖ All the supplying firms must be audited and certified by **MCEF1**.
- ❖ Since **MCEF1** was ISO accredited and follows World Class Performance (WCP); **MCEF1** therefore had strict requirement that all suppliers must be credible.
- ❖ Must be certified by either ISO or KEBS or both of them (i.e. must maintain certain levels of quality). If not accredited, **MCEF1** encourages them to start the process.
- ❖ They must be efficient in all their operations including delivery.
- ❖ They must have the right machinery and equipment.
- ❖ They must offer technological trainings in their firms.
- ❖ They must have sound management (accounting and organisational) practices.
- ❖ They must be sound financially.

This was an interesting example in that it indicates how a foreign firm can stimulate learning, capability building and innovation in domestic firms. A similar case is that of

MCEF3 outlined in Box 6.5.1. This supported our theoretical arguments and empirical findings in Chapter 2 and 5 respectively.

MCEF4 obtained its raw materials from local firms. For instance the steel metal used for drum making was obtained from domestic firms. Similarly, the spraying ink for the drums comes from local manufacturers. **MCEF4** manufactures its drums to international standard as most of its customers include international organisations such as United Nation agencies who use these drum in the transportation of many things including relieve medicine, food etc. So the drums must pass tests such as stacking test. They must also pass the immersion, hydraulic and drop tests. With regard to colours it is important to mention that the spray must posses certain qualities. They must be matching and must also be easy to cure otherwise the curing process can be problematic. They must be free from adhesion problems and finally they must have the appropriate characteristics of gloss – surface shine. As explained, this firm ensures that local suppliers have the capacity to meet the standards expected. In this case the firm encourages and supports suppliers to engage in the quality improvement process as well as training. Hence, this firm directly stimulated spillover occurrence to its suppliers.

The firms interacted with business associations and institutions. As will be shown, these interactions resulted in skills and knowledge sharing, including technical assistance. For instance, all the firms studied were members of KAM. The vice-chairman of **MCEF3** was a board member of KAM where they shared their expertise, see Box 6.5.1. Such experience could include corporate governance, policy lobbying technique, labour ethics, intellectual property rights etc.

The firms also interacted with government regulatory bodies such as Kenya KEBS and FKE. As an example, all the firms interacted with FKE for labour issues and disputes. For instance recently **MCEF4** were advised to scrap the position of a personnel manager since the company was actually a small one. They were advised to change it to human resources manager. Also all firms participated in the development of standards with KEBS. They need to achieve Kenya Quality Award (KQA) as well as Diamond Mark of Quality all awarded by KEBS. As noted elsewhere, KEBS in collaboration with SGS awards ISO 9000 series for implementation of Quality Management Systems (QMS) and ISO 14000 certification for implementation of Environmental Management Systems (EMS). KEBS deals with calibration, pressure gauge and vineyard - as an example KEBS calibrates the master instruments for **MCEF4**. Other memberships included KIRDI (**MCEF3** – see Box 6.5.1), Export Processing Council (**MCEF2**), Kenya Industrial Property Office (**MCEF2**) and Kenya National Chamber of Commerce and Industry (**MCEF2**). **MCEF2** does not obtain any finance from the local institutions. The firm felt that collateral arrangements and high interest rates were big obstacles to obtaining such finances.

All the firms participated in human capacity development in the country. The firms offered industrial attachment annually where graduates from local universities and polytechnics taking engineering course undertake their industrial internship. The firms such as **MCEF3** also allowed students and organised groups to visit and acquaint themselves with the car production assembling processes.

Box 6.5.1

Linkage Effects: The Case of MCEF3

MCEF3 deals with motor vehicle assembly. This firm had a policy to increase its local content. **MCEF3** maintained strong backward and forward linkages. Backward linkages were maintained with the manufactures of (1) paints, varnishes and allied products. (2) Manufactures car leaf springs, bolts, nuts etc. (3) Windscreens, toughened automobile sidelines (4) body builders for mini bus bodies, medium to large vehicles bodies, commercial vehicles, trucks and pick-ups. (5) Tyres and auto vehicle batteries. Forward linkages were maintained with dealers and sometimes direct customers like local bus service companies as will be shown below.

MCEF3 had a spectacular arrangement with most of its suppliers and distributors. As an example, all the dealers – firms that deal with selling and distribution of **MCEF3** motor vehicles are also trained. They are usually invited to come to the headquarters for a few days and sometimes months where they are trained on how to deal with customers, how to conduct repairs and provide after sale services to the customers.

Training was not only limited to the few cases highlighted above, **MCEF3** also offers trainings to its suppliers. In almost all the cases, all the firms supplying auto parts have to be audited by **MCEF3**. This was a requirement to all the companies, which have achieved ISO. In this case, the supplying firms have to demonstrate how certain auto parts will have to be made. In this case, the arrangement goes beyond just presenting contractual specifications to include deliberations and training in order to make sure that the products supplied are of the right specifications (quality and standards). We therefore see a very good example of linkage that comes with demonstration and training. An example of a domestic firm, which had maintained a long-term relationship with **MCEF3**, was presented. In the contractual arrangement the domestic firm was supposed to supply certain auto parts (exhaust pipes) to **MCEF3**. The procedure involved proceeded in several stages as follows:

- ❖ *It starts with **MCEF3** placing an order with the domestic firm manufacturing. Its important to note that unless it is a special order specifically meant for this domestic firm, other orders are made through an advertisement in the local dailies to attract competition.*
- ❖ *Second, the engineers/technicians from this domestic firm would bring auto parts and demonstrate them to the **MCEF3** engineers.*
- ❖ *Third, the **MCEF3** engineers would audit them before allowing them to start supplying them. This audit is supposed to ascertain that the products supplied comply with the required specifications and standards.*
- ❖ *Fourth, the engineers visit the domestic firm to hold discussions with them. In the past, they have even trained the engineers from this domestic firm on how to manufacture some of the products ordered. They would certify that everything else including the conditions of processing was done in the right manner.*
- ❖ *Finally, they would do a final audit to ascertain that the products made meet the specifications given.*

As explained during interview, this example throws considerable light into the kind of interactions **MCEF3** has had with other domestic firms. It clearly shows that other domestic firms have learnt a lot from **MCEF3**. This case supports to a large extent the argument that a firm is not only for the purpose of production but also for generation of skills and experience which can be shared with other firms in the form of knowledge spillovers.

MCEF3 also offers trainings to most of the firms linked to it. A practical example is borrowed from a travel firm in Kenya known as Kenya Bus Services (KBS). KBS has a very strong relationship with **MCEF3**. Besides manufacturing the chassis for the KBS, the **MCEF3** also offers intensive training to the automotive mechanical engineers who undertake maintenance and automotive repair works at KBS. The maintenance mechanical engineers at KBS are supposed to maintain the buses and other trucks bought from **MCEF3**. The collaboration between **MCEF3** and KBS is even made broader by the fact that since **MCEF3** has an extensive network of dealers in many towns; KBS maintains an arrangement to have **MCEF3** automotive mechanical engineers provide back up to the KBS team during the up country bus service trips.

The body builders contracted by **MCEF3** must also comply with the **MCEF3** standards. Once again this is a requirement given that **MCEF3** has an ISO accreditation and thus all the suppliers of raw materials and services must be audited. When a firm places an order with **MCEF3** to have say; some buses or trucks made for them, this is done in two stages. In the first stage the chassis is made at **MCEF3**. The second stage involves body building. Since **MCEF3** does not build bodies for buses and trucks, a second party would have to be involved. At this stage, three parties are in place; **MCEF3**, the body builder and the bus/truck owner. The bus owner explains if possible by making drawing expressions of the appearance he would want his bus to assume. The automotive designers at **MCEF3** would then come up with draft design of the impression presented to them by the bus/truck owner. This design is then presented to the bus/truck owner for further discussion. In case of any alterations the designer incorporates any changes. The process is repeated until the required design is obtained. Once the required design has been obtained, it is then presented to the designers at the body building firm - in this case often locally owned firms. This liaison with the designers at the local firms is to make sure that the exact design and other specifications from their customer are communicated to the body builders. This would avoid anomalies that usually occur. An example is when an oversize body is built, or sometimes so heavy causing damage to other parts such as the chassis. This would erode **MCEF3** reputation. At each stage of the body building the designers would visit the body building just to make sure that everything was correctly done to the drawing and specification. This interaction continues until the expected body is built and certified to the correct specification.

A good example of forward linkage is demonstrated by the case of KBS, one of the key companies in the public transport industry. KBS, which has offered transport services for several decades, operated only in a few towns in the country including only Nairobi and Mombasa. In 1995, the KBS started offering upcountry services popularly known as 'Stagecoach Express'. In order to have enough buses for this purpose, KBS ordered 20 new buses from **MCEF3** valued at KShs 150 Million. The **MCEF3** built the chassis. The buses' bodies were built by local body builders. In this collaboration, the three bodies were involved. The KBS placed the order and the design of their buses. They also wanted their engineers introduced on how to repair and maintain the buses. In addition to building the chassis, **MCEF3** was also to train the engineers at KBS. The distributors of **MCEF3** in the upcountry would also provide a back up to the engineers in the field. The local body builders would build the bodies. But the design of the body would have to be agreed upon by all the parties involved.

6.5.4 Competition Effects

This section attempts to examine the effect of competition pressure exerted by foreign firms to the locally owned firms. The results obtained were quite interesting in that many cases of foreign firms were observed where foreign firms created opportunities for learning, skills and knowledge spillovers to locally owned firms. The extent to which the foreign firms might have triggered the learning process leading to accumulation of technological capability will be evaluated in Chapter 7 from the perspective of locally owned firms.

In machine and engineering industry, both foreign and locally owned firms competed with each other. As the following examples illustrate, the competition served as a trigger for locally owned firms to learn including those in the informal sector. **MCEF1** faces moderate competition from its local competitors but in-turn poses more competition to them. Its toughest competitors are foreign firms operating in the same industry. **MCEF1** was the sole producer of crown cork for several decades. As explained locally owned firms were able to enter the market by producing low priced crown corks – this will be discussed in Chapter 7. The entry of a domestic firm into the production of crown for bottles resulted in the loss of **MCEF1** market. The crown corks produced by **MCEF1** were of high quality standard and thus the cost of producing them was high. The firm could not lower the quality standard given that it follows WCP supported by the parent company. A recent audit conducted by **FBF3** awarded **MCEF1** over 97% marks for efficiency, quality of the products, management practices among other checks. As they claimed, one of their locally owned competing firms received only one point above the accepted audit standard by **FBF3**, which is 70%. But since the local firm is able to provide crown corks at lower prices it had taken a substantial amount of supply orders from **FBF3**. **FBF3** procures more from **MCEL1** than from **MCEF1**. Competition with the foreign firm had created the necessary stimulus for learning and training in **MCEL1** to the extent that the firm has developed much production and export capabilities. The firm now exports crown corks to many countries in the region. It has also been awarded an ISO 9000 certification for achieving international quality standard.

Another interesting case that resulted in intensive competition happened as a result of a merger and acquisition between two domestic firms. The merger happened between a crown paint manufacturing firm and crown tin manufacturing firm. **MCEF1** used to manufacture and supply tin for the crown paint firm until the merger took place. The merger resulted in significant market loss for **MCEF1**. The domestic firm after the merger and **MCEF1** are now stiff competitors and as we gathered, the domestic firm had tremendous learning effects resulting in capability building. **MCEF1** indicated that competition continued becoming stiff, it would have to sell the paint tin processing line and just concentrate in other core businesses. The local firm benefited product skills since the same design was brought. As a part of **MCEF1**'s strategy, it plans to undertake workers training and improve market strategies. The firm was also considering relocating to a lower wage-cost country and had thus started looking for new markets in Tanzania and Uganda.

Interviews with **MCEF2** also indicated that it posed stiff competition to the local firms. This was due to the technology it uses in its operations. It also contended that, it engages qualified personnel and offers continuous training for its staff. When asked whether competition from these firms triggers certain changes in other firms, the firm answered in the affirmative. This was supported by the fact the locals learnt quickly and introduced things as soon as this firm did. The competitors seemed to be advancing their technology

rapidly. This implies that the firm also faces stiff competition from competing firms domestically. As a result of this competition, **MCEF2** has had to undertake several things: improve quality control. Become even more keen human resources development. The immediate strategy is to diversify into other products, new markets and acquisition of new processing techniques.

MCEF4 faces moderate competition as a result of imports into the country by competing firms. However, the firm is into stiff competition with a few domestic firms owned by Kenyans of the Asian origin using relatively advanced technology and machinery. From the interviews done, **MCEF4** claimed that the competing domestic firms learnt a lot from it. The firm contended that "Being among the pioneers in drum making in the country, definitely the followers have a lot to learn from us. It is not only in marketing, but also where the raw materials were obtained from and how to undertake certain logistics." Competition has forced **MCEF4** to introduce new machinery and equipment continuously. At the same time, the firm decided to venture into the production of plastic drums. This was as a part of diversification and to try and get new markets. This is another area where the firm contended that locally owned firms have learnt from them. Apart from introduction of plastic drums, other innovations included introduction of new minor products, redevelopment of some old products, introduction of new processes and market. Above all, the firm had to undertake a very intensive training campaign just to make sure that their employees were fully abreast of what was required. The firm had to also engage in the process of acquiring ISO 9000 quality certification. Since this firm acts as the leader, its competitors have also launched the process of acquiring ISO certification. This example demonstrates that spillovers did exist by stimulating learning processes and introduction of technological changes in the firms.

In the **MCEF3** sector, all firms were faced with stiff competition due to the influx of imported motor vehicles and auto parts. Kenya's Motor industry can be regarded as one of the most competitive industry. The competition comes from the imported motor vehicles commonly known in the Kenya market as 'Mitumbas'¹⁴². Competition started with the liberalisation of the motor vehicle industry. It was then that imported second hand vehicles found their way into the domestic market. The demand for the newly assembled vehicles therefore declined. This is supported by figures obtained from Kenya Motors Industries (KMI) which showed that the annual sales of new vehicles were declining and especially so in the later parts of 1990s including 2000. A similar trend was observed with the market share of new vehicles.

Interestingly, between 1999 and 2000 there was a complete change in the market share scenario. The sale of second hand vehicles commanded a high market share than the sale of new vehicles. From 1999, dealers in second hand vehicles controlled the largest markets share of approximately 60 % up from 43% in 1998 (IEA). So, three significant changes can be noted in the Kenyan motor vehicle industry: *First* is a major decline in the volume of new vehicle sales. *Second* is a major decline in the market shares of new motor vehicles and *finally* a significant increase in the market share of second hand vehicles. Several reasons were flouted for the above trend. The main one was that the tax regime was in favour of importers of second hand vehicles. Report by KMI indicated that a new vehicle attracted a tax of KShs 500,000 while a second hand vehicle attracted a tax of KShs 100,000. This tax disparity made new vehicles expensive. One school of thought had it that the dealers in new vehicles were not innovative, all the local market wanted

¹⁴² This is a commonly used slang language to represent old or second hand clothes and motor vehicles.

was a cheap, low priced vehicle that was affordable given the existing economic hardships that had resulted in diminishing purchasing power.

The second reason was founded on the notion that in the second hand business there was ease of entry and exit. This was so because in the importation of second hand cars not much of capital was needed, as would be the case in starting a big business where significant initial amount of capital investment would be needed. Similarly, for such big investments where sunken capital is enormous, there is usually a huge loss whenever business environment changes. The major critique here is that there has been lack of motor sector policy.

Despite the above stiff competition environment, **MCEF3** faces from the importers of second hand vehicles, it poses competition to other firms operating in the country. Such include foreign firms and locally owned firms. They range from dealers of auto parts to body builders. There is no doubt that as a result of competition from **MCEF3** local firms have been forced to learn and sometimes to introduce certain technological changes. On its side due to competition, **MCEF3** has been forced to introduce dynamic changes often and mainly in products and marketing. For instance, the firm tries to introduce a new vehicle each year. Second, the firm has introduced new marketing schemes with intensive training of their local dealers. Finally, the firm has introduced new processing machinery and technology. The firm's future strategy is to undertake more staff training, improve market strategies and improve organisation and management structure.

6.5.5 Demonstration Effects

This section examines how foreign presence created opportunities for spillover occurrence through demonstration effects in the machine and engineering industry. Using the firms selected, we investigated whether foreign firms techniques are usually introduced or adopted or imitated by the domestic firms and if so whether they are likely to have resulted in learning and innovation. New techniques included production techniques, management and organisation techniques, marketing techniques and strategies etc. Interesting cases of demonstration effect were observed to exist.

We now turn to individual firm accounts. **MCEF2** claimed that many domestic firms have benefited demonstration effects from its activities. According to the firms examples were many that included kind of technology and machinery to be used (processing techniques), products and marketing procedures. **MCEF1** claimed to have had a tremendous demonstration effect to domestic firms. Such companies included the domestic firm which started making crown Corks in the same industry. **MCEF1** claimed that the domestic firm enjoyed demonstration effect that ranged from production technology to the export market.

MCEF3 has had a few examples of demonstrated products. In the Kenyan transport industry the mode of transport is use of vans. These vans are in two categories – big truck buses and small vans. The big truck buses are assembled by **MCEF3** and their bodies are built by the body builders. The first kind of demonstration takes place when **MCEF3** demonstrates to the local body builders how the bodies should be built. The second demonstration occurred to **MCEF3**. The small trucks are normally imported as second hand from Japan. The trucks have served tremendous demonstration to **MCEF3**. The firm has keenly learnt from the imported trucks and was now coming up with their

own model designed similar to those trucks initially imported from Japan as second hand. As explained, the firms was the same in appearance but made slightly big with regard to capacity space. Demonstration to **MCEF3** has led to further demonstration to the domestic suppliers of the required raw materials. This is also a good example where a firm studies the market and then comes up with an innovation facilitated by the in house capability. The innovation then leads to demonstration effects.

Lastly, **MCEF4** claimed to have benefited tremendous spillovers from demonstration effects from competing firms and processing firms that buy its products. Examples cited included introduction of traceability and embossment of their logo in all their products. The suppliers have also demonstrated certain products and **MCEF4** has been able to fabricate them coming up with the required products (equipment). Nevertheless, the domestic competing firms had equally benefited a lot of demonstration effects from **MCEF4**. This was on the side of drum making machinery, drum making technique and marketing techniques.

6.6 Summary and Conclusion

In this chapter, we presented ten detailed case studies to illustrate the ways in which foreign presence created/opened opportunities for spillover occurrence. Six case study firms were considered in food processing and beverages while four firms were considered in machine and engineering industry. For the purpose of our case study illustrations, a framework of analysis was developed on the basis of approach developed and utilised in Chapter 2 and 5 respectively. The analytical framework was developed along four thematic issues; human resources (training) and labour mobility, linkages, competition and demonstration effects that are perceived important in the spillover process. This framework enabled us to go beyond the productivity analysis conducted in Chapter 4. Interestingly, the findings in this chapter supported the results obtained in Chapter 5 – that foreign presence stimulated learning, capability and innovation in locally owned firms.

In order to justify and have an informed understanding of the technological characteristics of the firms, an extra component was added which enabled us to examine production technology, learning and innovation. Analysis of their production technology showed that these firms mainly relied on international sources for the supply of processing technology and machinery. The same trend was observed with product technology, which was often provided by the parent companies or licensed from abroad. In light of this, no serious process or product R&D was conducted in-house but nonetheless the firms maintained strong technical departments and quality control laboratories. When products were developed locally, the parent companies offered technical support. As a result the firms' major innovations to a large extent could be attributed to the introduction of new products and process technology from abroad. This supported the argument that foreign firms do not conduct R&D in foreign developing countries and if they did it was only to a limited extent [Lall, (1979: 1980); Cantwell, 1995; OECD, 1998; Patel and Vega, 1999; Amsden, Tschang and Goto, 2001; Rasiah, 2003].

Subsequently, we sought to understand whether any skills and experience were acquired from the foreign acquired production technology. Based on the discussion presented, it can be argued concretely that foreign production technology and participation in production activities was critical in human capital development, which would in-turn

latently benefit locally owned firms in the form of knowledge spillovers should the workers leave to join locally owned firms. In all the cases, local employees had accumulated tacit and experiential knowledge from on-the-job training and learning by performing. Since most of the time the processing machine and technology obtained were complex, state-of-the-art, this was suggestive that local staff would have to be trained on how to operate, maintain and repair them. This involved people dealing with production such production managers, production operators, as well as engineers and technicians from the technical departments. As gathered, technological trainings often commenced with plant lay out and process installation including commissioning and would entail process operations, process adaptations and maintenance procedures etc. The same case happened with product technology. In all the cases, locals had learnt how to make products including the ones produced under foreign license. Arguably, learning by making changes, by using and by doing enabled local personnel to learn and acquire experience. Similarly, participation in quality management systems (QMS) presented locals with tremendous learning opportunities.

Human resource development was examined in the context of firms' training and other modes of skill enrichment programmes and labour mobility. The analysis showed that local personnel in all these firms acquired technological skills and accumulated experiential knowledge from trainings offered and through learning by doing. At the same time these firms seemed to generate tremendous enrichment of local employee skills by allowing them to participate in skill enrichment programmes organised either in-house or externally. All these firms had better organised training modes with good training facilities and resources to even send staff abroad for specialised training. Many local staff benefited enormous training from exchange programme trainings either with the firm's parent companies or with the suppliers of production technology. With regard to labour market conditions, the firms seemed to observe labour ethics, union, high wages, transportation, better terms and conditions of service etc. The acquired skills and accumulated tacit knowledge resulted in an upward intra-firm mobility, hierarchical, of the local staff. Discussions presented in this chapter showed convincingly how several locals rose through the ranks from junior levels to become senior managers after training and acquiring work experience.

It was interesting to discover the existence of tremendous labour mobility from these firms to locally owned firms. In all the cases, professionals, engineers, and technically skilled workers were reported to have at one time left their jobs and taken up new appointments with locally owned firms. In fact, some left to begin their own entrepreneurs suggesting a possible vital role FDI could be playing in the industry as a breeding ground for local entrepreneurs. We were able to track such locals who confirmed the usefulness and applicability of the skills they had acquired while working with these firms suggesting knowledge spillovers through labour mobility. More details will be provided in the next chapter. These investigations shed tremendous insight into the possible and positive role that presence of foreign firms played in the country's human capital development effort. This in-turn could play a vital role in the growth of locally owned firms and the entire industry.

We examined extensively direct linkages generated by these firms with locally owned firms, institutions and business associations. Pecuniary and non-pecuniary linkages were identified from which backward and forward linkages were traced. This was possible after mapping out all possible and significant production linkages and networks generated by individual case study firms. Some firms formed strong pecuniary linkages compared to others. This seemed to depend on sectors as firms in food and beverages

processing seemed to have more and stronger pecuniary linkages than machine and engineering industry. Even with pecuniary linkages some firms formed strong forward linkages than backward linkages. That depended on market orientation of the firms given that some of them were mainly exporters while others manufactured purely for the domestic and regional market. The demand created by these firms through pecuniary linkages with locally owned firms helped the growth of local firms by providing them with capital for growth, investment and expansion. The effort to improve their orders helped them to improve on their technological capabilities. Nevertheless, the linkages had business advantages to the case study firms in that feed back generated resulted in improvements on products, processes and even marketing approach.

Non-pecuniary linkages included machine and engineering linkages and technical assistance. In contrast to the above, these linkages were more in the case of machine and engineering industry compared to the food and beverages sector. It must be mentioned that due to reliance on foreign suppliers of machinery and technology, local technical links were only limited to maintenance, repairs and sale of machine and engineering equipment. Foreign firms audited their local suppliers. They offered training to appointed co-packers of their products especially in food safety and marketing operations and advertising services. They helped in fixing prices for the co-packers. Some foreign firms engaged local firms in intermediary activities, packaging for them. Others were noted to have positioned some of their experienced personnel in the local firms to supervise and oversee the processing activities. Interactions of these kind resulted in information sharing, trainings on quality control and production management.

Most of the foreign firms contended that the local suppliers of some of the machinery and equipment procured locally have been able to grow, expand and build technological capability and thus absorptive capacity as a result of learning from the orders placed from foreign firm. Engineers and technicians from domestic firms benefited spillover of knowledge as a result of interactions with foreign firms during machine repairs and maintenance or during negotiation on the equipment to be supplied. Some foreign firms were noted to have offered strict conditions. Many cases were identified where domestic supplying firms had to undergo strict auditing, vetting and certification by foreign firms. Just to cite an example almost all of the foreign firms were ISO accredited and a few followed World Class Performance (WCP) in their operations. As a result, the firms had strict requirements that all domestic suppliers must be credible firms. For instance they must be ISO certified in order to maintain the required level of quality. If not accredited in terms of quality, foreign firms encouraged them to start the process towards accreditation. Apart from quality, foreign firms required the domestic firms to be efficient in all their operations including delivery. They must have the right machinery and equipment. They must offer trainings in their firms. They must have sound management practices.

The foreign firms interacted with business associations, private and public institutions such as R&D/academic institutions, financing institutions and government regulatory organisations and enforcement agencies. These interactions resulted in skills and knowledge sharing and in some cases technical assistance. The foreign firms had direct and active participation in most of these institutions – the firms were active members of KAM whose effort to transform the Kenyan manufacturing industry appears promising. While a few chief executives were board members of KAM others held chairmanship in various sectoral committees within KAM charged with specific tasks. Interestingly, some of the chief executives were foreigners with enormous experience derived from vast international exposure. As a result, the wider association of KAM members definitely

enjoyed sharing their wide knowledge and expertise in areas such as labour ethics, trade disputes, corporate governance, policy lobbying technique, technology transfer, formation of linkage, strategic alliances and mergers and acquisitions, intellectual property rights etc. Firms interacted with the MSK whose mission is to promote marketing as a vital ingredient for success and prosperity. Similar to KAM, some of the council members of MSK's were drawn from foreign firms (FBF2 and FBF6). Both institutions organised competitions that created good forum for the exchange of information, ideas and skills.

Firms also interacted with government regulatory bodies such as KEBS where they actively participated in the standards development. To operate in Kenya they need to be awarded the Kenya Quality certification. It is the country's custodian for standards and measurements in Kenya and thus does instrument and equipment calibration, pressure gauge and vineyard etc for firms. KEBS also collaborates with SGS in issuing ISO 9000 certification for Quality Management Systems (QMS) and ISO 14000 certification for Environmental Management Systems (EMS) and Hazard Critical Control Point (HACC). It organises trainings whereby resource persons are sometimes drawn from foreign firms. In partnership with foreign firms, KEBS organises annual competitions for quality awards "Kenya Quality Award (KQA)". Firms interacted with FKE whose efforts to deal with local labour issues appeared fairly promising. For instance, all the firms interacted with FKE for advice on labour issues and trade disputes. Other institutions included KIRDI, Export Processing Council, Kenya Industrial Property Office and Kenya National Chamber of Commerce and Industry. Foreign firms were not keen on obtaining finance from the local institutions and thus had limited interactions with financing agencies for industrial development (IDB and ICDC). However, they also felt that collateral and high interest rate requirements were obstacles to obtaining such finance for investment and expansion more so to the domestic firms. Foreign firms did not interact much with Monopolies and Prices Department, IPC, EPZ and EPC.

The firms were observed to participate in the broader national human capacity development. They offered fellowships to bright students to take courses like engineering courses, computing and other professional courses like marketing and business management. Such were very common with the local universities under, parallel degree programmes¹⁴³, and with intermediary colleges like Kenya Institute of Management (KIM), Strathmore, IAT and school of professional studies. Additionally, they offered industrial attachment to graduates from tertiary institutes of learning. One of the firms worked closely with the Government's Management Training and Advisory Centre (MTAC), the Directorate of Industrial Training (DIT) and Kenya Polytechnic in developing a special training programme. The foreign firms allowed students and organised groups to visit their production plants for observation. The firms also participated in Agricultural shows of Kenya (ASK) where they exhibited their products. As a form of corporate responsibility these firms have participated in building schools – vocational schools. They have also participated in various forms of community development by giving material and money donations to the government to support calamities and disaster victims, or combat diseases like malaria and AIDS etc.

The analysis of competition between these firms and locally owned firms was observed to exist. Stiff competition was noted from imported products into the country, mainly from Egypt and South Africa after the apartheid. The competition was exacerbated by

¹⁴³ The parallel degree programs were established recently in Kenya where anybody including the workers – those already in employment could go back to school on part-time basis and obtain diplomas, degrees (bachelors or even masters).

the onset of liberalisation. Foreign firms competed with domestic firms mainly for domestic and regional market (East Africa and COMESA). Competition came out as one of the most important mechanisms through which firms were triggered to introduce changes in virtually all their operations. Locally owned firms were forced to engage in learning processes while at the same time introducing technological changes. This was so given that these firms were more dominant due to their size and scale of operation, complexity of processing and product technology used etc. The technological changes undertaken in domestic firms would be meant to improve firms' technical efficiency, thus reflecting occurrence of spillovers. This aspect is studied in detail in Chapter 7.

Locally owned firms seemed to have benefited from demonstration effects from foreign firms. Locally owned firms quite often copied and/or imitated processes or products from foreign firms. This happened during the participation in agricultural shows. It also happened when firms observed things manufactured by foreign firms in the supermarkets and so on. As will be shown in Chapter 7, the domestic firms therefore benefit a wider set of product and portfolio without having to conduct a prolonged search for new product development.

In light of the above summary, we can conclude that presence of foreign firms in the Kenyan manufacturing industry seems to stimulate spillover occurrence to the locally owned firms. The positive contribution supports the theoretical arguments in Chapter 2, analysis in Chapter 3 and empirical evaluation done in Chapter 4 and 5. The occurrence of spillovers and their relevance to the building of local capabilities will however be examined in the perspective of locally owned firms in Chapter 7. This will be particularly important in enhancing policy relevance with regard to spillovers, learning and innovation.

TECHNOLOGICAL LEARNING AND INNOVATION IN THE LOCAL FIRMS

7.1 Introduction

In Chapter 6, we examined the extent to which foreign presence stimulated spillover occurrence in locally owned firms. The analysis showed interesting individual firm level accounts of how foreign presence created opportunities for spillover occurrence to the locally owned firms. In this chapter, we attempt to examine the spillover occurrence from the angle of locally owned firms. The analysis is done using eight detailed case studies of locally owned firms selected from food and beverages and machine and engineering industries. The two industries were shown in Chapter 4 to be the most dynamic in the entire manufacturing industry in terms of high growth rate levels, VAD, employment generation, FDI presence etc. As discussed in Chapter 2 and 5, this thesis conceptualises technological spillovers in terms of learning, skills and knowledge acquisition and accumulation. This chapter, therefore, examines extensively the extent to which such knowledge spillovers engender technological changes and stimulate learning process with possible accumulation of technological capability and innovation in locally owned firms¹⁴⁴. The chapter is divided into seven major sections. In section 7.2, the framework of analysis is presented. Section 7.3 offers a brief analysis of the firms studied. Section 7.4 presents the case studies on food and beverages industry while section 7.5 presents the case studies on machine and engineering industry. In section 7.6, an attempt is made to assess the government's role in spillover occurrence. The summary and conclusions are presented in section 7.7.

7.2 Framework of Analysis

This chapter uses a framework similar to the one used in Chapter 6 to examine the extent to which foreign presence stimulates spillover occurrence to the locally owned firms. Most importantly, we seek to understand whether spillovers from MNC firms stimulate any kind of technological changes and learning and if so to what extent that leads to technological capability building and innovation in the locally owned firms¹⁴⁵. Since spillovers as defined in this study are specific to the firm, the framework used allows us to trace and examine spillovers uniquely through their occurrence mechanism¹⁴⁶. The framework of analysis proceeds as follows:

From our approach in Chapter 2 and 5, it was shown that spillover occurrence involved activities of both foreign and locally owned firms. Since the activities of foreign presence were presented in Chapter 6, in this chapter we will look at activities of locally owned firms. The analysis done here is expected to go beyond the productivity technique and examine the mechanisms through which spillovers occur and how they translate into production through learning, capability and innovation. This will further enhance policy

¹⁴⁴ It is important to emphasise that although locally owned firms could as well stimulate spillover occurrence in foreign firms, this chapter will not address that in significant detail and will only be limited to studying how foreign firms stimulate spillover occurrence in locally owned firms.

¹⁴⁵ We emphasise once again here that not all spillovers should be interpreted to be good especially so in food processing when food rich in hormones or sugar content get copied by locally owned firms.

¹⁴⁶ In Chapter 5 a generic approach was adopted referring to technology and machinery as process technology and so on. In this chapter specific spillovers are traced, e.g. machines and technology which are different from one firm to another.

relevance in which case informed recommendations for policy necessary for continued development of a dynamic manufacturing sector will be prescribed with regard to FDI, capability building and innovation¹⁴⁷. As pointed out in Chapter 6, the analysis done here is not meant to compare concretely between foreign and locally owned firms as such data and/or information would not be available in the Kenyan context. Rather it is just meant to provide individual firm level accounts of the spillover process. We now discuss the framework developed in the perspective of locally owned firms¹⁴⁸. *First*, we examined human resource development undertaken in these firms emphasising on training. Subsequently, we investigated labour mobility. Investigations are made to determine whether any of the professionals, scientists and engineers or any other skilled workers had previous experience acquired while working with other firms and whether the previous firms were MNC or locally owned. Evidence of spillovers due to labour mobility is still scarce with only a few studies existing (Gerschenberg, 1987; Behrman and Wallender, 1976; Pack, 1993; Fosfuri, Massimo and Ronde, 2001; Lin and Rasiah, 2003). We focused more on workers from foreign firms to locally owned firms. In such cases, we were interested in finding out whether such employees introduced any new technological changes or new forms of learning which would lead to accumulation of technological capability and absorptive capacity. This would provide insight into whether foreign firms participated in the country's human capital development effort.

Second, linkages formed with foreign firms were mapped out and their importance in terms of contents was investigated. As noted earlier, the importance of linkages between MNCs and domestic firms has been discussed in different contexts (Hirschman, 1958; Lall, 1980; Rasiah 1995; Rodriguez-Clare, 1996; UNCTAD, 2002; Belderbos, Capannelli and Fukao, 2001; Smarzyska, 2003). Examining linkages from the angle of local firms was important in that some linkages which might appear less significant viewed in the lenses of foreign firms could be of tremendous importance in the perspective of locally owned firms. For instance, as indicated above pecuniary linkages might have helped the growth of local firms by providing them with much needed capital. More so, the demand or supply created by foreign firms sometimes exposes new opportunities for local firms to make new investments and/or expand. The links could also expose and stimulate locally owned firms into joining value-added chains new to them. Non-pecuniary linkages formed with foreign firms were equally studied. They included links with the machine and engineering (user-supplier relationships) and technical assistance through interactions with the local support systems such as business associations and institutions such as R&D/academic and financing institutions.

The role of institutions as intermediates for spillover occurrence to the locally owned firms was assessed. The importance of institutions as intermediary organisations that coordinate demand-supply relations between firms, government, and institutions has been emphasised (Rasiah, 2001; Doner, 2001; Aoki, 2001). As discussed in Chapter 3, institutions were observed to provide support but at different levels of efficiency and performance. We emphasise that support structure provided by the institutions in an industry is likely to enhance domestic firms' capacity to absorb spillovers from foreign firms¹⁴⁹. To assess this phenomenon, a few institutions were carefully selected from

¹⁴⁷ The chapter will however carry the discussion only and the policy dialogue and prescriptions will be provided in Chapter 8.

¹⁴⁸ The analytical framework elements are similar to those discussed in Chapter 6 and contained in our approach in Chapter 2 and 5.

¹⁴⁹ The support included offering finance, offering technical training, regulatory purposes, providing technical information, providing technical and advisory support etc. Institutions can create forum for interactions as they hold joint firm trainings and thus can result in knowledge spillovers and information sharing.

business associations, ministries and institutions – academic as well as financial institutions (see Table 2.3 in Chapter 2). The information was obtained through interviews and discussions held with personalities deemed knowledgeable mainly in investment, industry, innovation, privatisation and FDI. The personalities often included local officials, professionals and scholars.

Third, competition between the case study firms and foreign firms was examined. Such competition often arises when foreign firms are active in the same markets with local firms. This could often reflect spillovers of knowledge and skills from foreign firms in the perspective of trigger effect (Caves, 1982; Das, 1987; Wang and Blomstrom, 1992). We attempted to understand the technological changes that take place in locally owned firms and how they undergo the process of undertaking them. As an example, we investigated how the local firms reacted to the competition pressure? By implementing changes and engaging in various learning processes do the locally owned firms manage to develop their own internal capabilities and respond positively to the foreign firms' competition pressures? Did the existing business support structure in the domestic innovative system help e.g. get a consultant, get help in raising quality levels etc? Several alternative explanations as to why Kenyan firms might have survived and continued keeping up can be provided. The government could offer some subsidies to the locally owned firms and second the locally owned firms could be serving a different market from that served by the foreign firms. The probing question here to be investigated is; how did the local firms survive or cope up with the competition pressure? Was it because of the reasons provided above or have they learned something from MNCs and if so what and how? If so, what kinds of technological capabilities have been built as a result of these spillovers? Note however, that competition pressure can have negative effects to learning and innovation in domestic firms. *First*, competition pressure can result in crowding out of domestic firms – unfortunately this effect will not be examined for lack of necessary data and information. *Second*, competition pressure can also result in shutting firm alternatives out of the markets. For instance, when competition is high domestic firms are likely to concentrate their effort in advertising at the expense of learning and innovation.

Fourth, we also examined demonstration effect from the angle of locally owned firms. Locally owned firms have often benefited from demonstration effects from FDI (Mansfield and Romeo, 1980; Blomstrom, 1986; Rasiah, 1995). We examined the extent to which locally owned firms have managed to copy or imitate products, processes and marketing skills from foreign firms. Demonstration effect provides the imitating firm with a wider choice of products, processes etc without having to engage in a rigorous search process. Similar to competition, imitation can have negative ramifications to the domestic firms. As an example, a negative effect can however occur when domestic firms simply copy products or processes of foreign firms without making much effort to learn and accumulate own technological capability which would enable them become innovative in the long run. Having to rely on low wages without real competitive advantage does not last if not accompanied by capacity to learn and innovate.

On the basis of survey data analysed in Chapter 5, eight locally owned enterprises were selected for a deeper analysis in the form of case studies. The eight firms included seven private firms and one state-owned enterprise (SOE). Four case study firms were selected for each manufacturing industry (food processing and beverages and machine and engineering). As in the case of foreign firms, the local firms' selection criterion was based on the nature of production technology as well as learning and innovation observed in the firms during the survey phase – the selection and technological characteristics of the

firms considered are discussed extensively in sections 7.4 and 7.5. As was the case with foreign firms, all the local firms except one offered us guided tours of the plants to view their production processes. In most of the cases, senior managers and often the production managers accompanied us during the tour. As was the case with foreign firms studied in Chapter 6, this out of office interaction with the professionals created an informal atmosphere, which provided a good opportunity for us to obtain extra information. Books, magazines and annual reports would also be collected. Extra information was obtained during international trade and agricultural show. Active links were maintained with the firms just in case certain clarifications needed to be made on information provided during the interviews. The link maintained with Central Bureau of Statistics proved to be extra useful in providing extra data and information required during the case study analysis.

7.3 Brief Analysis of the Firms: Background and General Information

7.3.1 Food and Beverages Industry Briefly

The four case study firms studied in the food and beverages industry included (**FBL1**, **FBL2**, **FBL3** and **FBL4**). **FBL3** and **FBL4** were established in Kenya before 1970 while the other two were relatively young having been established after 1980. All the case study firms can be regarded as large scale firms by Kenyan standard as they employed more than 100 employees (see Table 7.1). Asians of Kenyan origin owned two (**FBL1** and **FBL3**) of these firms. An African of Kenyan origin owns **FBL2** while **FBL4** is a state owned enterprise.

With regard to production, **FBL1** was a slightly large scale firm that refines and manufactures cooking fat and edible oils, margarines and soaps. The firm is run as a family business and has a long history dating back in the 1970s when it was first established as clothing factory founded in Nairobi. This firm was later sold after the textile industry collapsed undermined by the dumping of imported textile (second hand) and increased cost of production. The proceeds from the sale of this firm and a loan from industrial development bank (IDB) enabled the family (father and his two sons) to establish a soap manufacturing plant in 1985 in Nairobi. In 1991, the family established an oil refinery a few kilometers from Nairobi and in 1998, the firm acquired a firm that manufactures edible oil from sunflower, soya bean and cornflower. **FBL1's** expansion plan has been gradually rolling over to other countries in the region. In 2001, **FBL1** acquired and expanded a soap-manufacturing factory in Tanzania. In 2003, the firm launched an oil refinery in Dar Es Salaam for processing edible oils and toilet soap. Plans to invest in a nucleus palm oil plantation and a refinery plant in Uganda were also at an advanced stage.

FBL2 was one of the group companies of a large conglomerate family business involved with mass production and distribution of soft drink and beverages. The firm also packages fresh fruit juices and mineral water.¹⁵⁰ **FBL2** has grown over time and can be regarded as one of the most successful indigenous family businesses in Kenya. At its inception the firm was involved with the manufacture of a South African sorghum beer, originally operated by a MNC subsidiary in Kenya. The business grew tremendously over time with significant diversification which resulted in establishment of five business conglomerates. Out of these, **FBL2** was regarded as the flagship of the family

¹⁵⁰ The proportions of products manufactured were as follows: carbonated soft drinks (80%), ready to drink juice (11%) and drinking water (1%).

business¹⁵¹. Similar to **FBL2**, **FBL3** was involved in the production of soft drinks, packing of fresh fruit juices and mineral water. It is authorized to bottle various soft drinks by an American based MNC, to import, sell and distribute Coke cans as well as non carbonated beverages of Coke.

FBL4 was initially established in Kenya, as a foreign owned firm (British) dealing with importation and distribution of wines and spirits in the country. However, the firm was transformed into a state owned enterprise (SOE) in 1969 when the Kenya government acquired it from its foreign owners. Upon acquisition, the firm continued importing and distributing wines and spirits in the country. Overtime, the firm has been able to learn and accumulate the necessary technological capability in production enabling it to diversify its operations to include manufacturing of own products – of high quality distilled alcoholic beverages from locally available tropical fruits. As will be shown at a later section, the firm enjoyed a major innovation when it pioneered wine making in the country in 1982. It's activities included procurement 65%, manufacturing 25% and distribution 10%. It also packages mineral water and a variety of fresh fruit juices.

As far as performance was concerned, **FBL1's** total fixed assets amounted to about KShs 2.8 billion in 2002. **FBL1** had the highest sales turnover. The firm had an annual sales turn over of approximately KShs 4.5 billion with about 30% of it coming from the exports to the COMESA region where the firm had been exporting for over 15 years. By 2002, **FBL2** had total fixed assets of close to KShs 15.0 million and with a turn over of approximately KShs 110.0 million, Table 7.1. All the manufactured products are meant for the domestic market, as **FBL2** does not export any of its products. **FBL3's** total fixed assets amounted to KShs 0.68 billion at the origin. The firm has a total output of about KShs 0.93 billion. The firm does not export but it sells goods worth KShs 2.0 million to domestic exporting firms. In 2002, **FBL4** had a total turnover sale of about KShs 0.8 billion. The firm's exporting experience spans over a period of 4 years but only to the regional market that includes Tanzania, Uganda, Rwanda and Eastern Congo.

¹⁵¹ The second one was involved in the processing of maize flour. The third business dealt with real estate properties. The fourth was an inter-net firm based in Nairobi, dealing with computer technologies offering diverse services that included domain registration, web design and web hosting. The last firm dealt with mobile phone businesses.

Firm Code	Year Established	% of Capacity Utilised	Number of Employees (Expatriates)	Profes. & Tech	Local & Owned Firm	Main Product(s) Manufactured	Sales Turnover (Mn KShs)	% of Sales Exported	Main Export Destination	R&D (% of Sales)	COMP	LNK	LM	DEM
Food and Beverages														
FBL1	1980	70	625(12)	33	Yes	Cooking fat, margarine, soaps	4,500	40	COMESA	1.25	3.60	3.50	3.40	3.60
FBL2	1988	60	241(0)	8	Yes	Soft drinks, mineral water, fruit juice, maize flour	110	0	Domestic market only	0.27	4.60	3.20	3.60	3.80
FBL3	1962	85	273(3)	7	Yes	Soft Drinks, mineral water, fruit juice	925	34		0.00	4.00	3.20	4.00	5.00
FBL4	1969	70	234(1)	21	Yes	Wines and Spirits, fruit juices, mineral water	800	7	Uganda, Rwanda and DR Congo	0.48	4.60	4.00	4.00	4.60
Machine and Engineering														
MCEL1	1978	80	44(2)	20	Yes	Crown for bottles, printing sheets	500	40	COMESA, Tanzania	0.00	1.80	2.00	0.60	3.00
MCEL2	1983	70	147(2)	29	Yes	Water pipes & sections, MS plates, profiles	753	30-40	COMESA countries	0.21	2.80	3.00	4.20	3.20
MCEL3	1929	68	355(1)	10	Yes	Aluminum cookware, aluminum sheets, aluminum circles	725	60	COMESA countries	0.08	4.00	3.20	3.60	4.60
MCEL4	1982	100	523(11)	26	Yes	Cold steel rolls, Annealed iron	5,000	45	COMESA, Africa, Europe, America	0.01	4.80	4.50	4.80	4.80

Table 7.1: Basic Data and Information on Locally Owned Firms Interviewed, Kenya, 2002-2004

Note: COMP, LNK, LM and DEM represents spillover indexes for spillovers from foreign firms computed for competition, linkages, mobility and demonstration mechanisms.

7.3.2 Machine and Engineering Industry Briefly

A total of four locally owned firms were interviewed in the case of machine and engineering industry (**MCEL1**, **MCEL2**, **MCEL3** and **MCEL4**) – see Table 7.1. **MCEL3**, owned by Asians of Kenyan origin, was the oldest having been established during the colonial days. The firm enjoys three major divisions; one manufactures Aluminium circles and sheets, the second one specialises in Aluminium utensils for European export market while the third one manufactures products destined for COMESA region only. **MCEL4** was originally established in 1961 as a galvanising plant located in Nairobi. By the close of 1970s, the firm underwent a major expansion when two new investments, a tube mill and a strapping mill were made. In 1982, the firm opened a major cold rolling mill in Mombasa¹⁵² where the firm had further expansion in 1999-2000 when it invested in a world-class continuous galvanising line (CGL). This was a US \$ 30 million project with US \$ 11.5 million from Investment Finance Corporation (IFC), and Euro 9.0 million from the European Union's Investment Bank (EIB). Asians of Kenyan origin established both **MCEL1** (Kenyan African) and **MCEL2** in 1978 and 1983 respectively. **MCEL1** is a part of a large group of companies that comprises financial institutions, banking institutions, insurance brokerage, real estate among other businesses. It is the only locally owned firm that manufactures metal crowns in the country with subsidiary of a MNC as its competitor – this was **MCEF1** studied in Chapter 6. As will be shown at a later stage, this firm has accumulated technological capability over time and has turned out to be a great competitor to the MNC subsidiary. At the time of its inception 1983, **MCEL2** used relatively state-of-the-art technology to manufacture a wide range of steel water pipes, hollow sections, steel plates and furniture tubes widely used in water projects, building industry and for exhaust pipes industry.

With regard to performance and investment, **MCEL1** had a turnover of about KShs 0.5 billion with total fixed assets amounting to about KShs 70 million. The firm has been exporting for over 25 years. Its market destination included COMESA and Tanzania. The firm has a turn over of approximately KShs 1.0 billion. It commands between 70% and 80% of the market share in Tanzania and Uganda. The firm also exports its products to Ethiopia, Rwanda, Malawi, Zaire and Eritrea. This firm was also the approved supplier of crown corks to MNCs like Coca-Cola and Pepsi-Cola. **MCEL2** had total fixed assets of over KShs 1.20 billion and a turn over of approximately KShs 0.75 billion. The firm controls between 40% and 45% of the total domestic steel pipe market. As explained by the production manager engineer, the firm is highly reputed in the COMESA and SADC regions due to the high quality of its export products. The firm exports between 30 - 40% of its products. Some of the main countries where the firm's products are exported include most countries within the COMESA region. Other countries include those outside the COMESA regional block like Mauritius, Tanzania, Madagascar and Ethiopia. **MCEL3** had total assets of about KShs140 million. The three main production activities include Aluminium circles (discs), which accounts for 50%, Aluminium wares that accounts for 45% of the firms production activities and Aluminium sheets, which accounts for 5%. The firm manufactures for the domestic as well as foreign market. In actual fact the fact the firm has a strong emphasis towards exporting. The firm has been exporting for over 20 years. Mainly the firm exports to the

¹⁵² This was the first cold rolling mill in Kenya and the largest in East Africa. When the rolling mill was commissioned in Mombasa, the galvanising division, tube mill and strapping divisions were then transferred to other associated companies based in Nairobi.

COMESA region. In 2002, the firm had total sales of KShs 0.725 billion and an export value of KShs 0.44 billion. **MCEL4** has total fixed assets of KShs 5.0 billion and an annual sales turnover of KShs 5 billion, Table 7.1. The firm exports 45% of its processed products while 55% are consumed in the domestic market. **MCEL4** enjoys over 50% of the local market share. Its products are mainly exported to East and Central African region. **MCEL4** also exports to West and North African region. With increased investment in technologically advanced machinery, the firm has acquired the necessary technological capability to manufacture products that match international quality standards. As a result, the firm's export destination and market has expanded to include countries in the Far East, Asia, Europe, North and South America.

7.4 The Case Studies of Locally Owned Firms in the Food and Beverage Industry

This section provides some illustrations on spillover process alongside the conceptual elements outlined in section 7.2. It begins with an explanation of how case study firms were selected. In addition to specific firm characteristics provided in section 7.3, our selection was further based on technological characteristics of the firms. Analysis of production technology in the case study firms in food processing and beverages had positive consequences for spillovers occurrence.

7.4.1 Firm Selection and Justification: Emphasis on Production Technology, Learning and Innovation

As Chapter 6, selection of local firms included in our case studies was based on sophistication of production technology as well as learning and innovation effort observed. **FBL1**'s selection was influenced by the flowing reasons: First, it operated in one of the most competitive sectors alongside MNC subsidiaries¹⁵³. Second, **FBL1** had several transactions involving production technology with MNC subsidiaries operating in the country. Finally, the firm operated large scale utilising some of the most versatile and completely integrated manufacturing processes in its industrial sector¹⁵⁴. While the core processing technology and machinery was primarily sourced from Europe, some of the product and processing technology had been purchased locally from a MNC subsidiary operating in Kenya. The firm, however, does not do search R&D for process technology and thus it relies totally on foreign supply of process innovation, technology and machinery.

The case of **FBL1** was particularly fascinating in that it represented an example of locally owned firm with an extraordinary expansion history and one that benefited tremendous technological spillovers from the presence of MNC subsidiaries operating in the same industry. As a result of these spillovers, the firm acquired significant production capability, which in-turn enabled the firm to innovate. The first example took place when **FBL1**

¹⁵³ This was the cooking fat and edible oil sector where **FBF1** operated. **FBF1** was included in our case studies discussed in Chapter 6.

¹⁵⁴ The firm utilizes fully foreign technology to manufacture a wide range of products that comprised cooking fat (50 %), margarine (35 %) and soap¹⁵⁴ (15 %). The firm contended that it utilised modern processes in oilseed crushing, extruding, solvent extraction, refining, fractionation, winterization, and hydrogenation, interesterification and in soap making.

acquired a branch of MNC subsidiary operating in the country. An Italian entrepreneur with vested interest in edible oil processing initially established the acquired firm in 1972. The firm was a *stand alone* without foreign affiliation for 14 years when the Italian entrepreneur decided to sell it to an American based subsidiary operating in the Kenyan flour milling industry. Later in 1998, **FBL1** acquired this firm from the American subsidiary. By so doing, **FBL1** benefited a broad portfolio of new product brands and processing techniques as well as human capacity. **FBL1** inherited an already established management and organisation set up as well as an established sales and distribution network including export market. All these summed up, amounted to strengthening **FBL1's** technological capability and marked a strong point of departure from which experience and in-house learning took place. The employees had accumulated the necessary production capability having acquired skills in production operations and management in the manufacture of edible oil from sunflower, soya bean and cornflower while working under the foreign firm. As a result of the strong production capability base inherited, coupled with management skills and extra capital injection from **FBL1**, this firm (now a branch of **FBL1**) expanded by 400% in a year. The branch had a further expansion in 2003 after undergoing new machinery and equipment investment raising its production capacity to over 30,000 tones per year. Strong human capacity and new capital investment by **FBL1** were regarded as the driving force behind the firm's growth and expansion.

The second example of technological spillovers to **FBL1** as a result of foreign presence was equally interesting. In 2002, **FBL1** bought major cooking fat brands from a subsidiary of a European MNC operating in the country – **FBF1** – considered for case study in Chapter 6. The MNC subsidiary was adopting its parent company's strategy of reducing the number of product brands worldwide to just a few. As a result of this strategy, **FBF1** stopped manufacturing, marketing, sale and distribution of some of its brands in Kenya. Subsequently, **FBF1** offered these products and their processing technologies for sale locally. **FBL1** decided to buy the cooking fat brands in addition to their production machinery and equipment, which included the entire processing line. The spillover benefits were wider, in that this transaction created business for other locally owned firms in the machine and engineering industry that were contracted to transfer and install the plant at the **FBL1's** plant site. This case confirms occurrence of spillovers as a result of foreign presence. Although **FBL1** was manufacturing its own cooking fat brands targeted at the middle-income group, this was the first time it was going to engage in the processing and distribution of this particular brands of cooking fat. Both the product and process were new innovations to **FBL1** and thus their manufacture meant increased skills of product and process technology, management and marketing skills and new distribution lines for the brands. **FBL1** has acquired more capability through learning by doing and has undergone expansion that has included opening new plants in the neighbouring countries.

With regard to R&D the firm has a relatively advanced R&D unit by local firms' standard. However, this was more of a quality control laboratory manned by a few food scientists and technicians who were basically charged with ensuring a smooth and efficient running of the plant. The quality control laboratory was charged with testing of raw materials, process control, inspection of packaging and delivery until the products got to the intended consumers. The process control was done by batch checking at regular intervals to guarantee that the expected standards were maintained. **FBL1's** has ISO 9002 certification by the Bureau Veritas Quality International of Geneva and thus its quality standards complies with

the ISO standards internationally. The continuous audit by SGS and KEBS and KIRDI ensures that expected standards are maintained. The firm maintains an engineering department charged with undertaking repairs and maintenance. This demonstrates that the firm has had an engineering and technological effort. This department maintains active links with suppliers of technology and machinery who in most cases would also be consulted whenever critical technical problems related to the production process arose or whenever a major modification was required.

The second firm selected was **FBL2**. This firm was selected as it was the most advanced Kenyan African owned firm we had and one that had survived stiff competition in a sector dominated by MNC subsidiaries such as **FBF6**¹⁵⁵. The firm maintained strong international links as will be shown in section 7.4.3. **FBL2** manufactures a variety of soft drinks products, packaged fruit juices and packages drinking mineral water¹⁵⁶. Its core production machinery for soft drinks was fully foreign – mainly sourced from Germany. This firm benefited technological spillovers from a foreign firm which stimulated it to innovate, grow and expand. Initially, the firm started with the manufacture of an alcoholic beverage, a South African Sorghum beer, which was originally manufactured by a MNC firm in Kenya known as Lonrho. **FBL2** bought the production machinery and the brand with the intention to develop the brand for the local market. However, due to shrinking market, the firm decided to shift its production to the processing and bottling of soft drinks. **FBL2** ventured into soft drinks manufacture by buying two popular local brands from a firm owned by Asians of Kenyan origin. Alongside the two soft drink brands, **FBL2** obtained the production process – machinery and a few engineers, technicians and machine operators.

At the time of this research the firm had just commissioned its second bottling process for its soft drinks. However, this was a second hand bottling process obtained at a cost of KShs 115 million from a German firm. Being about four times efficient in terms of performance compared to the old bottling line¹⁵⁷, the bottling process could be regarded as a remarkable process innovation to the firm. As will be discussed later in this section, competition pressure from the MNCs operating in the sector forced this firm to invest in the bottling process. The new machine was more automated and required less personnel to operate it. The government supported introduction of the new bottling line by waiving the firm from paying tax on the imported machinery and equipment. Further, the line enjoyed commissioning by a government minister. By extending the tax waiver to the firm, the government played a crucial supportive and a facilitative role. For the installation of the new machinery, the firm relied on foreign technical partners to lay the plant and introduce staff to the know-how among other machine operations – see a rough drawing on the process layout in Figure 7.1 below. The technical staff from the machine suppliers interacted with **FBL2**'s technicians. From this interactions and training offered they would then be able to operate, maintain and sometime in future modify the machine without having to rely on the

¹⁵⁵ FBF6 was a case study firm studied in Chapter 6.

¹⁵⁶ The firm was also involved in the manufacture of maize flour. The firm uses Italian and Swiss mills manufactured by Roncanglia and Buhler AG companies respectively. These were the only mills of their kind in East Africa.

¹⁵⁷ The new machine had a processing and packaging capacity of 16,000 cases a day compared to 4,000 cases a day with the old bottling process line. As claimed by the corporate affairs manager, the acquired line would enable the firm to produce enough soft drinks to cover domestic and regional market at least in the immediate trading blocks – i.e. East Africa COMESA and SADC.

foreign technical partners. To the firm, acquisition and installation of this plant was regarded as a significant process innovation.

Figure 7.1: Simplified Soft Drink Production Process in FBL2¹⁵⁸

The process and product technology support obtained from Europe (German, Italy, France and Switzerland) enabled **FBL2** to successfully develop its own soft drink brands. As an example, product technology backing came from leading firms in the production of flavouring constituents for soft drinks. Dohler Euro Citrus, a firm based in Germany was cited as a leading example from which **FBL2** had obtained a few product innovations. Two examples can be singled out. The *first* example involved the carbonated soft drink flavours, which made **FBL2** the only African owned firm with a large number of soft drink flavour in the carbonated soft drinks industry. In the second example, the German firm also supported the introduction of ready to drink juices in **FBL2**. This firm continued to supply **FBL2** with the required juice concentrates. The firm offered production assistance in setting the required quality standards. Introduction of blackcurrant was an example of a product innovation introduced with the support from Dohler Euro Citrus. Collaborative R&D efforts between Dohler Euro Citrus and researchers from **FBL2** led to the development of high quality blackcurrant flavour, resulting in a blackcurrant ready to drink juice. This was another example of a local firm stimulated by a foreign firm to undertake innovation by introducing new products for a domestic market. This also buttresses a second point that locally owned firms in Kenya can indeed be innovative. It also supported existence though rare of a collaborative R&D between a locally owned indigenous firm and a foreign firm. In

¹⁵⁸ The process in this plant proceeded as follows: The bottles are fed into the processing line for cleaning in the washing machine. After that the bottles are then fed into the filling machine for filling. The soft drink is fed from the mixing and blending machine and after the carbonation has been done. At each stage there are always quality control checks. The blender is a mixing machine for concentrates, syrup and water. After the bottles are filled, they are then taken to a capping machine. The capping machine uses a Germany technology and corks the bottles with crown corks obtained locally. Another unit of inspection and coding using a machine for fixing expiry dates follows the capping unit. The soft drink is then off loaded to the stores or to the warehouse awaiting distribution and delivery.

the light of the above discussion we can conclude that **FBL2** learnt from the foreign firm and that the production capability acquired enabled **FBL2** to manufacture and package its own juice products¹⁵⁹. As a further innovation on its own, **FBL2** introduced 'dilute to drink juices' or the concentrated juices. This was a result of information gathered from market research and intelligence. The firm discovered an existing niche market for dilute to drink juices. This was supported by requests and feedback from retail customers, distributors and wholesalers triggered the firm to join the concentrated juice market. The firm introduced a dilute to drink juice which was in the form of a concentrate developed maintaining the same flavours already known by the **FBL2** customers. This was a typical example of a case where interactions and feedback from the market triggers learning and innovation in a firm. This is consistent with the innovation literature [Lundvall, 1992; Nelson, 1993; Edquist, 1997; Mytelka, (2000: 2004)].

In sum and according to the interviews conducted with the firm's public affairs manager, production engineers and food scientist indicated that as a result of strict path followed towards improvements, **FBL2** had improved its product brands to match international standards. They contended that the firm was on its path toward achieving ISO certification for high and international quality standards. Although the firm can be regarded as innovative in terms of (process and product changes), it cannot be regarded as one with strong R&D to continuously generate and support strong innovations. The firm had quality assurance certification from KEBS and planned to work towards achieving ISO for international quality management certification.

The selection of **FBL3** was equally exciting in that it represented a case of a firm, which was one of the franchise firms that bottles soft drink brands of a US based MNC and a world giant. The MNC through **FBF6** provides advice and guidelines on products, processing, marketing, and organisation and management techniques. All these can be viewed as direct technological spillovers. **FBL3** utilises fully foreign production technology and machinery all obtained with support and advice of the brand suppliers. The firm enjoyed three bottling lines at the time of this research. The recent and most efficient bottling line was acquired in 2002 from Germany. This was a new bottling line, completely state-of-the-art; computer numerically controlled (CNC) and was fitted with two robot¹⁶⁰ machines. Acquisition of this process line made an enormous contribution to the firm's production capability¹⁶¹. This was not only a significant innovation to the firm but also served as a great source of technological learning to the staff in the firm. The line had other innovations – it was fitted

¹⁵⁹ The production manager outlined the juice making process which staff had fully mastered (production capability) as follows: The first one was syrup preparation process. The second was mastery of the pasteurization process which had to be done at specified temperature and time. Third was knowledge of how constituents required in juice making are mixed and blend. About five separate constituents are mixed i.e. they include water, concentrates, flavour secret obtained from Germany, preservatives and vitamins in the form of ascorbic acid. A wide variety of flavours are prepared ranging from strawberry, lemon, pineapple, and passion to blackcurrant. The Germany firm offers technical support as well as KEBS which sets the standards for juices in the country.

¹⁶⁰ The main innovations in this production process line, robots, enhanced the firm's efficiency and productivity significantly.

¹⁶¹ Some of the statistics provided on efficiency showed that, when the old line had a rated capacity of 500 – 600 cases for the 300-ml bottles per hour, the new line had a rated capacity of 1,192 cases per hour for the 300-ml bottles. In addition, this line had the capacity to bottle 500-ml and 1,000-ml bottles at a rated capacity of 954 cases and 1,433 per hour respectively.

with new quality control machine supplied by a South African firm "Filtec." The machine was automatically programmed to check specific quality characteristics of the bottles that included residual, finishing, base and inner sidewall. The use of ultra violet radiation made the machine particularly very sensitive and accurate.

We now turn to the learning and experience accumulated from this technology and machinery. Before installation of the process line, three engineers were sent to Germany for more than a month to be trained by the suppliers on how to operate the production technology and manage production. During the installation of the processing line including robots, many 'people' were involved. Apart from expatriates from technology suppliers, and firm engineers and technicians, the firm for the first time involved engineering students from a local national polytechnic. The idea behind it was that engineering students from the polytechnic would comprehend and assimilate technical issues quickly given the sophistication and integrated nature of the new process technology. The firm later employed some of the students when they completed their diploma programme. As the interviews confirmed, acquisition of the new process technology and machinery led to significant firm re-organisation in terms of management structure and training. These were further innovations to the firm. This example shows how production processes obtained from the above results in learning, capability building and innovation in firms and institutions like the national polytechnic involved.

Apart from the bottling lines discussed above, the firm maintained a syrup preparation section for the purpose of soft drink manufacture. The section presented a different form of technological learning to the firm. As explained by the production manager, the staff had been trained on the syrup manufacture. Since this firm operated under a franchise arrangement under the US soft drink MNC giant, the training offered was in line with its international standards. In addition, the staff also learnt while on job by doing and had fully mastered the entire process of syrup making. The process learnt and mastered entailed mixing concentrate, sweeteners, water and CO₂. Each time a new brand is introduced, the instructions and fresh trainings are provided.

FBL3 does not conduct R&D in product technology hence it does not perform any product innovation. As in the case of **BBF6** discussed in Chapter 6, the firm relies on international brand suppliers for innovations in product technology. The firm is therefore authorised to manufacture, bottle and distribute the products under the brand owner's license. The firm observes strict quality standards set by the brand owners who often audit the firm and thus everyone has to be very well trained. As a response to the firm's effort in quality control, it has achieved ISO 9002 and ISO 9000-2000 certification. The later quality certification emphasises on strict quality control, continuous changes, customer satisfaction and human resources development. The firm has an engineering department employing about 40 to 50 skilled personnel who include: engineers, technicians, mechanics and electricians.

FBL4 was selected due to several reasons. The *first* one was that we needed at least one case study of a state owned enterprise firm in our sample. *Second*, this firm had strong links with **BBF5**; a MNC subsidiary studied in Chapter 6. *Third*, it had very strong international links. *Fourth*, the firm operated in a very competitive environment where MNC subsidiaries such as **BBF3** also operated. The *fifth* reason was that **FBL4** benefited tremendous technological spillovers after it inherited processing machinery, importation and a whole distribution

network of wines and spirits from a foreign firm. This provided a sound base of its future expansion. At the time of our survey, **FBL4** utilised fully foreign processing technology. The core production technology and machinery were obtained from Europe – mainly Sweden, United Kingdom and German. The estimated age of all the firm's production machines was below 10 years and utilised 70% of its total installed processing capacity.

Since 1982, the firm has been involved in the importation, packaging and distribution of wines and spirits. It imported wine in bulk (barrels) and then re-packaged it after undergoing partial processing in the firm¹⁶². The partial processing was done to reduce strength, a process referred to as 'dilute to drink' since some of the wines and spirits were imported in their highly concentrated form. Brandy, for instance, was imported in a highly concentrated form and had to be partially processed to reduce its concentration to local specifications and standards before bottling it for the domestic and regional market. The production manager acknowledged that through importation and continuous partial processing of the imported wines and spirits, the firm had over time learnt and accumulated enough production capability, which enabled it to commence manufacture of its own alcoholic brands¹⁶³. The process presented learning opportunities to the firm that resulted in accumulation of proprietary product know-how, which led to development of **FBL4**'s own products. **FBL4**'s first product innovation was in 1982 when it developed its own brand of wine known as 'papaya wine' made from locally available paw paws. There was high demand for this wine in the domestic market given its competitive pricing strategy compared to that of imported wine. Additionally, this wine became a favourite of tourists in the country, making it one of the major products of the firm. Due to the path maintained in production, **FBL4** has managed to develop about 20 own brands of wines and spirits. These brands are manufactured from locally available fruits e.g. grape wine made from grapes, pineapple wine from pineapples and passion wine from passion fruits.

FBL4 maintained a relatively advanced winery – the entire process of changing fresh fruit juice into wine. As observed in the firm, the wine making process proceeded in distinct stages which had been fully mastered by the staff. **FBL4** enjoyed four packaging lines¹⁶⁴ for wines and spirits. All of them were obtained from abroad and each one of them had own contributions to learning. The first line packaged wine at compressed air (vacuum and gravitational). The second one utilised British technology for packaging whisky. The third line packages carbonated drinks (vacuum filler). The fourth one utilised Germany technology¹⁶⁵ to package alcohol of lower strength (4.5%) at high pressure, low temperature while pasteurising the alcohol at 60 °C for 20-30 minutes. The firm also enjoyed another line

¹⁶² The wines and spirit suppliers provided training in production and testing. They offered knowledge in product designs and technical specifications. **FBL4** consulted with the suppliers to help them master new technologies.

¹⁶³ The firm acknowledged that initially there was a lot of product technical support from the wines and spirit suppliers which enabled **FBL4** to accumulate its own know-how. The path dependence results in accumulation of technological capability.

¹⁶⁴ In all these lines, the processing procedure was more or less the same. All the lines started with a washer – the technique being soak-washing bottle, a process that takes 50 minutes to complete. Other stages included rinser, filler, sealing machines, inspection and labeler.

¹⁶⁵ It is a PLC controlled computer programmed, with filling capacity of 600,000 bottles per hour and with less than 1 % defect rate.

for filling and sealing spirits¹⁶⁶ in the sachets acquired from Britain. This was one of the latest innovations in the firm with high filling capacity of 80 sachets¹⁶⁷ per minute. The sachets were pressure filled and skillfully sealed in such a way that they could withstand high pressure without bursting.

In addition to the packaging lines, **FBL4** also had a fully-automated, PLC controlled Swedish filling machine and technology for aseptic packaging of fresh fruit juices. This machine was bought from a local subsidiary of a Swedish MNC, Tetra Pak International. This could be viewed as technological spillovers from a foreign firm and at the same time as a major innovation to **FBL4**. This was a more sophisticated process requiring enormous personnel training. When asked to explain about the necessity of training, the production manager explained:

The firm had not operated such a processing line before. Every unit of it required thorough training of our staff. Suppliers from the MNC subsidiary in the country were involved in the training. First, training was needed in the pasteurization process. Second, training was required to operate in a septic and pressurized room where packaging was done. The room is also sterilized to prevent microorganisms from entering into the septic room. Third training was also needed to cope up with the speed of the process¹⁶⁸.

The filled packets were then packed into cartons ready for dispatch using another sophisticated technique – the tray packing technique. Until 1992, packing was done manually and required many workers who would do the packing manually. The tray packing technique was fully automated and required only two attendants to control the whole packing process. This machine could automatically erect carton blanks, seals the top and after filling, seals the bottom and forms the package. This was another significant innovation in the firm, which brought a tremendous improvement in the packing process¹⁶⁹.

The firm had another example that supported technological learning in the firms from foreign technology. It had a water treatment plant, which supplied the entire firm with clean water. The machine used at the water treatment plant had a capacity to process 4,000 litres of water per hour thus utilizing about 81% of the total installed capacity while purifying water up to 99%. It was a highly sophisticated computer controlled process that combined filtering technology to remove impurities with approved ion exchange technology for water softening. The machine used ultraviolet (UV) radiations to confirm that no microorganisms were remaining in the water. The important thing to mention at this point is that the scientist

¹⁶⁶ At the time of this survey, the spirit packaged had 40 % alcohol content.

¹⁶⁷ These sachets were special, sourced from South Africa. The firm had demonstrated these sachets to local firms to find out if they could develop capability in making them. This would reduce the cost of importing such sachets from abroad.

¹⁶⁸ The machinery had a capacity to fill 3,600 packages per hour for the 500 and 1000 ml packages and 4,500 packages per hour for 200 and 250 ml packages. This translates to about 30,000 packages per day for the 500 and 1000-ml packages.

¹⁶⁹ There was significant improvement in efficiency from 6,000 packs per day before the machine was introduced to 32,000 per day with the new machine. This innovation has resulted in not only increased efficiency but also reduced cost due to wastage.

and engineers had mastered all the operations of this machine¹⁷⁰. The repair was possible due to the rigorous training that had been provided by the German engineers during the machine and technology transfer phase that ranged from plant layout, installation to commissioning. Two of the firm's engineers had also spent a few months with the suppliers of the machinery in Germany to acquaint themselves with machine operations.

The firm acknowledges the importance of innovation and thus maintains an R&D department¹⁷¹ that was well equipped and relatively advanced by local firms' standard. According to the production manager "FBL4 believes in research and undertakes continuous research on tropical fruits for the purpose of making alcoholic beverages". Nevertheless, as a result of in-house R&D, the firm had acquired product technology that enabled it to manufacture its own distilled alcoholic beverages as discussed above. In the R&D department quality control is undertaken that includes materials, product and chemical analysis¹⁷². During processing, line quality control was done regularly with the quality control staff conducting routine and random checks after every 15 minutes. The quality control unit was also supposed to release the products including those under contract packaging. The unit also follows the products in the market where further inspections and testing are done. Having developed capabilities in quality control and maintenance the firm was preparing towards achieving ISO for quality assurance¹⁷³. The firm does not undertake major process innovation and thus maintains foreign technical partners for the supply of core machinery and technology. Nevertheless, the firm has acquired the necessary capability to upgrade, adapt, maintain and repair most of its machinery. Some of the simple innovations included the introduction of external water jackets on the fermentation tanks to regulate the internal temperature during wine fermentation¹⁷⁴.

7.4.2 Human Resources Development and Labour Mobility

Under this section, we examine firm level training and labour mobility. The case studies revealed interesting cases of firm technological training and labour mobility which resulted in spillovers from FDI to locally owned firms. This supported our hypothesis in Chapter 2 and empirical findings in Chapter 5 that foreign presence stimulates spillover occurrence through labour mobility.

¹⁷⁰ An example was given during the interview where the machinery had developed a mechanical problem in its internal flow rate known as 'backwashing'. The engineers in consultation with the suppliers were able to rectify the problem without the suppliers having to travel to the firm from Germany.

¹⁷¹ Although the firm sets aside KShs 3.8 million budget for its R&D activities, this is however not enough, as it was far less than 0.5 % of the firm's total sales.

¹⁷² Quality control started in the field where the fruits are grown. Just to make sure that fruits are of the expected quality, they were tested for sweetness specifications, microorganisms, pests and acidity levels.

¹⁷³ It was indeed confirmed that FBL4 had launched the process of acquiring ISO in early 2002 and all the procedures were in place.

¹⁷⁴ The jackets introduced allow cold water to circulate outside the tank thus maintaining the required temperature. The heated water is then used for general purpose in the plant.

7.4.2.1 Human Resources Development (Firm Training)

The four case studies revealed that all the firms offered training. All the forms of firm level training noted in the foreign firms in Chapter 6 also existed in the locally owned firms studied. As noted after liberalisation, locally owned firms were forced to embrace training more than ever before. This was due to the increased competition especially from foreign firms as will be shown at a later section and due to the increased influx of imported goods and products. The desire to adopt quality management systems, to acquire sophisticated technology and machinery and improve on management and marketing techniques also triggered the learning processes in these firms. However, from these case studies it was notable that technological training offered by these firms was not comparable to that offered in the foreign firms. While these firms offered rather simple and less organised form of trainings, the foreign firms offered more comprehensive, well coordinated training programmes that included overseas specialised training and regular participation in training exchange programmes regionally and internationally.

From the interviews done, **FBL1** indicated that it has decided to embrace a continuous training process mainly in house. The firm has realized that in order to compete and keep pace with the changing product tastes and preferences, it has to engage in rigorous training of its staff. For instance, ISO 9000 series certification emphasises on dynamic changes in the firm and critical staff training in quality control management systems. It thus forces a firm to subject its staff to continuous training to drive such changes and maintain the required quality standards. Moreover, the firm's investment in new technology and machinery has necessitated immense technological training given that drivers of such machinery must have the skills to operate and maintain them. The firm has therefore established a human resources department after realising the importance of strong human capacity. The training is also done in accordance with the identified training needs and occupational levels. In a few cases, the training is done externally in some selected local institutions. The firm also organises workshops for staff enrichment and invites external resource persons. In order to enhance staff motivation and make them develop right attitudes towards goal achievement and team spirit, the firm had a remarkable programme where it engages consultancy services from international management consultants. This is meant to crystallize personal and business goals as individual staff develops self-confidence and determination in their operations. Despite the importance attached to training in this firm, it has not tapped very much into the international knowledge pool. It plans to do that by sending its employees for international training when it begins its future strategy of exporting overseas.

FBL2 claimed to have adopted a capacity building policy whereby the firm would strictly maintain a continuous process of training to all its workers. The firm now sets a budget about 5% of its payroll for training purposes. According to the human resources manager, these trainings mainly take place in house. This mainly happens during the induction of newly recruited staff and is done by the experienced personnel or the supervisors. The firm does not have an in-house training department. External trainings were also offered but these were rare as they were only done in collaboration with other firms, institutions and business associations such as KEBS, KIRDI and KAM. It is important to highlight that due to the seriousness attached to the quality standards, the firm offers more training support to the quality control staff than to the others. Interestingly, although the firm indicated that it offered training for its staff internationally, no single example of overseas training was provided.

FBL3 also offers technological training. In the last three years, the firm had offered training at an average cost of 5-10% of the payroll per annum. Although the firm offered an in-house training it also did not have a training department created yet. Once in a year the **FBF6** trains people in the firm – this is a spillover benefit. Workers trained include production inspectors and operators, syrup manufactures and statistical process controllers. Trainings are also taken in collaboration with KEBS. On its side, **FBL4** contended that since liberalisation, it was forced to adopt human capital development measures. Two reasons accounted for that: *First*, there was increased entry of MNCs in the sector and *second* the existing MNCs were increasing their effort to improve their competitiveness. For the purpose of competitiveness in wine processing, **FBL4** recognizes the importance of strong human capital. To this end, the firm spends approximately 10% of its total payroll on staff training, which is done on a continuous basis. The firm's human resource department is responsible for assessing the firm capacity needed and for organising the required trainings. Although training takes place in-house, the firm acknowledged that trainings are as well offered externally in the local institutions such as the polytechnic and business associations such KEBS. According to the production manager, the firm offers international training only occasionally, for instance with the suppliers of raw materials, technology and machinery. However, compared to subsidiaries of MNCs, this firm trains less of its staff overseas. The experienced staff – particularly those who have worked for many years and have acquired experiential tacit knowledge were responsible of conducting the trainings done in-house. As an example, the production manager and his senior technical staff offer training to the less experienced technical staff and section supervisors who in-turn offer training to staff below them. The production manager was highly experienced after having worked in the firm for over 23 years. He was one of the lucky ones to have received extensive training in alcohol production from abroad – many countries in Europe. The trained technical staff and supervisors were also responsible for inducting and training new staff when they joined the production unit of the firm. The trainings offered included production management, machine operations, problem solving (how to handle trouble shootings), repairs and maintenance procedures etc.

7.4.1.2 Labour Mobility

As noted in Chapter 6, firms hardly documented information on labour mobility. Since the firms were reluctant to trace employees' background, it was impossible to know from the human resources and/or personnel records where the staff had joined from or where they went to after leaving their employment. We therefore relied on human resources and/or personnel managers. We also relied on other staff, such as the production manager and more so on long serving employees to reveal to us any cases they were aware of, of professionals, skilled workers and experienced technicians who had joined the firm and where they had come from. We paid particular attention to the importance of skills of the identified employees to the firm. To some of the firms, this information was obtained informally by interviewing the marketers and sales representatives during international agricultural and trade fairs annually held in Nairobi and Mombasa. We also endeavoured to find out about those who had also left these firms.

On the side of employment, the firms contended that lack of skilled workers (qualified engineers and technicians) was not severe in the country. As they contended, Kenya has a pool of qualified and experienced workers, engineers and scientists, and it does not require

much effort to get a replacement for a skilled worker at any time. It was interesting to note that the firms had a strong policy regarding its employment of fresh graduates. The firms preferred employing fresh skilled graduates from polytechnics/vocational institutions as opposed to the universities. They were preferred because the former had more practical experience, which is not mainly the case with the latter where their concentration seems to have been on the theories. Furthermore the university graduates took long to be inducted notwithstanding the fact that the graduates demanded higher wages and salaries which were not commensurate with their output performance.

As expected, the firms had lost some of their staff in the past and at the same time absorbed staff from other firms. As will be shown in a moment, firms had received professional and engineers from foreign firms. **FBL1** had received qualified workers - scientists and engineers; technicians, craftsmen and artisans - from local and subsidiaries of MNCs operating in the country. Examples of some major companies and subsidiaries of MNC from which **FBL1** had employed workers from included **FBF5** and **FBF2**. From the interviews, it was confirmed that while some of the incoming employees assisted in the development of new products or improvement of existing products to market needs; others assisted in the processing activities, quality control, upgrading machinery and equipment stretching to save energy, cost and raise productivity. All these represented various forms of spillovers which supported our findings in Chapter 5 and 6. Examples of professionals, scientists and other skilled workers were multiple. They included a chemical engineer who was behind soap making in one of the local subsidiary of a European based MNC. Another professional was a food science technologist, a former employee of another MNC subsidiary, which manufactures margarine for domestic and regional market. Other professionals employed brought in their experiences and tacit knowledge acquired while working in subsidiaries of MNCs that manufacture cooking fat, edible oil and toilet soaps. Professionals from abroad brought in their skills in plant lay out, setting up of the technology and equipment and making initial processing demonstrations to the local **FBL1** staff.

FBL2 also received professionals and skilled workers from both local and foreign firms such as **FBF6**. The firm indicated that employees from foreign firms had played significant role in the introduction of certain technological changes and trainings to the firm. To begin with, **FBL2** received professionals and expatriates from overseas firms (e.g. Germany) who would work in **FBL2** for some time ranging from several weeks to a few months. During their stay they would train **FBL2**'s staff in production activities, thus contributing to the firm's production capability directly. At the time of doing this survey, a professional had just joined **FBL2** from a MNC subsidiary - **FBF6**. As discussed in Chapter 6, this was the biggest of all the franchise firms of an American based MNC in the country and was a leading player in soft drinks industry controlling over 90% of the local market. Before joining **FBL2**, the professional was initially a sales representative in **FBF6**. After joining **FBL2**, he was promoted and given the full responsibilities of a marketing manager. *But what skills did he bring to FBL2?* While working as a sales representative with **FBF6** he had undergone several trainings both locally and internationally. Major trainings included marketing, market logistics and gathering market intelligence. He had also obtained some multi skilling since **FBF6** had started offering a multi skilling kind of training where an individual obtained an all round training ranging from processing, management to marketing. As he explained:

The most important thing I can emphasise here is that the training I underwent while in **FBF6** pertained to soft drink marketing. It also involved gathering market intelligence, which provides extremely important feed back for the production purposes. As you perhaps know, effective interface is necessary for immediate feedback, on what changes are taking place in the local and foreign market and to be able to translate it on time to opportunities for the company.

We therefore note that, as an experienced sales representative from a MNC subsidiary, he joined **FBL2** with a wealth of experience, skills and knowledge, which enabled him to introduce wide-ranging changes in the marketing operations of **FBL2**. This supported our spillover occurrence proposition as a result of labour mobility. The manager was in the process of designing a new marketing strategy, which was to be launched soon. This was easy since the firm had also accumulated some capability in the area through its own in-house technological effort. The firms also had the required human capital – highly skilled and qualified staff. According to the manager, the marketing strategy would include trainings in marketing, innovative approaches to mobilise workers, schemes to motivate them and so on.

As expected, these firms have also lost some of their employees in the past to other firms. Examples provided where several employees (a few engineers and many technicians) had left **FBL1** to join other local firms or to start their own businesses. This implied that in addition to its production purpose, **FBL1** served as a breeding ground for local entrepreneurs. The firm contended that due to the training offered, the workers who left had acquired experience, which they definitely shared with the other firms, which they joined. No single case was cited of **FBL1** having lost any of its workers to a foreign firm. On its side, **FBL2** had lost some managers and professionals, engineers and technicians in the past to the competing firms – local and foreign owned firms. **FBL3** lost its employees to many other firms especially those dealing with fast moving consumer goods. The firm claimed that the employees were offered competitive salary especially by the foreign firms. This would be expected since foreign firms have the resources to spread over higher salaries. Similarly and as noted in the preceding chapter they utilize sophisticated technologies, thus efficient with high productivity, profit from which they are then able to pay higher wages and salaries. Loss of staff in **FBL4** was reported to be a rare phenomenon apart from those proceeding for retirement. With regard to workers retirement, an example was provided where a former managing director had opened a wines and spirits shop and was now retailing **FBL4** products. This example shows that local firms as well serve as breeding ground for local entrepreneurs by a way of providing entrepreneurial skills.

7.4.3 Linkage Effects

As in Chapter 6 we mapped out significant pecuniary and non-pecuniary (technological) linkages formed by each of the case study firms. We also investigated firm interactions with institutions and business associations. We found interesting cases of technological spillovers. In general, firms maintained backward linkages with suppliers of raw materials, services, machinery and equipment. Suppliers of raw materials included manufacturing firms and agro-industry while services included banking or financing institutions. Utility comprised suppliers of energy components mainly petroleum products, gas and electricity. Forward

linkages were maintained with distributors, sales representatives, supermarkets and hotels. Forward linkages also included transport and communication. In cases where raw materials required were not available locally, international linkages were maintained for the supply. For instance, **FBL4** maintained a link with USA and Spain suppliers of wooden barrels used for edging wine. This constitutes spillovers in a way in that they are then sold at lower cost to the domestic brew manufacturers mainly in the informal sector. **FBL1** maintained international linkages with suppliers of raw materials needed in edible oil manufacture; countries sourced from included Malaysia, Indonesia, USA and Argentina.

Since all the linkages cannot be considered elaborately, we will present only interesting cases of backward and forward linkages, which resulted in technological spillovers occurrence to the case study and other connected firms. We begin with international linkages maintained by the firms. **FBL4** maintains strong international links with its suppliers of raw materials – in this case wines and spirits. As elaborated earlier, the firm imports wines and spirits in bulk from Europe, reprocesses it and packages it for the domestic market. As an example, brandy was imported from Spain and Italy in highly concentrated form and then reprocessed to reduce its alcohol content to be in line with local standards and specifications¹⁷⁵. Reprocessing is done with technical support from suppliers who must examine the wine product before it is dispatched to the local and regional market. The international technical linkage was extremely important when new brands are to be introduced. In complex cases an expatriate visits the firm to offer technical support while in manageable cases samples are sent to the suppliers for testing through courier services (e.g. DHL) and after 3-4 days they get feedback by fax or e-mail. **FBL4** contended that the process of importing, processing and interacting internationally with suppliers presented unique and significant learning spillovers, which resulted in accumulation of tremendous processing capability in the firm which enabled the firm to innovate as explained earlier.

Since most of the processing and packaging machines were sourced from abroad, **FBL4** maintains international links with suppliers of its machinery and technology. All the suppliers have equally been a major source of technological learning spillovers to the firm. Technical support arises in multiple ways: the *first* one explained is during the initial setting of the production machinery. Firm engineers, technicians including some of the managers were involved in all the installation until commissioning phases. *Second*, whenever there are technical problems technical expatriates from the suppliers are usually consulted. *Third*, most of the machinery and equipment purchased have after sales services, which include suppliers' engineers visiting **FBL4** for inspection checks. *Fourth*, the suppliers are sometimes involved when major adaptations have to be done. By participating in these technical activities with engineers from technology and machine suppliers, **FBL4** has incrementally strengthened its production capabilities (production management and engineering, repair and maintenance of capital equipment and quality control) in wines and spirit processing and packaging.

FBL2 maintained many international linkages with MNC firms in countries such as: Switzerland, South Africa, China, Italy and Germany. As explained above, the international linkages were maintained for technical support; either supply of production process or support in product development including soft drink, juice and mineral water flavours.

¹⁷⁵ This is done following the guidelines provided by the Kenya Bureau of Standards (KEBS).

These could be interpreted as spillovers which enabled the firm to innovate, grow and expand.

Turning now to backward linkages, a few backward linkages are worth articulating which resulted in substantial technological spillovers. The first one is the technical linkage maintained between **FBL1** and **FBF2** – this was a European MNC discussed in Chapter 6. The MNC sold its edible oil and cooking fat brands to **FBL1**. Although the linkage was maintained for only a short time, the MNC offered substantial technical support in product and process technology to **FBL1**. This could be interpreted as technological spillovers in process and product technology as **FBL1** did not have to engage in substantial search effort or heavy R&D investment for process or product development. This is supported by our finding for the computed spillover index (3.5) with regard to linkages (Table 7.1). The technical support entailed setting the entire plant lay out, setting the plant and training the engineers and technical staff at **FBL1** in machine and production operation. The MNC was also supposed to offer technical support in product technology as well. These was done by training the staff in the formulation of the edible oil and cooking fat ranging from the required raw materials, source of the raw materials, mixing to obtain the right chemical formulation and quality control etc. An extra benefit to **FBL1** included the supplier and distribution networks inherited. **FBL1** has now acquired enormous production capability and has been able to expand the plant by modifying to cope up with the increased demand of the products. The firm has become more innovative and has even opened new branches in East Africa. This example supported our argument that technological spillovers can result in learning, capability building and thus innovation and improved performance.

The next case we present involves **FBL3**¹⁷⁶. This firm maintains backward linkages with many foreign firms such as **MCEF1** and local firm such as **MCEL1** who supplied metal crowns. However, instead of discussing MNC linkage, we will discuss a linkage with locally owned firms and show how spillover effects trickled down to the locally owned firms through **FBL3**. **FBL3** has long-term relationship with local manufacturers and suppliers of bottles and plastic cases. This linkage was very interesting to us due to existing indirect learning spillovers. Recall that **FBL3** is a franchise of one of the global giants in soft drinks manufacture who are the brand suppliers – who also offer advice on production technology, management, marketing etc. The implication of this is that suppliers to this firm must therefore comply with the high standards observed by the global giant. Thus bottles and plastic cases obtained from these firms must be made to specifications as guided by the brand suppliers. We sought to understand whether any learning took place as a result of this relationship. As explained by the production manager:

... At one time the firm had a problem with the plastic cases supplied to us by a locally owned firm. The cases supplied were not meeting the expected standards, in accordance with our brand suppliers. The audit done by engineers from our technical department indicated that the supplying firm needed to improve its production capability in order to continue supplying the plastic cases for our use. The new requirements and specifications were discussed jointly. New conditions were put in place that if the locally owned firm failed to meet the specifications and standard required, a new supplier would be approached.

¹⁷⁶ This is one of the few cases that had high levels of spillovers through linkage as indicated by a spillover index of 4.0 (see Table 7.2).

Engineers and technicians at the locally owned firm at stake put in a lot of effort, time, making many trials until they were finally able to meet the specified quality standards. Surprisingly, the locally owned firm came up with plastic cases that lasted much longer than the earlier ones they were supplying to us. In actual fact, one of the tough conditions specified; included a five-year guarantee, time for which the plastic cases should withstand damage. Another challenge posed on them, an innovation, was to try and append traceability codes, including the dates of manufacture and batch numbers on the plastic cases.

The above example shows how learning spillovers indirectly spills over to other locally owned firms – sometimes in other branches of manufacturing. This supports the argument mainly founded in the NICs that with conscious effort and entrepreneur spirit from the side of the firms, spillovers can reach a wider network of firms [Fransman, 1985; Amsden, (1989: 1994); Lall, 1996; Kim, (1988: 1997)]. The second and related example involves supply of bottles for soft drinks. The bottles were obtained from both foreign firms in the country as well as from locally owned firms. More than one source of supply was preferred for two reasons. The first one was the need to diversify while the second one was the fact that some firms manufactured only colourless, or one type of bottles. Since most of the product brands are coloured e.g sprite then the firm has to look for coloured bottles from different firms. The important point to note here is that tough requirements and specifications must be maintained and follows those of the brand suppliers. The local suppliers must be technically and financially stable to be in a position to supply bottles in bulk since **FBL3** usually purchases once or twice in a year. When we tried to probe further how simple things like bottle manufacture could result in learning and training in locally owned firms, the quality control manager explained as follows:

The process is much complex that you can figure out. For instance, there has been a change in the shape, weight and design of some of the soft drinks bottles. The old bottles had serious wearing out problem, which we refer to as “scarfing”. To get round this, the brand suppliers decided to come up with a new design and with reduced weight. They wanted the weight reduced by 20 grams. The new kind of bottle was referred to as lightweight. The new bottle would indicate design, year of manufacture, manufacturer and the mode (so that it becomes easier to detect the problem with a particular mode). The process of introducing this change involves regional office, general managers, general sales and marketing managers among others. Then the agreed specifications are discussed with the manufacturers to determine the possibility of translating that into real bottles. So you can then see the learning challenge in it and due to the capabilities developed gradually by our local suppliers they are able to switch and supply us within a reasonable period of time. Each change that comes leaves them much better in terms of skills and experience acquired.

There were also interesting examples in machine and engineering industry identified. **FBL4** claimed that it maintained strong backward linkages with many firms in machine and engineering industry. As an example, a local machine and engineering firm located in the industrial area supplies **FBL4** with wine fermentation and storage tanks. The required tanks are special in that they; (1) must have a capacity to hold ½ a million litres, (2) must be of high quality made from stainless steel to avoid corrosion and (3) must regulate the temperature internally. Again these specifications were in accordance with those of the MNCs supplying wines and spirits to **FBL4**. Through this linkage the supplying firm has built the necessary technological capability and has become one of the sole suppliers of steel drums in the industry. It was established that the learning opportunity created by this link enabled the firm

to acquire the necessary production capability to make and supply such tanks to other firms including new entrants in the food processing and beverages industry. As a result of this capability, **FBL4** placed more tank orders and has now been able to increase its fermenting tanks from 4 inherited from the previous MNC firm to over 30 tanks including storage tanks. This example further shows that it is possible for a local firm to stimulate learning (spillovers of learning) in another local firm leading to technology capability accumulation.

We also discovered that some of the case study firms maintained backward linkages with the agro-industry. In the first case, **FBL1** maintained linkages with farmers who supplied sunflower, soya beans and cornflower needed for its edible oil manufacture. It was noted that when **FBL1** bought the foreign firm subsidiary that operated in Kenya, it benefited tremendous technological spillovers¹⁷⁷. This had a trickle down effect not only in the manufacturing industry but to the agro-based industry as well in that new opportunities were opened for the farmers who would enjoy the market created from **FBL1**'s increased demand for agricultural raw material. This can be viewed as an indirect spillover benefit from **FBF2** through **FBL1**. In addition there was technology transfer from **FBL1** to the farmers. **FBL1** uses field managers, as extension service managers to deal with out-growers, to discuss and plan harvest strategies and input processes. The firm has published booklets and manuals on agronomical practices, which are availed to the farmers. **FBL1** also triggers the farmers to adopt the best farming practices by paying more for high quality products.

The second case arose as a result of **FBL4** effort to source all the raw materials required in making its own brands of wines and spirits locally. Recall **FBL4** as a firm that inherited a production process in the early years from a foreign firm and as a firm that benefited immense technical support from international suppliers of wine and spirit products, all amounting to spillovers. The paw paws used in the manufacture of papaya-wine are obtained from a local irrigation scheme (Perkerra Irrigation Scheme in Marigat). **FBL4** maintains relationship with private farmers in the irrigation scheme for a continuous supply of fresh farm paw-paw. The grapes used in grape-wine manufacture are obtained from **FBL4**'s own vineyard located in the country (Yatta Plateau in Machakos District). The vineyard is managed by **FBL4**. **FBL4** uses staff trained both locally and overseas to advice and supervise fruit farmers in the fields. The firm engages the services of professional grape growers. It also engages the services of winemaking consultants. All these ensure that fruits from the fields to the end products are of high standards. Studies have shown that making good wine and sherry depends on growing of good quality fruits and having the necessary tacit knowledge to produce good product from it (Mytelka and Goertzen, 2004). Pineapples and passion juices are obtained from **FBF5** who are among the leading manufacturers of fruit juices. As indicated earlier, interactions with **FBF5** have resulted in learning spillovers in **FBL4** thus contributing to production capability.

¹⁷⁷ This example shows that presence of MNCs in a host country can lead to an extended or indirect spillover benefits. After buying the edible oil branch of MNCs, **FBL1** acquired product and processing capability required in manufacturing edible oil. As a result of **FBL1**'s expansion there were more backward linkages created mainly in the agriculture sector. These linkages were created with the farmers who would grow and supply the required inputs needed in the processing of soya beans, cornflower or sunflower. The interesting thing is that **FBL1** now supports farmers by offering extension services.

We now turn to forward linkages formed. It was noted above that, firms maintained forward linkages for the purpose of marketing their products. Hence, they maintain many distributional channels depending on location, product preferences, resources and capital available. Some firms support distributors e.g. to become a supplier of **FBL2** products, they only asked for minimum purchase quantities and enough capital to startup the distribution. In doing so, they promote local entrepreneurship. In this section we again concentrate on those forward linkages, which had spillovers effects.

FBL4 had an interesting forward linkage. Due to enormous production capability accumulated and excess packaging capacity in juice processing and packaging, **FBL4** has created forward linkages with several firms to do 'contract packaging'. Two of such linkages, which presented learning spillovers, were identified during our interviews. The first and the biggest contract packaging was done for **FBF5**¹⁷⁸, which was processing fruit juices but did not have enough capacity to package it. **FBF5** therefore relied on **FBL4** to do contract packaging for them. **FBF5** positions a few of its staff at **FBL4** who coordinate and supervise the packaging process. They included staff with tacit knowledge and skills in quality control, septic packaging and marketing. The juice from **FBF5** was taken to **FBL4** in concentrated form – once seeds are removed from the fruits, juice is squeezed out and excess water evaporated leaving only the concentrated syrup, which includes only sugar and aroma¹⁷⁹ concentrated up to about 60 bricks. The process of contract packaging involved reconstituting the water up to a level of 12-13 bricks before packaging the juice—this is in line with local specification set by Kenya Bureau of Standards. **FBL4** benefited training and learning by interacting with the staff from **FBF5**. **FBF5** was ISO certified and was therefore very strict on quality control. By adhering to such strict standards, **FBL4** continued to accumulate quality control capability - production capability. The second contract packaging was done for a pharmaceutical company, which was a subsidiary of a European MNC operating in Kenya. The MNC subsidiary wanted **FBL4** to package certain kind of medicine for it. To win this contract, **FBL4** had to be audited by this MNC for a number of things that included a careful verification of its general capacity. The MNC was very strict in its audit and more so in quality control given that it was dealing with manufacture of pharmaceuticals. **FBL4** had to comply with the specified quality and hygiene standards set. The MNC regularly visits **FBL4** for auditing purposes; collects samples and swaps for onward testing and in-depth analysis in their laboratory. By and large, **FBL4** has benefits from the advice provided by this MNC, which have often served as a new source of knowledge to **FBL4**. Technical effort to maintain high standards stimulated learning processes and thus improved mastery of specific procedures.

Another useful forward linkage is with the buyers of **FBL4** products, which include supermarkets, retail shops and pubs, hotels and lodges. From all these linkages **FBL4** has benefited knowledge feedback, which has enabled it to maintain a continuous improvement of its products. However, a strategic marketing linkage established by **FBL4** with Distell – a MNC led to introduction of new skills in logistics and marketing. This linkage was noted to have offered the most learning to the **FBL4**. The kind of learning got from this firm

¹⁷⁸ **FBF5** was discussed in Chapter 6. It is one of the most successful large scale agro-processing subsidiary of an American MNC operating in Kenya.

¹⁷⁹ One of the advantages of concentrating the fruit juices is that it occupies little space thus economical in terms of storage space and also cheaper to transport and export.

includes marketing, logistics, gathering market intelligence etc. Since this linkage was established as a result of competition pressure, we will discuss it extensively at a later stage under competition.

Interactions among food and beverages with institutions and business associations were also noted to be important for spillover occurrence (see institutions interviewed in Table 7.1). Hence as in Chapter 6, we attempted to find out whether firms did interact and if so whether there were any spillover benefits. Interestingly, all firms studied (**FBL1**, **FBL2**, **FBL3** and **FBL4**) were members of Federation of Kenyan Employees (KAM) and Kenya Association of Manufacturers (KAM). All firms contended that membership to KAM was beneficial in that they interacted with other firms (local and foreign firms) and obtained information, ideas; generally learning spillovers. The firms also interact with KEBS and Kenya Industrial Research Institute (KIRDI). According to the firms, both institutes offered assistance during product developments. The levels of satisfaction to the services offered differed from firm to firm. In addition, KEBS regularly audits quality control and offers recommendations. KIRDI calibrates the equipment used by the firms. **FBL2** and **FBL4** consult with KIPi in the area of intellectual property rights. **FBL1**, **FBL2** and **FBL4** send their staff to participate in trainings offered by KEBS and SGS or KIRDI for instance on production management (quality control), ISO standard requirements and management procedures. **FBL1**, **FBL2** and **FBL4** participated in competitions organised by Kenya Institute of Management (KIM) to determine firms depicting high levels of innovativeness and good corporate governance. All firms allow student from local universities and polytechnics to have industrial attachment in their plants (collaborative industrial internship programme). This supported one fact that locally owned firms participate in country's effort towards human capital development. **FBL3** recruited some of the best students at the time of internship. At the firm level, firms also interacted with other firms. As this explanation indicates ... *we were the pioneers in IT applications. Many CEOs from other manufacturing firms visits our company to acquaint themselves with the working of the IT in the firm before they go to establish theirs.* Interestingly, also some of the case study firms maintained international memberships depicting international interactions. **FBL2** has a membership with international associations, which increases its interactions at an international level to take place. It is an international affiliate member of the National Soft Drink Association (NSDA) located in Washington DC, USA. NSDA keeps its members informed on all the latest developments in the soft drink industry. We sum this in the spirit of **FBL1**'s observation that interactions and close monitoring by the regulatory bodies forced firms partly to learn and develop the necessary capabilities in manufacturing their products.

7.4.4 Competition Effects

In the preceding section, we have examined linkages generated and how they resulted in spillovers. In this section, we examine whether the intensity of competition pressure exerted by foreign firms stimulated learning in locally owned firms using the case study firms considered. To begin with, all case study firms studied faced stiff competition from imports into the country mainly from COMESA and SADAC countries such as Egypt and South Africa respectively. Incidentally, the case study firms were drawn in sectors with fierce competition between foreign and locally owned firms. The competition pressure was found to have triggered learning processes and technological changes in locally owned firms.

Interestingly, locally owned firms were noted to have learnt and accumulated technological capability as a result of this competition. This supported the argument by Caves (1974), Das (1987) and Wang and Blomstrom (1992) that competition pressure from foreign firms stimulates learning and capability building in domestic firms. We present a few exciting examples which emerged during our case studies.

When we asked a representative from **FBL1** at an international agricultural show about competition effect to her firm, this is what she had to say:

We face moderate competition from imported goods. However since establishment, our firm has faced stiff competition from the MNCs who had dominated the fast moving consumer goods industry which included cooking fats, edible oil and soap products. Our entry into this line of production and market required an innovative mind. An existing window of opportunity in the industry prompted our firm's establishment. The prices charged by the MNCs for their products were high for the medium and low-income earners. Incidentally, this was happening in the 1990s when the Kenyan economic growth continued to decline. We had to capitalise very quickly on this advantage. Upon entry, the competition became stiffer. These were the early years of structural adjustments; liberalisation etc and I guess you recall how things were. On our side, we marketed aggressively targeting medium and low-income consumers. The marketing included out-door promotions, radio and television advertisements with strong recommendation of high quality and cheaper priced cooking fats, cooking oil, washing soap and detergents.

As explained, the competition in the industry became intensive and rivalness heightened. Firms imitated each other's tricks in marketing and advertising. This is discussed in detail at a later section. Although **FBL1** strategy was similar to that of MNCs, it seemed to win as it acquired a substantial market of its products. The MNCs were losing their grip on the domestic market and **FBL1's** products seemed to be preferred by the consumers. **FBL1** therefore capitalised on this and manufactured relatively cheap brands without compromising on their quality. Finance from IDB and existing human capital backed by a few foreign expatriates supported their growth. Another innovation introduced was that of product differentiation. **FBL1** introduced a wide range of product sizes ranging from "100 grammes" to "7 kilogrammes". Due to the product differentiation more consumers would afford their products. There was a great transformation in the industry since **FBL1** could now provide quality products at affordable prices. Cost advantages were achieved by diverting from expensive can packaging to plastic containers and sachets. This innovation has now been adopted widely in the manufacturing industry¹⁸⁰. So, the source of **FBL1's** competitive strength is price. The computed spillover index (3.6) based on competition for this firm supported very high spillover occurrence (see Table 7.2).

This has enabled the company to grow and expand both in the country and regionally. As a result of maintained competition by this firm and a few other locally owned firms, some of the MNCs in the country were forced to re-organise resulting in the stoppage of some of the product manufacture. We noted earlier, a case where **FBL1** bought process and products from **FBF2**. Acquisition of various products and processing techniques including their market segment from these MNCs seems to have pushed further the growth of **FBL1**. This

¹⁸⁰ This innovation has been adopted despite its adverse environmental impact because of inadequate recycling capacity in Kenya.

represented spillover benefits from FDI. As a result, **FBL1** has now made investment in Tanzania through which they will also capture and exploit the business opportunities including tax-free advantages offered under the SADC of which Tanzania is a member. Similarly by investing in Uganda, **FBL1** aims to capture the emerging markets such as Rwanda, Burundi, Democratic Republic of Congo (DRC) and even Southern Sudan.

FBL1 success story does not end there, as there were more innovations to come. It has developed and adopted a unique proactive distribution network, where channel partners have been appointed to operate exclusively within a dedicated geographical area and hubs created and distributors are appointed to achieve distribution depth. All activities of the channel partners have also been integrated with the firm's Network via satellite-based VSAT and Internet links and developed transport systems to deliver directly to hubs, distributors and sub-distributors. The firm was among the first in Kenya's manufacturing to have V-sat. Operations of all the firms are based on integrated software known as Enterprise Resource Planning System (ERPS)¹⁸¹. ERPS is linked to the company's main plant via VSAT and any information that is required can be obtained on a real time status.

The second case study firm, **FBL2**, also indicated that its main competitors were foreign firms – its computed spillover index was also very high at 4.6. The firm contended that the soft drinks sector in which they operated had the toughest competition having been the domain of the global giants, which in a way had operated as monopoly for many years controlling over 95% of the soft drink market. When asked how the presence of the FDI in their industry affected them, this is what they had to say:

As a result of competition in the soft drinks industry, we have endeavoured to: introduce new flavours for our soft drinks and fruit juices; introduce new concentrates adding up to the popular ready-to-drink product line; introduce new marketing plans; use of wholesale containers; use promotion teams rigorously whereby promotions would include winning some presents with the firm's logo like caps, pens, free drinks etc; launch a new pushcart project placing pushcarts selling the firm's products which help in job creation as well; encourage discounts for retailers and finally, look for alternative financing ways.

The above shows that competition pressure forced **FBL2** to introduce many technological changes. We can argue that due to the increased competition in the soft drinks industry, **FBL2** has become more innovative. In addition to introducing new plant machinery, the firm plans to increase and diversify its products. We present an exciting example presented to us of how the firm took advantage of the prevailing terrorism activities in the world. Following the existing antagonism between the Muslims and Americans, the consumption of most American products declined significantly in the Muslim World. The argument forged being that consuming products from US MNCs such as *Coca Cola* was seen as being supportive to the Americans, a phenomenon interpreted as providing funds to the Americans for continued war and antagonism with Muslims.

¹⁸¹ ERPS incorporates modules on finance, purchasing, warehousing, inventory, asset management, pricing, quality management sales control, statistical history and human resource management such as check in time and remuneration calculator. Other modules include project management, order management, budgeting and finance management among others.

As a result of this, alternative soft drink products were being sought and developed elsewhere in the world. When a new soft drink product was launched, **FBL2** decided to take the advantage of processing and bottling it in the country. The launch of this soft drink was a major product innovation primarily due to the existing competition. This product had already been launched in foreign markets in Europe such as in France, the Middle East and West African Region where it had very strong impact. The same was expected in the Kenyan market where the new product was anticipated to cause significant changes in the trends of the soft drinks industry that had been dominated by MNCs for long. In addition, to taking the advantage of the prevailing circumstances, world terrorism and conflicts, the introduction of a new product in the Kenyan market was intended to compete with the MNC soft drink brand products by curving away a portion of its market. **FBF6** who are strong competitors thrives on marketing and product diversification.

FBL2 would counter react to this by making sure that the product introduced was of very high quality standard. In order to ascertain that, the company had sought product technical support from a Germany firm reputed for its high quality products and process techniques. As mentioned above the firm has bought an ultra-modern KShs 115 million bottling plant from Germany and has already been commission¹⁸². As noted above, **FBL2** has also employed more technical and professionals such marketing experts. It has embarked on rigorous training, continuous and involving all category of workers. The firm also engaged other firms that are linked to them.

Interviews done indicated that their source of competitiveness was high quality and low prices. The two, especially low prices enabled the firm to contain changes occasioned by changing tastes and drop in purchasing power. In actual fact they interpreted a move by **FBF6** to reduce the retail price of its 300 ml soda brands by 25% as a reactive strategy just meant to recoup the market share **FBF6** had lost to **FBL2**. This would not worry **FBL2** as the prices are maintained low purposely to keep the firm competitive. This is one good example where an indigenous firm has struggled to survive in a very competitive environment patronized by MNCs, and has developed specific capabilities and benefited from technological spillovers from foreign firms enabling it remain competitive. To date, the firm is being considered as a major threat by other players including foreign firms in the soft drinks industry.

Interviews conducted, indicated that **FBL2** lowered the price of its soda brands by 50% as a strategy to increase company's market penetration in Kenya and later in the region. This was possible following the government reduction of excise tax on soft drinks from 15 to 10% included in the budget of 2003. As a result of this price reduction the firm's market expanded to the extent that the production, supply, is unable to meet prevailing demand. This seemed to indicate some level of patriotism whereby the consumers seem to have a preference to consume high quality local products produced by an indigenous firm. The reduction in excise tax contained in the budget enabled the firm to introduce a marketing innovation; the firm organised a marketing campaign known as BOGO (Buy One Get One). This was a very successful marketing campaign, major hit with the soft drink consumers, whereby for every one bottle of soft drink that you buy you would get one for free. It was

¹⁸² It was noted elsewhere that this firm was particularly able to purchase this machinery due to the government waiver at the time on all the taxes on imported manufacturing machinery and technology. This was based on its effort to promote industrialisation, discussions in Chapter 3.

also a big advantage to the distributors, since what that meant was that for every 100 crates bought, the distributor would get 100 crates free. This would enable them earn good profit necessary for their expansion and growth. The **FBL2** also earned good profit and was able to capture a very wide market.

As a result of stiff competition faced by **FBL2** particularly from MNCs, we sought to know whether it had any specific planned strategies. The corporate affairs manager explained:

... the firm intends to introduce new bottling plants, new brands, consolidate the existing brands and penetrate the wider Kenyan market and further stretch to the East African and other regional market. We have already started as we have replaced the old production machinery. The new processing machinery offers some leverage for penetration into say three more provinces. Our other strategy is necessitated by lack of capital. However, lack of local entrepreneurs' ready access to credit was hindering our expansion. The high cost of financing which adds to the already high transaction costs in the operations has equally hindered the penetration of the soft drinks market. Interest rates have remained very high and perhaps a reform in the financial sector to support mainly the local entrepreneurs would ensure that local upstarts access credit. Due to this constraint, our company was planning to issue bonds at the Nairobi Stock Exchange. As a starting point we were planning to issue a KShs 100 million bond. This would enable us to raise more money to finance our accelerated expansion into the local market. We have seen accelerated growth in our product portfolio and presence in new parts of the country. We are now planning to enter the bond market to raise more money for our expansion. The past expansion programmes have been financed through borrowing from the local banking system which has been extremely expensive. In addition, our company plans to intensify a newly planned micro-finance project through which the company gives its employees interest free loans to buy and own soft drink containers. The company has put a side a budget of about KShs 8.4 million for the purpose of privatising such containers. As an example, out of 120 containers located in Nairobi, 74 have already been sold to interested entrepreneurs to enable them start their own businesses.

This supports our argument that as a result of competition pressure, firms introduce technological changes despite hardships. These changes were noted to include process, product, marketing, management and organisation etc. The results supported the theoretical arguments in Chapter 2 and empirical findings obtained in Chapter 5 where competition was observed to be among the leading mechanisms of spillover occurrence. Note that unlike **FBL2**, **FBL3** is a franchise of a MNC giant and was thus cushioned from stiff competition pressure.

We take one more example of competition pressure from MNCs. **FBL4** faces stiff competition from imports and competing firms in the industry. In the entire period before 1993 when the market was still highly protected, **FBL4** was a monopoly in the wines and spirits industry. However, after 1993 the prevailing incentive system changed dramatically. The market was fully liberalised, and **FBL4** faced stiff competition from imports into the country and from new entrants into the industry. New entrants included subsidiaries of MNCs mainly from Europe such as Ederman, Wines of the World and London Distillers. In the same period, competition was further exacerbated by the enormous re-orientation undertaken by the firms already in the industry. The existing firms such as Castle (South

African MNC) and **FBF3** in the beer industry introduced brands that targeted the middle-market, which was the niche market for **FBL4**. Similarly, proliferation of the informal businesses in alcohol processing targeting the lower end of the market contributed to a further shrinkage of the existing market.

Reacting to the competition pressure, **FBL4** reacts in more or less the same way as **FBL2** by implementing the following measures: *First*, it launched a new marketing and distribution strategy. The firm increased its brand advertisement in the local media and organised intensive promotional campaigns on the ground. By 2002, **FBL4** had the highest estimated marketing cost ever (including advertisement) that accounted for 7.5% of the firm's total sales. The other strategy involved formation of strategic marketing alliance with Distell Company. This was important given that **FBL4**'s marketing skills were relatively weak. Given the importance of marketing capability in the industry, the firm acknowledged that it had no choice but to strengthen its capability in marketing by forging a strategic alliance with Distell Company. Distell Company was one of the world's leading wine manufacturers and distributors in the world with wide experience in marketing wines and spirits in North Africa. **FBL4** entered into a bottling and distribution contract with Distell to support marketing of **FBL4**'s products in East African Region. As the production manager was quoted in one of the business periodicals, *"the entry of other players in the lucrative market segment means that FBL4 must increase its penetration into regional markets, where we have an advantage in terms of quality and affordability"*. At the time of this research, the process had already started in Tanzania; it was being rolled over to Uganda. Entry to Uganda was meant to be strategic, as it would serve as the springboard into the Great Lakes region of Central Africa. This example shows that competition pressure triggered **FBL4** to engage in a marketing capability development path.

The *second* approach to deal with increased competition was through diversification of **FBL4**'s products. As explained *".... the firm realises that demand for wines and spirit products is highly volatile and that markets are heterogeneous. To be competitive, therefore, they have to be able to serve many market segments at the same time. This is what everyone else is doing"*. For this reason, **FBL4** has undertaken to improve its production capability including quality control. **FBL4** was also trying to introduce cost cutting innovation measures. *Third*, **FBL4** has also realised the importance of human capital in driving production and innovation. This has resulted in re-organisation and intensification of training programmes. The firm has also endeavoured to improve its organisation and management structure to enhance its efficiency and reduce cost. In sum, these examples showed spillover occurrence to **FBL4** which tended to support our computed index of 4.6.

7.4.5 Demonstration Effects

Investigation of demonstration effects indicated that all the local firms studied enjoyed demonstration effects from foreign firms but at varying levels. Locally owned firms were able to copy, imitate products and techniques from foreign firms. This supported our thesis that foreign presence stimulates spillovers. It further supported findings of Chapter 5 that demonstration effect was one of the strong mechanisms of spillover occurrence. We present some interesting cases of demonstration effects, which were observed to have technological spillovers.

We start with **FBL1**. Growth and expansion of **FBL1** has benefited significant demonstration effects (had a spillover index of 3.6) from presence of foreign firms in the country. *First*, the idea to invest in the cooking fat, edible oil and soaps industry was prompted by the MNCs such as **FBF2** as they were the pioneers in the industry. So, **FBL1** did not have to do any product, process or market search as they could already see what was in the market. Recall the soap making example which was imitated by the local firms including **FBL1**. *Second*, it benefited demonstration effects in product, process and marketing. In marketing, for example, the MNC companies were among the first to make use of foreign logistic companies. This served as demonstration effect to **FBL1** who now uses their services. *Third*, **FBL1** learnt the importance of advertising strategy to boost sales and marketing from the MNCs. The firm contended that their advertising strategy closely imitated the path followed by **FBF2** in its eternal search for medium income earners. The firm has therefore adopted strong re-launching campaigns of its products. The idea of re-launching old products is to create new awareness in the consumers mind and to extend the market to the region where the MNCs were already dominant. The MNCs started in the country and then formed branches in the East African region. Locally owned firms also learnt the importance of offering training to become innovative and competitive. Other things learnt from MNCs include need to improve quality standards to match international standards – becoming ISO 9002 certified. **FBL1** has also served demonstration effect to other firms who intend to start computer network and also use of plastic packaging.

Next we discuss **FBL2**, which benefited tremendous demonstration effects from foreign competing firms. Its first case was the demonstration of the South African alcoholic drink by a foreign firm. **FBL2** manufactured the alcohol drink initially which provided a base for their take off. The second example of a demonstration effect was indirect where the company bought a brand from one of the local firms. The brand had initially been obtained from a foreign firm. This brand was then developed even though the development was done with the technical assistance of a Germany based company. So in the initial stages, the locally owned firm demonstrated to the **FBL2** how to produce these products. They benefited training on processing and product processing demonstrations. To date the company is able to produce its own products, flavours, compounds, ingredients and concentrates.

Another demonstration effect pertains to the organisation structure of the firm operations. The firm intends to copy MNC's model of soft drinks production whereby the firm plans to open regional bottling plants. The firm plans to open about eleven bottling plants in the East African region where eight of these would operate in Kenya's main towns. According to the firm's managing director, this is "a strategy that is styled along **FBF6's** model"¹⁸³. "Tanzania will have two bottling plants while Uganda will have one to facilitate a further foray into the great lakes region". Although this is due to competition and desire to capture more market, it is also necessitated by the fact that transportation of carbonated soft drinks for long distances is problematic especially due to gas included, carbon dioxide which must be maintained at certain levels of pressure. So this constraint serves as driving force towards decentralization of processing, packaging and distribution of carbonated soft drink.

¹⁸³ Financial standard Tuesday, August 26, 2003.

Another demonstration effect is that of the plastic cases used in the packaging and transportation of sodas. **FBL2** adopts **FBF6's** red colour and design. This is possible since colour is not patentable. Similarly, the firm uses the design of the old bottles used by MNC, which has changed its old design into a new one, noted elsewhere in this study. What this means is that **FBL2** is imitated packaging material from a foreign company. This is on purpose since its likely to carry some impact in the penetration of the new product. Recall that one of its new products will be primarily marketed in the Muslims region and although a different brand it will have the same colour as that supplied by the US MNC subsidiary, marketed in similar packaging materials. The idea is to make the product not look so much different after all.

Another demonstration effect is diversification. Most of the time in the interviews, it was reported that the firm wanted to diversify, introduce new products, introduce different lines, different business and to look for joint ventures. Similar to other firms, mainly foreign firms, **FBL2** has introduced bottled water and fruit juices. It has also introduced a totally different line from processing soft drinks meant for flour milling. In addition, this has made the firm go even a head and introduce businesses as discussed above. Nevertheless, a comparison between **FBL2** and **FBL3** shows that the latter has substantial demonstration effect from **FBF6**. As a franchise of a giant MNC, it enjoyed the most demonstration effects that included process, product, marketing, management and organisation etc. Hence unlike **FBL1**, the technological spillovers in this firm are significant due to franchise aspect.

Finally, we look at **FBL4**, which benefited substantial demonstration from foreign firms from its onset. This is supported by the high spillover index computed of 4.6, Table 7.2. The firm was foreign owned before the Kenya government acquired it. So it benefited an initial investment plan without having to conduct any feasibility studies, R&D or plant commissioning. As a newly acquired firm it copied/imitated most of the things that were being done by the predecessor. All these amounted to spillover benefits. Also by dealing with wines from foreign suppliers it was able to make its own brands of wine—with time this resulted in incremental accumulation of production capability. **FBL4** has benefited tremendous demonstration effects from foreign firms in the country and joint ventures like **FBF3**. **FBL4** acknowledged that **FBF3** and Castle had demonstrated to them what could be done, the need to innovate and diversify and also the need to improve human capacity by offering continuous training. **FBL4** has now introduced light alcoholic drink for the middle level class. **FBL4** also increased its capacity to package juice and has ventured into mineral water packaging. **FBL4** has had demonstration effect on marketing and distribution e.g. the importance of strong marketing campaigns, use of bill boards, media and support sporting activities like soft drink and beer MNC giants in the country. Local firms and subsidiaries of MNCs were forming partnership and **FBL4** decided to forge a marketing alliance as well. It benefited a lot of demonstration effect from Distell and **FBF3**. **FBL4** has also gone regional. Demonstration effect is from competing firms and firms that distribute its products. **FBL4** also started packaging fruit juices for the domestic and regional market. Also from supplying firms e.g. **FBF5**.

7.5 The Case Studies of Locally Owned Firms in the Machine and Engineering Industry

In this section, we provide case study illustrations of the spillover process in machine and engineering industry on the basis of the four conceptual elements outlined in section 7.2. The section begins with an explanation of how case study firms in machinery and engineering were selected. As in all the other cases, the selection was based on technological characteristics of the firms. This is explained in the immediate section below.

7.5.1 Firm Selection and Justification: Emphasis on Production Technology, Learning and Innovation

Case studies of locally owned firms in machine and engineering industries were selected on the basis of their production technology, learning and innovation. As indicated earlier, production technology in a firm was noted to have a strong positive bearing for spillovers occurrence in machine and engineering firms. This was more so because production technology used alongside production activities and effort undertaken to learn and master it results in accumulation of technological capability. This would occur as locals accumulate tacit and experiential knowledge acquired through on-the-job training and learning by doing. The resultant would be human capital development and enhanced absorptive capacity in the firms. Hence, a strong correlation between production technology used and spillover occurrence can be said to exist. We now present individual cases that justified selection of the local firm.

MCEL1 was the first case study firm selected. The firm's case was interesting in that it represented a typical firm that receives technical advice and support from MNCs operating in the country (primarily in the soft drink and beer sectors). **MCEL1** utilises fully foreign machinery and equipment for crown cork manufacturing and printing. Over 90% of the firm's activity is manufacturing of crown cork. It enjoys huge supplies of metal crowns to these firms (demand created by the MNCs). The source of core production machinery was United Kingdom, Italy and Germany. The average age of its core production machinery was below 10 years. Over 75% of the raw materials used in the firm were imported given that the country has no steel, Aluminium or Tin. With regard to training on the basis of production technology, the firm contended that:

Our firm maintains international links with the suppliers of machinery, technology and equipment. We have international links with firms in Italy, Germany, United Kingdom and Japan. Foreign suppliers of technology have been behind the driving force towards achieving our production capability in the firm. We also get advice from the buyers of our products who are mainly foreign firms operating in the country. Interactions with machine suppliers during machine installation and after sales services have some knowledge benefits in that our staff acquires knowledge in the process. All our machine installations were accompanied by a training module meant to introduce the staff to the required machine procedures of how to use, maintain the machine etc.

Training must also be undertaken in all the other process activities. Crown cork is manufactured from electrolyte tin plate or Chromium-plated steel. Most of the crown corks must be printed, at least with the firm's logo or some advertisement as desired by the

procuring firm. The firm therefore prints the sheets before the crown corks are made. This stage of printing the coated sheets is the most elaborate step in the production of crown corks. As explained, the firm has acquired capability as pressured by existing demand. The firm has no R&D department but it maintains a technical/engineering section strong enough to ensure that the process was running efficiently. The department also undertakes repairs and maintenance of the machinery and equipment. This section was also responsible for quality control purposes. The quality control systems used in the firm include statistical process control and technical benchmarking. The firm is ISO 9002 certified. The section makes sure that like all other raw materials, the Tin plate and Chromium-plated steel used in crown cork making is subjected to stringent quality control. All the products are subjected to 100% final automatic inspection. All the materials used in the production of crown corks, sealing, vanishes and printing inks do not affect organoleptic characteristics of drinks.

The second firm selected was **MCEL2**. This was the most advanced firm in the manufacture of products like water pipes, cold-formed sections, open sections and steel door frame sections. The firm's products are widely used for water pipes, vehicle structure body, chairs, exhaust pipes, zed purlins, galvanised steel conduits and hot water cylinders etc. The firm contended that local and foreign demand has enabled it to grow. The striking thing was that foreign firms were singled out to have been the main customers from all the sectors; manufacturing, agriculture and services (mainly building and construction). **MCEL2** uses different kinds of production machines. The firm's plant consists of slitting machine, open sections forming; automatic shearing line; 3 tube mills and galvanizing plant. Over time and with technological learning effort, a few machinery and equipment have been fabricated in house.

The firm's water pipe making process had enabled the firm to learn and accumulate technological capability (see Figure 7.2). **MCEL2** was among the few firms to have advanced pipe making technology enabling it to control about 45% of the pipe market in the country. **MCEL2** manufactured water pipes to international standard¹⁸⁴. The cold-formed sections are manufactured on a tube mill using a high frequency induction welding technique. The process proceeded rigorously from a steel strip. The strip is seam welded while round and gradually made to the desired section using the sizing mill. As explained, the weld seam was put to a "great amount of cold working while being sized." This was meant to test seam welding to ensure that the entire length of the hollow section was properly welded for the required strength. The hot dip galvanising facility of the firm was also explained to us, Figure 7.2. The firm had a large hot dip-galvanising tank 8000 mm long, 1600 mm deep

¹⁸⁴ The process started by feeding accurately sized steel slits into the tube mill. The steel slits are cut from high steel coils. The tube mills gradually form the steel slits into round profile with open seam along its length. The firm utilises a Japanese technology, a high frequency induction welding technique to form a strong continuous seam joint. After welding, the formed pipe is then subjected to another process referred to as external scarfing and sizing, meant to bring its dimensions within specified tolerances. Pipes are cut to the required lengths followed by straightening, end facing and hydro testing. The hydro testing is performed to ensure that welding strong enough and free from leaks. Once the pipe passes this test, it is taken for galvanising after which it is screwed and socketed. The water pipes are threaded to BSPT specification and are fitted with a socket on one of its sides.

and 1000 mm wide and can be used to galvanise articles of up to 10 m long. **MCEL2** is one of the few firms with a capacity to galvanise its products using hot dip galvanizing method¹⁸⁵.

The firm has a quality assurance certification KS-06-259 & KS-02-104. The main quality control system used is statistical process control. The firm ensures that strict quality control measures are observed. The products usually have to be tested to ensure conformity to the set KEBS standards or customer specifications. The firm treats quality as a continuous process commencing from the point of receiving raw materials to the end product.

Figure 7.2: The Metal Pipe Making Process in MCEL2

Source: Obtained from the firm's website

The third firm selected was **MCEL3**. This firm utilised the most sophisticated technology and machinery in its production of Aluminium cookware¹⁸⁶. The firm commands a big market for sufurias – about 50 to 70% of the market share. In addition, the firm benefits supply orders from foreign firms. The firm also manufactures specialized orders for international agencies such as UNHCR and WFP. Through these orders, the firm has benefited tremendous demonstration effects – this is explained at a later section. The firm has the capacity to produce between 15,000 and 20,000 sufurias in a day. As shown in Figure 7.3, production of sufurias involved several stages. The activities taking place in **MCEL3** were based on old experience accumulated, strong engineering culture, attitude towards work and problem solving culture. Consequently, the workers are subjected to a culture of learning which had resulted in the accumulation of technological capability and absorptive capacity.

¹⁸⁵ The galvanising method involved a chemical process that uses pure Zinc to coat the steel surface using over 99 % pure Zinc.

¹⁸⁶ The commonly made products are the sufurias that constitute about 80 % of the firm's production. They are used for cooking in almost all the households, hotels, hospitals and institutions in Kenya. In the remaining 20 %, manufacture of kettle takes approximately 15 % while the remaining 5 % is taken up by special orders.

The firm had a sophisticated process which commenced with the inspection and oiling of the raw materials¹⁸⁷ – Aluminium circles. The actual process can be observed to start with the pressing of the circles to put the sufurias into shape. This process was referred to as punch & dye. The firm used three drawing press machines¹⁸⁸ for this purpose. It has a machining section where sufurias were trimmed using a special lathe machine¹⁸⁹ with significant in-house fabrication. The fabrications and the trainings of the technicians and machine operators have resulted in tremendous improvement in the sufurias trimming efficiency¹⁹⁰.

¹⁸⁷ The inspection is to make sure that the raw materials are received as per the batching done at the supplying firm. This involves physical certification, visual; then the quantity and quality. The computer testing is done at the sister company before supply is done.

¹⁸⁸ The first one is a drawing press acquired from England. This is a very unique machine in the sense that significant adoption has been done on it. For instance this machine has been fabricated to offer protection under the Kenyan law. The second machine is slightly bigger than the first one while the third one is the largest capable of making items of 36 inches in diameter.

¹⁸⁹ The lathe machine is different from a normal lathe machine with over 70 % of it being an in-house fabrication. This fabrication has been necessitated by the desire to adapt the machine to cope with the production of changing products as dictated by the dynamics in the market (changes in peoples' taste and preferences).

¹⁹⁰ Although this may not qualify as major innovation, it can however be regarded as incremental innovation which further enhanced performance. With this fabrication in place the firm was capable of trimming an average of 4,000 pieces of sufurias compared to 200 pieces before the fabrication. This innovation took place after the production engineers undertook a study of the work method to find out how changes could be introduced. It was also necessitated by ISO 9000: 2000 acquisition

Figure 7.3: Production of Aluminium Cookware in MCEL3

The firm also had a sophisticated kettle making process which was similar to the one used in sufuria making – the kettle making uses more or less the same technology. There were two press machines and one machine for putting patterns on the kettles. Each of these machines have undergone in-house fabrication to make them comply with the current safety standards and to improve their efficiency. Given that different designs are required from time to time, the adaptation and fabrication, helps the firm to fit certain customers to their tastes and preferences¹⁹¹. The assembly line for the kettles was equally interesting. This assembly was an in house innovation by the works manager; production manager and quality control manager who wanted improve production schedules and efficiency¹⁹². In the assembly line, kettles were fitted with handles, spouts, filters etc¹⁹³. As confided to us during the interview, the engineers have to be innovative at all times and they must learn constantly to enable introduction of changes in the working atmosphere for efficient operations. This enables the firm to change swiftly to the market needs, for instance introduction of new designs as will be shown in the demonstration effect section. All these activities are supported by the engineering workshop. These examples support the fact that local firms in technically backward countries can also be innovative (Dahlman and Westphal, 1982; Fransman, 1984; Lal, 1987; Kline and Rosenberg, 1992). The firm also had another section that dealt with fabrication of specialised orders such as big buckets, milk cans, reflectors, civil engineering and structural works see Figure 7.3. Their discussion will be done under demonstrations effects section.

The firm does not have an R&D unit. However, it had a strong engineering workshop backed up by a team of 15 technicians. The senior engineers supported technically the technicians. Recently, the general manager came with a new work schedule to where all the workers were supposed to follow a set procedure of doing things: mechanical emergency repair, stretch wrapping, table fabrication, cake dies making, washing line repair and factory roof repair. The firm introduces new products often. The products introduced were often new to the local as well as the regional market. In the last 5 years the firm had undertaken significant improvements on the already existing products. This was due to the changes in the tastes and preferences out there, which results in an increased competition atmosphere. The firm was ISO 9001: 2000 certified after having satisfied all the procedures. The quality control systems used by the firm are statistical quality control and statistical process control.

The last firm selected was **MCEL4**. The firm utilised highly sophisticated technology and machinery acquired from abroad. While the process technology was sourced from Japan, the product technology was licensed from USA. At the time of interview the firm was operating 100% of the total installed capacity as a result of new machine invested and increased demand of its newly launched products. The firm was operating three major plant lines. The *first one* was a cold rolling mill (CRM) regarded as state-of-the-art technology in Kenya at the time of its establishment in 1982. CRM was a 4-Hi reversing

¹⁹¹ As an example the pattern of the kettles preferred by the Muslims is different from that required by the Christians.

¹⁹² This was done in-house using the accumulated capability from the engineering unit/workshop. There was significant change in efficiency in terms of logistics and operations. Shedding more light on this assembly innovation, the production statistics showed that where only about 2,300 kettles could be assembled by 1990 in a shift of 8 hours, after the introduction of the assembly line in 1993 the firm was in a position to assemble over 4,800 kettles in a similar shift of 8 hours.

¹⁹³ The spouts and handles are also made in house. The raw materials come from **MCEL4**. The firm has a furnace for manufacturing steel handles which was fabricated in house. Any shape of handles can be made since the firm has already installed the necessary capability required.

combination mill¹⁹⁴ from Hitachi Japan set up in technical collaboration with Yodogawa Steel Works. It uses radioisotope gamma ray gauges and deviation signals to determine the strip thickness of the cold rolled steel. The cold rolled coils are further annealed by heat application to a temperature range of 600-7000C in an electric bell-annealing furnace to produce deep drawing and enamelling grade materials. This is done in a protective gas environment meant to impart brightness and cleanliness to the steel strip surface. The installed CRM has a capacity to produce 100,000 tonnes of cold rolled steel for various industrial and domestic applications. It is used in the manufacture of Galvanised, Aluminium coated, Aluminium-Zinc coated and pre-painted roofing sheets. Other common applications include automobile bodies, enamelware, metal cans and drum manufacturing, steel tubes and pipes. Acquisition of this machinery and the technology embodied provided a lot of in-house learning, through learning by doing and interacting with suppliers who offered basic training on machine operations and sometimes maintained links for continued technical and human capital development support.

The *second plant* was a colour coating line established in 1989 with a processing capacity of 35,000 tones per annum to paint galvanised, Aluminium-Zinc and Aluminium coated steel. The colour coating line has an oven that cures the painted material for 30 seconds at about 240 degree centigrade to strengthen the painted surface and its bond to the base material. The plant was also a great source of learning to the firm.

The *third plant* was a continuous galvanising line (CGL) established in 2000. As the firm indicated, CGL was the most advanced continuous galvanising line in Africa with state-of-the-art technology from world-renowned Kawasaki Heavy Industries from Japan. The plant has a capacity of producing 80,000 metric tonnes per annum of galvanised and Aluminium Zinc (Al-Zn) coated steel coils. It has a dual facility for coating both Zinc and 55% Aluminium-Zinc alloy. A major innovation introduced on this plant was the Non-Oxidising Furnace (NOF) technology. This innovation replaced the conventional pre-treatment process involving chemicals and was thus more environmentally friendly. The NOF uses thermal cleaning with LPG flame and a mixture of Nitrogen and Hydrogen gases for preparing the steel surface to ensure strong adherence of the coating to the strip surface. Once the steel had been treated, it was then fed into molten baths at a speed of 150 meters per minute. Another innovation introduced was the on-line X-ray coating weight gauge to ensure accuracy and uniformity of coating across the length and width of the sheet. The process ends with a tension leveller to ensure flatness of the steel before it was coiled in readiness for dispatch. The products of this plant were; galvanised steel coils and sheets. Traditionally, galvanising was the most cost-effective method of preventing atmospheric corrosion of steel. It was commonly done by coating the steel surface with a Zinc layer. The combination of Aluminium and Zinc (Al-Zn) offered more effective atmospheric barriers to corrosion. This innovation came about in 1972 as a result of extensive R&D done in USA by Bethlehem Steel Corporation with the aim of developing a new type of coating that would be more effective compared to traditional galvanising methods. **MCELA** is the sole licensee of this technology in Kenya and in Africa. The firm confirmed that investment in this plant presented an intensive and broad form of learning in the firm. It revolutionised the way things were done in terms of organisation and production management. As an example, the firm would start exporting and thus there would be training on export marketing.

¹⁹⁴ One small mill costed about KShs 1 million while the big mill costed about KShs 8 million.

Although the firm does not do in-house R&D, it however maintains rigorous unit that deals with process and quality control. None of **MCEL4** process technology was innovated in-house as all of them were sourced and transferred from abroad. Given the sophistication of its latest technology and machinery, it has a process control unit manned by specially trained systems and software engineers to make sure there was efficient running of the process. The firm maintains a highly equipped engineering unit that deals with maintenance and in-house fabrications. The fabrications performed were sometimes major and involved adapting the machinery and its components to operate at a high or low capacity depending on product demand or availability of raw materials. The team, which comprises technically experienced engineers, had introduced energy saving innovations to the old machinery whose technology and operations they had carefully mastered. Similarly, they had invented an in-house waste oil and water treatment plant. The engineering unit maintains Canadian cranes installed for lifting steel rolls in place¹⁹⁵. For technical consultation, the firm maintains a technical link with the machine suppliers. With respect to quality control, **MCEL4** is ISO 9000-2000 certified by SGS who audits them periodically. The quality of its products is also certified by KEBS. **MCEL4** therefore adheres to local and international standards. Some examples of standards adhered to include KS 0602; ASTM A-366M; DIN 1623; JIS 3041; BS 1449. Special tests performed in-house include accelerated weathering inspection, salt spray test and spectrometer inspection. Steel must also undergo a series of mechanical or chemical tests depending on the intended application. Since the firm does not do any research on product development, it acknowledged that similar to process technology product technology was developed abroad. Hence, this firm relied on foreign suppliers for technological knowledge and innovation.

7.5.2 Human Resources Development and Labour Mobility

This section presents a discussion on training and labour mobility. Interesting cases of firm training and spillover occurrence through labour mobility were discovered. These results supported the theoretical arguments in Chapter 2 and empirical findings in Chapter 5 and 6.

7.5.2.1 Human Resources Development (Firm Training)

All the firms offered training although different in scope, depth levels etc. As indicated earlier, the effects of structural adjustments and liberalisation, created intensive competition that forced locally owned firms to embrace training. Other points advanced earlier were responsible for triggering training and learning processes in firms: quality management systems, acquisition of sophisticated technology and machinery and management and marketing techniques. From the interviews, it was observed that local firms in machine and engineering industry relied very much on in-house training. However, in a few areas like quality control training was offered outside the firm. Similarly, when a new technology was being purchased training was offered abroad. In all respects, the study revealed that learning and training offered by these firms was not comparable to that offered in the foreign firms. When locally owned firms relied more on in-house training, learning in foreign firms was wider in scope. Comparatively, foreign firms training programmes seemed broader and well-organised and included overseas specialised training and participation in regional and international exchange programmes.

¹⁹⁵ The cold rolled coils are usually heavy and can vary between 4 – 8 tonnes.

All the firms interviewed in the machine and engineering industry acknowledged the importance of firm training. For instance, **MCEL1**, **MCEL2** and **MCEL4** set aside between 5 – 10% of their total payroll for training purposes while **MCEL3** used 4% of the total payroll for training purpose. The firms offered various kinds of on job trainings to its entire staff and particularly the engineers involved in the production. All the firms main mode of training was in-house, on-the-job training and to some extent external training in the local universities and polytechnics. **MCEL3** attached significant attention to the extent that each of the training was followed by strict supervision to ensure that the trained workers indeed assimilated the issues covered during the training. **MCEL4** invites external trainers – subject matter specialists are regularly invited to offer training in-house. The trainings offered are diverse and could range from quality to process control and management or from individual attitude towards work to market labour conditions and ethics. **MCEL2** in-house programme is recognised to the extent that the firm has made a special arrangement with local universities and polytechnics offering technical and engineering programmes to bring their interns there for some time. External training in the local institutions is also offered but occasionally. Some of the employees are sent to train with R&D institutions like KIRDI, business association such as KAM and regulatory bodies such as KEBS. However, they argue that KEBS lacks adequate capacity to undertake certain aspects e.g. testing of certain equipment. As they claimed the government should offer more support.

Although training abroad was rare, we managed to trace a few. **MCEL4** acknowledges the complexity of technology and machinery used for its operations thus reiterating the importance of providing continuous training to strengthen its human development activities and to motivate the staff. The firm contended that strong human capacity was the driving force behind the firm's productivity and performance and thus in addition to local technical training; some personnel were sent abroad for specialized courses. During the time of this interview, three senior managers were attending an advanced course with one of the technology suppliers' abroad. Earlier, there was another course with the suppliers of product technology. According to **MCEL3**, rigorous and extensive trainings are offered in-house and only in rare occasions, training in abroad was considered. However, a few months ago the production manager had been taken for training abroad, in India. This was a special programme organised and partially funded by UNIDO meant for international exchange of technology and ideas. This serves as a very good example where an international agency offers some assistance in identifying the course, identifying and recommending the deserving entrepreneur and goes ahead to offer substantial financial facilitation for this training to be undertaken abroad, in India. The impact of continuous training in the firm has a positive and significant effect on efficiency in the firm's production activity. There has been an increase in productivity, increase in marketing capability, increase in in-house fabrication and introduction of new products. This will be elaborated at the relevant sections later.

7.5.2.2 Labour Mobility

As in other cases, these firms did not maintain any comprehensive database of their employees' mobility. No information was also documented for their past employment experience. We asked human resource managers, personnel managers and production managers to explain to us where the staff had come from. Consequently, we relied on them to explain the importance of employees' skills and experience to the firms. Long serving employees proved to be quite useful as most of them provided useful information pertaining to workers mobility and their experiences.

During the firm interview with the works manager, production manager, quality controls manager and other engineers, they informed us that the firm had a high preference for graduates from local polytechnics and vocational training institutions. In this regard the firm always accorded students from polytechnics and vocational training high preference during recruitment. This was nonetheless followed by university. The firms do not regard the availability of skilled scientists, engineers, technicians and other professional workers as severe. Occasionally the firm has also employed workers from local firms as well as from foreign firms. The contribution of such workers is discussed below.

MCEL1 had employed from foreign firms highly technical and experienced staff that contributed to strengthening its production capability. Some of them were experienced in mixing colours and printing. Others were managers who introduced useful changes in the organisation structure. In this case therefore the firm has benefited from knowledge spillovers associated with labour mobility from foreign firms. In **MCEL3**, two examples were provided. The first one included an employee who joined from a joint venture and who helped strengthen the personnel department. In the second example an employee joined the company at a higher professional management level. As claimed, he was the brain behind significant management changes touching on organisation, marketing and logistics.

On its side, **MCEL4** had received a few professional workers, engineers and technicians from subsidiaries of MNC firms operating in the country. An interesting case was cited of a sitting director who was a Kenyan African and a holder of B.Sc. degree in engineering from Nairobi University. He had a wealth of experience acquired while working in Kenya and abroad in Britain as a consulting engineer. He was also a former employee of **FBF2** (a subsidiary of European MNC studied in Chapter 6) for over 35 years, where he had worked as the production manager and later as the technical director. As a result of tacit and experiential knowledge acquired while working with **FBF2**, he was instrumental in introducing valuable changes pertaining to production and organisation management. From the angle of local firms, this example supports the argument that at least foreign firms in Kenya serve as a 'supply' source of professional expatriates to the local firms – local labour market.

Another kind of mobility witnessed involved employees from MNC in abroad. Such employees introduced substantial technological changes and training in locally owned firms - see Box 7.5.1 and Box 7.5.2. This is a good example of knowledge spillovers through international mobility of workers. Among the highly rated innovations emanating from such employees were assistance in the processing activities; quality control; upgrading machinery and equipment stretching to save energy, cost and raise productivity. They also assisted in repair and maintenance of physical capital and inventory control. Significant contribution was also noted to the organisational changes that brought in better management and implementation of high production & routine activities enhancing firm's efficiency. This was supported by the spillover index computed for **MCEL4** with regard to LM (4.2), see Table 7.2.

Box 7.5.1

Technological Spillovers through International Labour Mobility: The Case of MCEL2

Although **MCEL1** contended that lack of skilled workers (qualified engineers and technicians) was not severe in the country, it however, has a strong policy to employ experienced workers from outside the country to cater for the high skills required for specific processing operations primarily geared towards quality control, cost saving measures and enhanced productivity.

This firm however presents an excellent example of a case where a firm outsources certain skills from international sources. About two years ago, **MCEL2** decided to engage the services of an expatriate engineer from India. This engineer had a long-standing experience gathered from many years working with TATA India. TATA is an Indian company, which assembles trucks with technical support from Mercedes Benz Company limited. When he joined **MCEL2**, he was made the production manager. He initiated several major technical changes and a few minor changes. Most of them were geared towards decreasing the cost of production and also to increase the life span of certain plant equipment. All these could be viewed as technological spillovers to the firm. This engineer was also involved in the technical negotiations that involved certain technical contracts in which case the firm had been unable to undertake due to lack of technical expertise. A good example was with locally owned firm involved with the production of exhaust pipes and silencers.

One of the major innovations introduced in the firm by the new production manager, involved introduction of a better cooling system capable of cooling water to below normal atmospheric temperatures. When the expert engineer joined the firm, the cooling system utilised was inefficient. It consumed a lot of energy 110 Kwh per tone of tubes made. As the production manager explained,

... The technology used in welding of the tubes after the sheeted steel is folded "formed" using forming mill is known as "High frequency induction welding technique". This is a Japanese technology, which heats the tube into a molten form along the width at very high temperatures 13000 °C. At the heart of the high frequency welder is an oscillator tube, which ought to be water-cooled. According to the production manager, this cooling system used a lot of energy and due to the temperatures, which were in actual sense not effectively maintained at low levels; the equipment life span was bound to deteriorate. The water in the pond was extremely hot. "It's like instead of cooling the welder it was being heated". Even though the water coming into the pond was much hotter, still the water leaving the cooling pond was hot. "It's like the water was just being circulated instead of being cooled". According to the manager within ½ to 1 hour the water would be extremely hot and by so doing, the life span of the equipment risked great deterioration and the power consumed remained high.

After taking some time to think about it, the production manager decided to come up with a totally different cooling system. Unfortunately, the cooling systems in the market were more expensive than it would cost to have 'one' fabricated in house. He therefore opted to design one in-house; fabricate it using available equipment, skill and his engineers. A cooling tower was made which did not employ any significantly new technology. It just required simple in house innovation. By fabricating it in-house they avoided high market cost of purchasing ready made cooling tower. After the installation

of the newly fabricated cooling tower, **MCEL1** reduced its power consumption by 36% from 110 KWh to 70 KWh per tone of pipes made. With only that cooling tower, the equipment lifespan was significantly enhanced.

As an example, the firm used to operate two shifts during the day and night, a total of 24 hrs including Saturdays and Sundays. At that time, the firm's production stood at 600 – 620 tones per month. There were a lot of substandard products, rejects resulting in excessive wastage and inefficiency. To improve firm's productivity, the production manager designed a training programme to have all the workers trained afresh. Interviews with the expert engineer revealed that he took the initiative himself to design and implement the training programme. He took all the workers through a rigorous training process in production and precision techniques, inventory and quality control, trouble shootings and logistics etc in the firm's boardroom. In order to have frequent interactions, the production manager also started a new initiative where he would hold meetings with the workers at least once in a week to thrash out any throbbing issues, get feedback and reports from various production sections. In a few months the firm was operating only one shift with a production of 500 tones per month. At the time of this interview, the firm was processing 1,058 tones per month. This was about 170% increment in production all done in one shift excluding Saturdays and Sundays. The training conducted plus learning by doing led to technological capability development and enhanced efficiency: high production in less time, energy saving and thus less cost.

The second example of international knowledge spillovers through mobility of workers is provided in Box 7.5.2. This pertains to workers who joined **MCEL4** from abroad.

Box 7.5.2

Technological Spillovers through International Labour Mobility: The Case of MCEL4

The firm realises the importance of acquiring capable team of management and staff in order to achieve its production objectives. To this effect, the firm has a policy that favours employment of qualified workers or strict recruitment of only graduates from universities and polytechnics. It is explained below how this firm absorbs some of the excellent students who come for industrial attachment from academic institutions of higher learning.

We focus on employment of expatriates in the firm. To strengthen its in-house human capacity, the firm engages the services of expatriates from abroad. It was confirmed that since 1981 the firm had received and employed a substantial number of foreign expatriates. According to the general manager, when the firm commissioned its first cold rolling mill in 1981 there were 12 expatriates engaged to provide an initial back up in production and to impart the staff with the skills required by offering training on how to operate the machinery and equipment. After the local staff had acquired the necessary skills and accumulated enough technological capability to operate the machinery, the expatriates' contracts would either be terminated or not renewed. As a result of this, between 1981 and 1990 the number of foreign expatriates reduced from 12 to only 3. Although these expatriates came from different countries most of them mainly on the technical side came from India. As explained during the interview, Indians had the required knowledge and experience, they were highly skilled and their labour was cheap.

This example provided an interesting case of knowledge and learning spillovers through international mobility of workers. Employment of expatriates was not only limited to the cold rolling mills plant cited above. When the new plant (CGL) was commissioned in 2000, about 7 foreign expatriates on the technical side were engaged. The plant comprised a highly sophisticated and integrated process that required a thorough mastery by local staff in order to operate it. This was the first time the firm had acquired such a complex, computer numerical controlled (CNC) technology and machinery. The firm therefore lacked the required skills at the time to operate it. The foreign expatriates were therefore supposed to introduce the local staff to the entire process management (machine operations, trouble shooting procedures, maintenance and safety procedures). In addition, the foreign expatriates introduced the staff to the product technology used in the CGL. Therefore it can be noted that technological spillovers pertaining to process and product technology occurred as a result of tremendous training offered by the foreign expatriates. The discussion supports the argument that spillovers of technological learning in firms could result from imported technology and machinery as well as from mobility of workers internationally.

With regard to firms losing staff, all the firms contended that they had lost some of their staff in the past. **MCEL1** claimed that employees who were engineers and technicians had left the firm to other local firms in the machine and engineering industry. Since these staff had been trained and had also acquired experience on-the-job, the receiving firms must have benefited spillovers of knowledge. Only a few people had left their jobs in **MCEL3** to join other firms. **MCEL2** had lost professionals, engineers and technicians to their local competitors. As noted with MNCs the locally owned firms studied had cases of workers who left to start own firms – commonly known as *Jua kali* sector in Kenya. These workers included those who had retired and those with intention to set their own productive facilities (to become simple entrepreneurs). This demonstrated that firms instilled skills through experience and trainings and then sheds these skills to others directly or indirectly. In this case the firms doubled out as production units and as breeding grounds for domestic entrepreneurs within the economy. These examples further support flow of skills and knowledge from one firm to another via labour mobility.

7.5.3 Linkage Effects

The discussion on linkages from the angle of locally owned firms follows the same approach as in food and beverages section 7.4.3. Linkages formed by each of the case study firms with other firms were mapped out and examined. Both pecuniary and non-pecuniary linkages were identified with spillover effects. We noted that although linkages may appear small from the perspective of foreign firms, they were often substantial in the perspective of locally owned firms and were sometimes extremely important in the growth and expansion of the firm.

Backward pecuniary linkages included relationship with firms' suppliers of machinery and equipment, raw materials and electricity, telephone, water and fuel consumption. They maintained links with transport and communication. Firms, which did not obtain their raw materials locally, had fewer pecuniary linkages. As an example, **MCEL4** lack of

strong pecuniary backward linkages with suppliers of raw materials in the country is accounted by the fact that almost 100% of the raw materials used are imported. There is no Iron Ore or Coal in the country. Thus (steel rolls) are mainly imported from South Africa and Asian countries. Nonetheless the firm has backward linkages with manufacturing, utility, construction, transport and communication. This was the same case with **MCEL1**, which imported most of its raw materials.

Forward pecuniary linkages were formed with manufacturing as well as with the services industry, wholesales and supermarkets, distributors and hospitals. We focus on only forward pecuniary linkages established with foreign firms. Foreign firms created more demand for these firms' products in most cases more than from locally owned firms. This demand provides finance and capital creating an opportunity for these local firms to grow and expand. This further confirms the argument that demand created by foreign firms stimulates growth, investment and expansion (Rasiah, 1995; Aitken, Haddad and Harrison, 1997; Aitken and Harrison, 1999; UNCTAD, 2001). We invoke a few examples noted earlier. **MCEL1** supplies crown corks to one of the biggest soft drink manufacturers and beer manufacturer – both of them were MNCs in the country. Although the firm also supplies crown corks to locally owned firms, it claimed that orders from the MNCs were the most significant to the firm. **MCEL3** supply of steel pipes followed a similar pattern. **MCEL3** supplies MNCS and international Aid Agencies operating in Kenya with Aluminium cookware. **MCEL4** has forward sales linkages with foreign firms in Kenya including **MCEF1**, **MCEF3** and **MCEF4**. It also maintains relationship with hardware dealers and the *Jua Kali* sector. The firm's exports have also grown especially after acquisition of new technology by the firm. The firm contended that demand created by foreign markets created a stimulus for its growth and expansion.

Interestingly, non-pecuniary linkages were only limited to maintenance, repairs and sale of simplified machine and engineering equipment. This tended to affect spillover occurrence negatively in the machine and engineering industry. This is so because foreign firms relied on foreign suppliers of their core production technology, machinery and equipment. Foreign firms also maintained foreign technical links with suppliers of technology and machinery. Through these technical links they could then solve serious technical problems. However, one point is clear that local firms seemed to have acquired skills and spillovers of knowledge through the linkages formed with foreign firms and existing interactions through the existing linkages. Foreign firms often audited their local suppliers. The foreign firms offered training in the locally owned firms, in quality control, product design and production management. These resulted in technological capability accumulation and absorptive capacity in the locally owned firms. Let's now turn to non-pecuniary linkages starting with international linkages maintained.

MCEL1 also maintains international links with the suppliers of machinery, technology and equipment. The firm has international links with firms in Italy, Germany, United Kingdom and Japan. As the firm contended, the foreign suppliers of technology have been behind the driving force towards achieving production capability in the firm. Interactions with machine suppliers during machine installation and after sales services had some knowledge spillovers in that the staff acquired knowledge in the process. It was also indicated to us during this research that, all the cases of machine installation were accompanied by a training module meant to introduce the staff to the required procedures of how to use the machine.

Similarly, **MCEL4** maintains strong technical links with foreign suppliers of technology and machinery. In this firm, the machinery and equipment were mainly sourced from Japan while product technology was licensed from USA, from Bethlehem international who are the worldwide licensors of the technology; know-how and patents associated with 55% Aluminium-Zinc alloy coated sheet steel. The firm relies on this links for technical support as well as human capital development through continuous training. At international level, **MCEL4** has membership with a few Germany Companies. Other international memberships include member of Pacific Zinc Aluminium, USA Zinc Aluminium and Europe Zinc Aluminium.

We now present an interesting indirect case where a firm's backward linkages with its suppliers of machinery and equipment have had profound effect in introducing technological changes, learning and capability building in other firms. This arises often with regard to spare parts for the firm's machinery and equipment. The process begins when **MCEL2** imports such spare parts from foreign firms in abroad e.g. from Japan or Britain. When they need replacement, the firm has a policy to take them first to the local manufacturers and request for their fabrication. That way the firm contended, "*we are developing local industries*". Interestingly, all the firms often approached have developed the necessary capability to supply the required spare parts. These represented spillover occurrence to a wider network since the spare parts could have been bought from outside but the firm decides to develop backward links and engage on services of other firms. When we asked the production manager to provide an example, this is what he had to say:

For example you have seen the steel rods, the stands on which the mills are fitted. These stands are usually sourced from Japan. We do not want to go to Japan for these stands any more. The cost is extremely high, logistics involved are enormous and testing skill are not in the country¹⁹⁶. We would want to source them locally if possible. So we approached a local company to make them for us. The local firm has casting, workshop (fabricating unit) and foundry section. We had confidence; trust in their technological effort and were able to make the stands for us. They have now developed enough capability to make these components (steel rods). As you can see next time we will not go to Japan for the stands.

This is a good example of a case where a firm faced with a constraint, takes the initiative to make contractual arrangement with other firms producing the required items. This example was rich to us as we could note demonstration effects, interactions and skills sharing to come up with steel rods/stands, which are as good as those previously obtained from Japan. Informal inquiries with other staff confirmed this to have been a true and successful case: "*Many items we have made them locally and this is cheaper for us, creates business for the others and we share skills*". This had a contagious phenomenon in that when a firm sees another local firm supplying to **MCEL2**, a respected firm and associated with high quality standards, they also want to procure things for them also. Because of that aspect they have got many other contractual arrangements, links, with other firms. In such a case **MCEL2** acts as a first mover in contract arrangement then followed by the others. This in itself represented a form of demonstration effect.

Next we present a few examples of forward linkages that had interesting incidences of spillover occurrence. The first example, which we provide is an indirect link in that **MCEL2** enjoyed a linkage with a locally owned firm which had a link with a MNC

¹⁹⁶ This was an example of a constraint facing a firm becoming an opportunity to another firm.

operating in the automobile industry. As explained by **MCEL2**'s production manager, the other locally owned firm enjoyed a long-term relationship that involved supply of exhaust pipes to the MNC. Although the locally owned firm supplied exhaust pipes whose one of the main component was pipe, it did not manufacture pipes and had to obtain them from **MCEL2**. This relationship often resulted in learning spillovers due to regular technological changes that used to be introduced by the MNC. At times, it involved deliberations between the engineers and technicians from the firms involved. The production manager explained how one particular episode resulted in learning and accumulation of capability.

I delivered some pipes for silencers to another local firm. The local company was a main supplier of auto parts to a MNC in the automobile industry. The company claimed that the pipes were not acceptable to him. I made a visit to the company to find out what exactly the problem was. The pipes were of the required standard, going by KEBS specified standards. The KEBS standards say the dimension can vary from $(D1 \pm)$. The company told us that according to them D1 meant D1 and without any room for plus or minus tolerance. Their argument was that if the pipes were loose they would form wrinkles and in that case they needed very smooth pipes with accurate specification. Since our customer was not KEBS we had no option than to strive to satisfy this particular customer. I went to my mill engineers and told them that mill standard for this particular customer was not KEBS standard. I told them that D1 meant D1 and strictly without any tolerance. They had problems in achieving this specification on the immediate as they were used to making pipes with extra tolerance. However, they were able to achieve the zero tolerance after intensive training and brainstorming. Once you have a set objective it is always easy to achieve it.

The above case supported spillover occurrence through indirect linkages formed in the machine and engineering industry. With the capabilities built, this firm could take more orders from other firms with strict specifications and with minimum problem of rejects since they would be within the KEBS standard.

MCEL1 forward linkage comes rather differently. As indicated above the firm supplies crown corks to one of the biggest soft drink manufacturers in the country. The firm also supplies crown corks to the largest bear manufacturing company in the country. This firm is also supplying crown corks to the local firms also in the soft drinks industry. This benefits others since the firm supplies local firms as well. These links have presented a lot of learning and thus improvement in the production capability. This is the most important part where we have to explain that, this firm benefited a lot from feedback given to them from the buyers who were very strict in quality control. They were already ISO certified and thus this firm needed to comply as well. They needed to source their raw materials from ISO certified firms and had to embrace a culture of continuous changes and staff training.

We finally provide a few examples of how forward 'supply' linkages with subsidiaries of MNCs in Kenya resulted in technological and learning spillovers to **MCEL4**. As in some of the examples above, the learning spillovers occurred indirectly. We begin with a supplier relationship between **MCEL4** and **MCEF4**. **MCEF4** was among the major manufacturers and suppliers of steel drums in Kenya. Their customers included key subsidiaries of MNCs operating in Kenya such as Total Kenya Limited, Caltex Kenya Limited and BP/Shell Kenya Limited in the petroleum and chemical industry who use the drums to transport petroleum chemical products. **FBF5** is another subsidiary of a MNC that seasonally places massive orders with **MCEF4** for the supply of drums. The drums are used in the exportation of pineapples to Europe and America. United Nation

(UN) agencies such as UNHCR places massive orders with **MCEF4** for the supply of drums to deliver relief and famine related goods in the region. With regard to each of these cases, we would like to emphasise that **MCEF4** has to be audited for a number of things; the quality drums used, technology used, skills employed and raw materials used¹⁹⁷ to ensure compliance with the accepted international standards. Interviews confirmed that a kind of indirect linkage gets established or trickle down effect from customers of **MCEF4** to **MCEL4** since they are the direct suppliers of raw materials used by **MCEF4**. The point we want to emphasise here is that the drums must meet international quality standards. The required quality standards and specifications of raw materials are presented to **MCEL4** who in turn have to proof that they have the capacity to supply them in the required form. **MCEF4** has to further undertake its own audit on **MCEL4** to verify that indeed it has the capacity to supply raw materials in line with specifications provided. This example shows that demand from buyers, MNCs, usually comes with unique specifications and standards, which presents new challenges and opportunities to learn new things. These are some of the facts that forced the **MCEL4** to expand and invest in new technology. They stimulate the firm to engage more skilled workers and offer more training, strive to acquire ISO standards etc.

A second example involves local body building companies (local and foreign companies) in the automobile industry who use the **MCEL4** products for their body building activities. The requirements by the foreign firms and joint ventures are usually very strict. The specifications must meet set standards and thus present learning opportunities to **MCEL4**. Presence of MNCs creates incentives for **MCEL4** to learn and accumulate technological capabilities.

Finally we look at interactions (see some of the institutions interviewed in Table 7.1). All the case study firms interacted with business associations, institutions such as R&D/academic, financing institutions and government regulatory organisations and enforcement agencies. The interactions enable these firms to interact and share skills and knowledge, including technical assistance with other firms. All the firms were members of KAM. At the time of this research, the chief executive of **MCEL4** was an executive committee member of KAM. He was also the chairman of KAM's metal and allied sector and trade promotion committee. Another **MCEL4** director chaired the EAC sub-committee of KAM. The participation by the local firms in the KAM means that their firms shared experience with foreign firms on things like labour ethics, corporate governance, policy lobbying technique, intellectual property rights etc.

Firms also interacted with the MSK. **MCEL4** participates in MSK competition and for instance in 2002 it won the best product award and best development of existing brand award in 2003. Firms interacted with KIM by participating in their annually organised company of the year award. For instance, it also participates in the company year award (COYA) organised annually by KIM. In 2003, it was the best overall company with best financial management and marketing practices.

All firms interacted with government regulatory bodies such as KEBS. In 2003, **MCEL4** achieved Kenya Quality Award (KQA) awarded by KEBS. Also, Diamond Mark of Quality by KEBS in the same year. In 2003, it obtained ISO 14001:1996 in Environmental Management Systems. In 2001, it obtained ISO 9001: 2000 for Quality Management Systems from SGS. **MCEL4** started implementing Total Quality Management (TQM) in 1995. It obtained ISO 9000-2000 certification in 2002 for strict

¹⁹⁷ Under UN drums must pass the staking test, immersion test, hydraulic and drop test.

quality management systems. In the same year it was also awarded ISO 14000 certification for implementing Environmental Management Systems.

The firms interacted with FKE for labour issues and settling trade disputes. Other memberships included KIRDI, EPZA (**MCEL1**), with KIPi and local financial institutions. **MCEL2** interacts with other R&D institutions like KIRDI. On technology, development the firms felt that the country lacks strong R&D to support industry innovation and technology development, as there was little involvement of universities research work in industrial activities. For this reasons, the firms have to rely on external sources for innovation and technology development. Firms do not obtain finance from the local financing institutions. Lack of collateral and high interest rates were big obstacles to obtaining such finances. They also argued that KEBS lacked adequate capacity to undertake certain aspects e.g. testing of certain equipment. All these factors amounted to high transaction costs to the firms and reduce the collective benefits that would otherwise occur.

Some firms have international interaction membership. At international level, **MCEL4** has membership with a few Germany companies. Other international memberships include member of Pacific Zinc Aluminium, USA Zinc Aluminium and Europe Zinc Aluminium. This has been beneficial for international information and knowledge.

With regard to human capacity building, these firms also played an important role in the country similar to the foreign firms. **MCEL2** is involved in training programme of the university-engineering students who come for several months of internship/attachment at the plant facilities. Engineering students from vocational and polytechnic are also accepted. The training offered is practical and is conducted in-house. This was the same case even with other training involving firm staff due to the fact that pipe making technology and training was not possible to get elsewhere outside the firm. **MCEL3** maintained a long run relationship with the local technical universities and polytechnics. It accepts students from the engineering departments of these institutions to have their industrial attachment with the firm for a period ranging from a few days to several months. The firm has a set programme through which such students must follow. A team from these institutions and from the firm usually works out the program to be followed. This programme is put in such a way that the students must work in all the sections before the end of the course. This is intended to provide the students with multiple practical skills and experience. The firm has a set policy to take a few of the best students from the batch that comes for the internship from tertiary institutions. One such case was identified where an intern student from a local polytechnic who had his industrial training in the firm and later joined **MCEL3** as a supervisor in the spinning department after he successfully completed his studies at the polytechnic. There was a similar case of another university graduate who was at the time working as the maintenance engineer.

MCEL4 also participated in human capacity development in the country. It offered competitive academic scholarship to students pursuing higher education in science and engineering subjects. A top student was benefiting from **MCEL4** academic sponsorship to take up Bachelor of Science (BSc) degree in engineering at Jomo Kenyatta University of Agriculture and Technology, a local public university. **MCEL4** also offers industrial attachment annually under its Young Professionals Programme. It takes 10-12 engineering graduates from Nairobi and Moi universities and 16-20 students from Kenya and Mombasa polytechnics for industrial attachment. It is highly competitive and only

top students can be considered in the scheme strictly restricted to mechanical, electrical, production and computer science studies. The firm can offer jobs to the best candidates after their industrial attachment. The firm has also established a vocational technical training school managed under the **MCEL4**-European Investment Bank (EIB) Trust and with further technical support from Don Bosco Schools. The growth and expansion, following technology transfer, its exploitation and skill development (for instance learning from foreign expatriates) enabled this firm to participate in the countries human capacity development.

7.5.4 Competition Effects

In this section, we examine the competition effects on the case study firms as a result of competition intensity especially from foreign firms. We found interesting cases where competition pressure from foreign firms had forced locally owned firms in our case study to introduce technological changes; learn and build capability. We present case by case.

MCEL1 does not face stiff competition from imports. However it faces stiff competition from competing firms domestically. This includes foreign firms operating in the country. As a result of this competition, the firm has had to undertake several things: improve quality control; offer more training; diversify and start processing of new products. Their competitors have advanced technology and it is a part of global network of companies with wide experience in the field. Similarly, **MCEL2** faces very stiff competition as a result of imports into the country from competing firms. The firm also faces stiff competition in its export region due to imports from other foreign companies and especially from Asian countries with the leading one being India. An example was provided where a company located a long the coast in India (Good luck) produces steel (India has steel) and sells it to Ethiopia. In their case since Kenya has no steel, they have to get it from South Africa through the port of Mombasa, process it before once again exporting the processed commodities through the same port. Responding to our question on the effect of competition pressure from foreign firms, the production manager elaborated as follows:

Since the company is interested in capturing a wider market including Ethiopia, the current strategy being pursued is that of trying to reduce the production cost. As a result of this initiative, the company has closed its galvanising plant to try and undertake some renovations geared towards cost reduction. The renovations are intended to introduce certain modifications; all being a plan strategy to reduce cost of production and be able to compete for export markets. Galvanising cost is very high and the company is not going to be competitive while incurring such high galvanising costs. We anticipate reducing the furnace oil consumed by about 50% upon completion from 100 litres to 50 litres per tone of pipes being galvanised. It is also necessary to change the blower since it is not providing sufficient air for combustion. Another innovation would be to change the standard for Zinc from the current 600 gm² to 200 gm². As you can see, we are behind in many things. The technology is very advanced at the moment. In most cases companies use computer controlled machines (CCN) but we were still doing everything mechanically. Our immediate plan would be to introduce a cutting tube machine with a small element of tolerance. It would also be important for us to obtain a new welder, which would even reduce the power consumption.

MCEL3 faces moderate competition from other firms both locally and foreign owned firms. In addition, the firm faces moderate competition from imports into the country by

quality management systems. In the same year it was also awarded ISO 14000 certification for implementing Environmental Management Systems.

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MCEL3 faces moderate competition from other firms both locally and foreign owned firms. In addition, the firm faces moderate competition from imports into the country by

competing firms. According to the managing director, such products were sometimes re-routed into the country through COMESA member countries such as Egypt. As a result of this competition, the firm had introduced a number of things:

- Introduced several fabrications in the plant.
- Sourcing raw materials from a different location. Initially it used to source certain things from France but now they obtain them from India where they are relatively cheaper.
- The firm has undertaken more training in house.
- The firm has looked for alternative markets.
- The firm has become keen on quality control.
- Introduced new products.
- Started engaging in procedures to reduce energy consumption.
- New machinery dependent on demand.
- Acquire new processing techniques.
- Improve market strategies (serve other markets).
- Improve organisation and management structure

MCEL4 faces stiff competition from imported steel mainly from Asian countries. It also faces stiff competition from local competitors who are mainly locally owned firms and a joint venture firm with a MNC. They have introduced new processing lines. The source of **MCEL4's** competitive strength has been its heavy investment in capital machinery and equipment. The company has also invested heavily in product technology that has been licensed from Abroad. Although the rival firm's have attempted to invest in machinery they however cannot match the superiority of **MCEL4's** machinery and technology. The product technology used in the rival firms is still the old one especially in galvanising sheets. In terms of innovation, **MCEL4** is far a head of the competing firms. The firm confirmed that it had the highest level of human capacity. It has more linkages established abroad, which serve as a source of information. The newly invested machinery allows more efficiency and flexibility - increased its ability to accommodate changes in customer tastes and preferences. As a result, it has been able to offer reduced prices due to low overhead costs. With the new technologically advanced plant, the firm has become more efficient and flexible (increased ability to accommodate changes in customer tastes and preferences), high capacity utilisation. It is able to offer its processed products at a low price. The firm is producing at international quality standards that can compete effectively in advanced markets in the Middle East, Europe and the United States of America. Attention is given to quality maintenance through consistent analysis of customer's needs and expectation through internally organised quality control circles and core team projects. It has a wide experience in product manufacture as well as marketing experience. The firm had a planned strategy to invest US\$ 40 million in expanding its plant and introducing new products. The investment is expected to improve the firm's capacity. It wants to introduce new products and acquire new processing techniques (a pickling line). This will involve increased workers training and changes in organisation and management.

7.5.5 Demonstration Effects

All the four firms enjoyed demonstration effects from foreign firms. As will be shown, this occurred either directly or indirectly to the firms. **MCEL1** contended that it had benefited tremendous demonstration effects from competing firms. However, this depended on the kind of machinery to be used. The firm contended that since the foreign firms were the pioneers in the production of crown corks in the country most things were then copied from them. These things range from processing techniques, product technology and marketing.

MCEL2 has introduced new products and new techniques observed from other ordinary companies both local and foreign. The firm was able to make similar but own products. From the example provided, below we note one important thing, a firm fabricating successfully (imitation) a product from a MNC from another country. This was a fascinating demonstration effect as explained by the production manager.

We had a special request by a particular customer who wanted some items done to his specification. He wanted steel angles produced and galvanised. The steel angles were required for floriculture (capillary action for the irrigation of floriculture) and about 20, 000 pieces were required. The customer used to obtain them from South Africa. We asked him to present a sample to us for examination. After examining it, we decided to try it out. We had never made anything of that kind before. To fabricate these angles, we had to make several trials in our fabricating unit. We had to make many jigs for galvanising as well as a system to test the angles quality. With a large number of trials and errors, we managed to come up with similar if not better angles than he used to get from South Africa. The customer was happy and satisfied with the product. Our firm can now make angles for other interested and needy customers. The learning done made us build the required production capability.

Another example is from **MCEL3**, which introduced new products and new techniques observed from other companies through demonstration effects. The interesting thing is that after the firm successfully imitated for the first time it was then able to make similar and own products afterwards. **MCEL3** has had demonstration effects from companies mainly based abroad. Such firms included Chinese, German, Egyptian and British firms. This was possible due to the capability built in-house as well as absorptive capacity. When the engineers were asked about the challenges posed by international orders, they answered that each one of them presents own technological challenges. A few examples were provided.

(1) The first example included a case where UNHCR wanted some special *flying pans* be made for them in 2002. The general manager had interacted with them. So they held discussions of how such could be made at the plant. This was a special kind of pan where an individual could eat from, put something on top to warm up and to cover the flying pan. The company made multiple trials before they eventually succeeded in coming up with the required flying pans, which met all the specifications.

(2) The second example involved manufacture of *round bowls*. A visiting high commissioner challenged them to come up with a specific design and volume. These were 5 litres bowls that had not been manufactured in Kenya before. The commissioner was concerned that the space taken by the previous bowls was extremely high making it very costly to transport them. The challenge was on how to come up with a bowl still 5 litres but of less volume (less bulky), high quality and if possible of a better design. With much effort the firm was able to come up with a bowl that met the exact standards

required by the commissioner. The bowl was of the exact capacity, better shape and quality but less bulky. This is a good example of a case where a firm can learn from something demonstrated to it by a foreign organisation and because of its accumulated technological capability the firm succeeds in making it.

(3) The third example involved *wholly communion cups* used for taking the wholly communion in the church. The actual process proceeds as follows: The churches usually demonstrate the kind of communion cups they want made to the **MCEL3** who study them and then come up with the required cups. These cups are new in the country, as they have only been manufactured by foreign firms abroad. As usual, the firm underwent through the normal challenges but eventually was able to come up with the required cups. Such challenges involve making the right size dies and then adopting the machinery in order to make such small cups, which had not been manufactured before. The capability developed at this time enabled them to make more cups for other churches, which were even bigger than the ones made before. The wholly communion cups were a demonstration from abroad where this particular church had originated from.

(4) The fourth example involves requests from firm's customers. Based on items/products they have seen in the local market. The requests are that **MCEL3** makes such products for these companies. Things often demonstrated come from supermarkets and can include anything e.g. making an Aluminium soap dish from a plastic soap dish demonstrated. This is possible since **MCEL3** has developed enough technological capability in-house in the firms fabricating unit.

(5) The fifth example involved *UNICEF Cooking Set*. This followed a successful tender, which they won for the supply of a cooking set for a relief operation. The set was demonstrated to them, it included 4 bowls with a capacity of 1 litre each; two sufurias of 3 and 5 litres; coffee pot 1.7 litres, frying pan with a detachable handle, 6 mug cups of 7 cm diameter. The firm was able to make the set and as a result they have been able to do the same for other international organisations like UNHCR, UNIDO and Red Cross.

(6) The sixth example involved collaboration between the firm, the government of Kenya and ILRI. This was done to improve the marketing and sale of milk. This came as a recommendation from a survey done and based on the feedback received, they decided to introduce a new milk can for the sale of milk different from the one used earlier on.

(7) The eighth example involved making dies for *baking queen cakes* and other established products. The customer come with the items and demonstrates them to the engineers in the firm. The engineers studied them and then try to investigate how they can introduce fabrications that would enable them make the required items. This was possible as the firm had the capacity to make very intricate shapes as a result of tacit and experiential knowledge garnered by the firm engineers.

In sum, demonstration effect from foreign firms and organisations affected the following activities in the firm: Assisted in the development of new products or improvement of existing products to market needs. Assisted in the processing activities; raw material and quality control; upgrading machinery and equipment stretching to save energy; cost; raise productivity etc. Assisted in repair and maintenance of physical capital, inventory control etc. strengthened the marketing department with new ideas and knowledge of existing local and foreign export markets.

Contrary to the above cases, **MCEL4** had not enjoyed any demonstration effects from firms based in Kenya. According to the general manager, **MCEL4** was the most advanced in the region and thus other firms imitated their products and way of doing things. They have always been first in many areas. They are the first to license the new product technology Al-Zn in the region. They were the first to introduce colour-coated sheets. From the country they were the first to penetrate the international export market in their line of products. They were the first to introduce the sophisticated Japanese CGL in the country. They were the first to be awarded ISO 9000 and ISO 14000 in quality systems management and environmental management respectively. They have won management, financial and quality awards several times. In this case other firms have indeed had demonstration effect from **MCEL4**. These firms have introduced new steel rolling lines some have even started processing colour-coated sheets. However, **MCEL4** enjoys demonstration effects from MNCs in other countries e.g. BHP of Australia. It wants to constantly upgrade and invest in machinery and technology to match BHP of Australia. Similarly, they want to introduce flexible processing technologies to match Japanese firms. Excerpt "At low cost with speedy delivery and assured customer satisfaction through benchmarking with Japanese Rolling Mills". This represents international spillovers through demonstration effects.

7.6 Perceived Government Role in the Spillover Process

The analysis done so far indicated that the government attracted FDI and created institutions all to promote industrialisation in Kenya. See our discussion in Chapter 3. However, it has emerged in this research that institutions remained inefficient and weak in performance. This was due to the constraints they faced including lack of support by the government. Their inefficiency added to the transactions costs of operating in the country. This aspect reduces technological spillovers from occurring. Institutions need support from the government until they are sound in their operations. Without these there will be very little support to the local firms in terms of finance, information and technical support etc. This demonstrated a lack of government attention and concern in scooping the benefits that arises from foreign presence in a host country. Take for example spillover occurrence through linkages formed. This study, Chapter 5, indicated linkages to be one of the lowest mechanisms that generated spillovers. While in other countries this has been a main mode of spillover occurrence [Lall, 1980; Rasiah, (1995: 2004); Rodriguez-Claire, 1996; UNCTAD 2001; Smarzynska, 2003]. This is so partly due to government's failure to encourage formation of linkages and interactions among economic agents; firms, institutions, business associations etc.

On competition some of the locally owned firms felt that competition was not properly regulated and tended to harm indigenous firms and thus their capability development. The firms argued that the government seemed to operate a blanket rule as if foreign and locally owned firms were equally endowed in terms of capacity and resources (e.g. technology and finance). Others felt that in some form of manufactures, which characterized by low value addition should be left to the locals. These arguments were supported by claims from the general manager of **FBL2** who reiterated that: *"the government needed to assist infant industries; by refusing to license foreign companies to package commodities that can be packaged by local investors and which add no value"*.

The provision of the facilities e.g. utilities and infrastructure remained below par. The firms claimed that despite their growth and expansion, they faced severe constraints: the cost of utilities to the firms e.g. power remained extremely high. The infrastructure (roads, railway, ports and telephone) affected their efficiency negatively. The general manager of MCEL3 outlined these problems as follows:

There is serious lack of capital in this country; lack of industrial development banks that provide credit at competitive rates; infrastructure remains inferior, cost of communication (inland, road and shipping frequencies); for instance transportation of goods to Northern Kenya, Moyale, is just impossible; cost of clearing at port is higher than within the land; telecommunication problem is unbearable. 56 km bandwidth gets divided and there is no fiber optics in this place; regional cost of telephoning is extremely high; no cheap web access.

These factors make the local firms uncompetitive. They increase operation and transactions costs. That way they hinder spillovers occurrence. As a result, large export orders even in the immediate region are left only to large economies like China and India. The high interest rates in Kenya make the cost of capital remain constantly high. All these factors were further aggravated by poor performance of the economy in the 1990s that resulted in declined local market due to low purchasing power and few projects undertaken. However, the firms have remained optimistic that the new political dispensation in the country in the wake of a new government was still likely to bring favourable policy changes to industrial development hence economic growth.

In sum, the government needs to decisively come up with pro-active industrial policies. This will be presented in Chapter 8. Firms and institutions need continuous and committed facilitation. Although the country has a fair level of human capital the firms need facilitation in technological learning and training. Here we mean training that is geared towards promotion of science and engineering and one tailored to the supply of industrial needs. This is possible particularly to the firms through training allowances. Firms also need facilitation to continuously acquire technology and machinery. This is innovation to the firms, which the government ought to consider and encourage in firms and industry. In doing this, it should make it a policy to give R&D allowances and put in place supportive industrial R&D institutions. With this kind of facilitation Kenyan products will be as competitive as those from advanced developing countries such as China; Taiwan; Korea; Japan etc. Export should be encouraged also through tax rivets etc. Competition should be critically scrutinized to avoid crowding out of the domestic investment. Such regulation would for instance take into consideration the effect of foreign firms having to penetrate the domestic firms' markets. Tariffs or a careful selective vetting process should be considered to block foreign firms, which would compete negatively with efficient domestic firms. Successful examples of infant industry protection and support can be traced to the East Asian countries e.g. Taiwan and Korea (Fransman, 1988; Amsden, 1989; Chang 1991).

7.7 Summary and Conclusion

In this chapter, we conducted eight detailed case studies from the perspective of locally owned firms to examine the extent to which foreign firms stimulated spillover occurrence. We used a similar analytical framework to that developed in Chapter 6, itself based on approach developed in Chapter 2 and utilised in Chapter 5. Accordingly, the chapter considered the following elements: human resource development and labour

mobility, linkage effects, demonstration effects and competition effects. The chapter began by presenting a quick overview of background characteristics for each of the ten case study firms. The findings obtained in this chapter supported the empirical analysis done in Chapter 5. Analysis of the eight case studies done showed that FDI in the two industries played a role in stimulating learning, capability development, innovation and performance in locally owned firms. This confirmed spillover occurrence from foreign firms to the locally owned firms in the two industries studied.

The choice and justification of the case study firms was mainly based on the nature of production technology, learning and innovation. Locally owned firms relied on international sources for the acquisition of their production technology and machinery. This was also found to be the case with foreign firms studied in Chapter 6. In a few cases the locally owned firms had obtained their production technology from MNCs located in the country. Product technology was also often licensed from abroad (**FBL3**, **FBL4** and **MCEL4**). Hence these firms did not do serious R&D but only maintained technical departments and laboratories for quality control checks and to ensure smooth running of the process. It emerged that locally owned firms were able to learn and build capabilities based on the foreign production technology and products. Participation in production activities allowed human capital development in that locals were able to accumulate tacit and experiential knowledge from on-the-job training and learning by doing. This would be expected since production technology obtained was sophisticated and new to the firms hence requiring training. Trainings commenced with plant lay-out and process installation. It would also include process operations, process adaptations and maintenance procedures etc. Training also involved product technology with locals learning how to make products including those produced under foreign license (e.g. **FBL2**, **FBL4** and **MCEL4**).

Examination of human resource development showed that local firms offered training in the firms. However, this was not comparable to the foreign firms training. This supported the argument that foreign firms offer more training than locally owned firms (Chen, 1983; Gerschenberg, 1987). Workers in foreign firms were able to acquire skills and experiential knowledge from better trainings offered. This was supported by resources enjoyed by foreign firms hence enabling them to offer better training programmes and superior training facilities. Foreign firms are in a position to organise skill enrichment programmes either in-house or externally. When locally owned firms just sent a few of its staff abroad for specialised training, foreign firms sent even more through exchange programme trainings or with the firms' parent companies. Although locally owned firms observe some labour ethics by allowing formation of unions, transportation, better terms and conditions of service they still had a lot of things to learn or to match with foreign firms e.g. awarding high salary and wages.

Analysis done in this chapter indicated that labour mobility existed in the locally owned firms. There were many cases identified of professionals, engineers, and technically skilled workers who had left jobs with MNCs and taken up new appointments with locally owned firms and vice versa. There were many cases observed of expatriates who had joined the local firms (e.g. **MCEL2** and **MCEL4**). This is supported in the literature by studies that found labour mobility from foreign to domestic firms (Pack, 1973; Behrman and Wallender, 1976; Gerschenberg, 1987). There were also cases of staff leaving to run their own entrepreneurship implying their role in breeding domestic entrepreneurs. Investigations done in the firms with some of the staff who had joined from foreign firms confirmed the usefulness and applicability of the skills they had

acquired while working with MNCs (**FBL1** and **FBL2**). This confirmed existence of knowledge spillovers through labour mobility. It also supported a broad and positive role FDI played in the country's human capital development effort, which has a positive bearing towards industrial development.

We examined linkages generated by these firms with foreign firms and interactions existing with institutions and business associations. Both pecuniary and non-pecuniary linkages were discovered. Local firms maintained backward linkages with suppliers of raw materials, services (banking and financing institutions), machinery and equipment. Forward linkages were maintained with distributors, transport and communication. In each of these cases local firms were observed to have benefited technological spillovers. Pecuniary linkages were important to the firms in that the demand they created helped the local firm to grow and expand as a result of finance obtained. First, international linkages maintained with technology and machinery suppliers provided a forum for interactions during machine repairs and maintenance. This was evidence of technological spillovers. It was noted that firms benefited training at every stage of plant setting ranging from initialisation to commissioning (**FBL1**, **FBL2**, **FBL3** and **MCEL4** offered good examples). In other cases international links with foreign firms offered technical support in making some products or adopting them to the local conditions and requirements. This was supported by the case of wine making firm (**FBL4**), soft drink firms (**FBL2** and **FBL3**) and Iron rolling firm (**MCEL4**). These were noted to be possible due to the technological effort maintained in firms.

Technological spillovers with regard to backward linkages emerged in a more or less the same manner. There were cases of locally owned firms (**FBL1**) that obtained production lines; products; marketing and distribution network from MNCs in the country. All these amounted to technological spillovers, which the firm was able to scoop due to its high level of human capital and availability of finance. This enabled the firm to learn, accumulate production capability and become innovative. Indirect cases of spillover occurrence were also found – second level linkage. This happened when spillovers occurred to a locally owned firm through another locally owned firm. As a result, such firms had to introduce technological changes, learn from doing and build capabilities (**FBL3**, **FBL4**, **MCEL2** and **MCEL4**). Backward linkages with spillovers were maintained in agro-industry as well (**FBL1**; **FBL4** and **MCEL2**).

With regard to forward linkages, the firms contended that due to the demand created by foreign firms they have been able to grow, expand and build technological capability as a result of learning from the orders placed from these foreign firms. It also allowed them to obtain finance. Foreign firm offered strict conditions to the supplying firms and maintained routine audit and certification. Most MNCs were ISO accredited while others followed World Class Performance (WCP) and thus they had to observe strict requirement with local suppliers. Local suppliers had to be or had to acquire ISO certified or at worst maintain KEBS quality certification. As noted also in Chapter 6 some of the MNCs encouraged locally owned firms to become ISO certified and to improve their efficiency. To the local firms that implied obtaining the right machinery and equipment, offer regular training and maintain sound management practices. All these amounted to spillovers. Some locally owned firms benefited spillovers when they offered services like contract packaging to MNCs (**FBF5**) benefiting spillovers in quality control which amounted to building production capability. Indirect cases of spillover occurrence were also noted with forward linkages (**MCEL1**). All these were possible due to the technological capabilities accumulated over a long period of time in production.

Local firms interacted with institutions such as R&D/academic institutions, financing institutions and government regulatory organisations and enforcement agencies. They also interacted with business associations. Although these interactions result in technical support; financial support; sharing of skills and knowledge; this was only to a limited extent as firms strongly felt that ought to have been better. Our findings in this chapter concurred with those of Chapter 3 that institutions in Kenya were weak and performed inefficiently partly due to neglect by the government. Their weak operation and poor coordination increased the transactions costs and tended to lower spillover occurrence. With regard to business and marketing associations, the situation was somehow better as the local firms interacted with foreign firms and enjoyed sharing knowledge and expertise in areas such as labour ethics, trade disputes, corporate governance, policy lobbying technique, technology transfer, formation of linkage, strategic alliances and mergers and acquisitions, intellectual property rights etc.

On competition, locally owned firms were able to survive competitive pressure due to a number of reasons including spillover benefits from such subsidiaries. *First* one is that MNC subsidiaries provide technical assistance to their local suppliers and customers, train workers and managers who are later employed by locally owned firms. *Second* is that locally owned firms may move into the production networks and interaction networks of subsidiaries (**FBL1** and **FBL2**). *Third* is that an opportunity to catch up arises stimulated by the interactions they have with MNC subsidiaries. The *final* one is that some demonstration and competitive elements force firms to undertake changes; these could also be made open by certain kind of policies that ensues foreign investment (**FBL1**, **FBL2**, **FBL4**, **MCEL2**, **MCEL3** and **MCEL4**). Competitive pressure exerted by subsidiaries forces locally owned firms to operate more efficiently and introduce new technologies earlier than what would have otherwise been the case.

Locally owned firms benefited tremendous demonstration effects from foreign firms. This was often possible due to the technological effort maintained in the studied firms. The findings in this chapter presented interesting cases where locally owned firms were able to imitate processes or products from foreign firms. Products imitated would sometimes come from abroad (**MCEL2** and **MCEL3**). This process enabled local firms to benefit a wider set of product and portfolio without having to do R&D for product or process development. The most important thing to point out here is that, local firms would then advance in their learning curve and build more capability to innovate.

As a conclusion, we argue that FDI in Kenyan manufacturing played a crucial role in industrial development through spillover occurrence to the locally owned firms. Spillovers of knowledge resulted in learning, accumulation of technological capability innovation, growth and enhanced performance. The case study findings in this chapter supports empirical analysis conducted in Chapter 5 and 6.

SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

8.1 Introduction

This chapter presents the summary, conclusions and policy implications of this study. The chapter is organised in six sections. Section 8.2 provides a summary of the study's purpose i.e. the research problem set for this study is described. Section 8.3 presents a summary of the theoretical issues and conceptual framework developed for the study. In section 8.4, the summaries of the study's main empirical findings with regard to the econometric and case study analyses conducted, are presented. Section 8.5 presents the summary of the policy implications based on the research findings obtained while section 8.6 provides the recommendations for further and future research works.

8.2 Research Problem and Objectives

This thesis arose out of concerns to understand how FDI affects industrialisation process in Kenya with particular emphasis on spillovers and technological capability. The broad objectives were outlined in Chapter 1. The thesis investigated whether technology, knowledge and skills transferred to the country from technically developed countries contributed to learning and development of technological capabilities in locally owned firms which would in turn enable them to innovate. The analysis was done by examining the effect of technological spillovers from MNC affiliates to locally owned firms in the Kenyan manufacturing industry.

8.3 Theoretical Considerations and Conceptual Framework Design

Due to the weaknesses observed in spillover analysis, an alternative theoretical framework was presented in Chapter 2. In view of the vast developments in the endogenous and evolutionary literature, neoclassical production function approaches utilised in examining technological spillovers are definitely flawed. Technological spillovers are to a large extent unnoticeable, as they do not leave a trail of smoke behind them, are uncertain and complex implying that an appropriate attempt to analyse them would beg for an equally complex and integrated systemic approach. Hence, a near understanding of technological spillovers can therefore be approached by assuming an endogenous, evolutionary and institutional approach, which views firms not as isolated, static and pure economic organisations, but rather as members of changing economic and social-economic-institutional networks. For instance, this would require a deep understanding of the network dynamics and corroborative linkages that exist in the industry and/or economy wide systems. The role and importance of the local support system in the spillover process would have to be taken into consideration as well as social capital.

In this light, an alternative framework was suggested for this study which extracted some overlapping elements of industrial organisation and incorporating them with the national

system of innovation. Spillovers were conceptualised in terms of learning and capability building. This follows the argument that in technically underdeveloped countries like Kenya, occurrence of spillovers was likely to place domestic firms on a learning function hence stimulating their capacity to build and accumulate capabilities which would in turn enable them introduce more technological changes and innovation.

8.4 Summary of the Study's Findings

In this section we present the summary of the study's findings starting with the findings obtained in context setting chapter.

8.4.1 Empirical Results Obtained Based on the Context Setting Analysis

The analysis done in Chapter 3 produced interesting findings. FDI was noted to be important for the emergence and continued development of manufacturing industry in Kenya. From the onset, Kenyan manufacturing was started by foreign firms mainly from Britain which established their operations mainly in agro-based industries. During the colonial days and before Second World War, the foreign firms only performed simple and very basic manufacturing activities characterised by low value addition. Nevertheless, the country is believed to have enjoyed extensively from the early colonial manufacturing experience since in strict sense no modern manufacturing existed before. In pursuit for further development and expansion by FDI, the country benefited and continues to enjoy most of the infrastructure developed then. Most of the portfolio investment such as railway, roads, airport, port harbour and public utility departments all instrumental in stimulating technology diffusion and market outlets for locally owned firms were made during this period. Similarly, most of the revenue earning primary sectors in the country were developed during the same period (examples include coffee, sisal and tea estates). A few public and private institutions were also established then.

The analysis done showed that after the Second World War, the British Government decided to allow more industrialisation in her colonies done under strict protection by use of tariffs and quota restrictions. After the Second World War the US started sending its FDI internationally. This created pressure indirectly to Britain as this would mean sending such FDI into its colonies and thus erosion of its market. Thus in addition to encouraging industrialisation in the colonies, the British Government also encouraged its firms to invest in its colonies. As a result of this drastic policy changes, the period 1945-1963 saw increased FDI inflow from Britain into Kenya's manufacturing. The production was meant to substitute manufactured products earlier imported – thus a kind of import substitution policy was being pursued.

At independence in 1963, Kenya enacted industrial policies meant to promote its industrialisation which was still at its infancy. The country continued pursuing the import substitution policy started earlier. Different kinds of policies were enacted: First, some policies were enacted meant to encourage entry of indigenous entrepreneurs into manufacturing. Second, some policies were enacted meant to open up to more and diversified FDI. Specific policies were tailored to change the witnessed outflow of some FDI from the country due to the existing fever at independence that most firms would

be nationalized under the *Kenyanisation programme*¹⁹⁸. Due to friendly policies enacted, good economic performance, raw materials and existing market, many MNCs made their entry into manufacturing. There was increased foreign capital in manufacturing placing the country among the leading in the region¹⁹⁹. It is believed too that in this period the Kenya's manufacturing benefited tremendous manufacturing experience in the form of technological spillovers. Industrialisation proceeded steadily with high manufacturing growth rates. In addition to the industrial policies formulated, many institutions were established meant to offer systemic support and promote industrialisation through stimulation of industrial capability building. The institutions were supposed to provide finance, offer entrepreneurial training, support acquisition of technology and machinery and support in industrial R&D etc. Similarly, interaction between FDI and these institutions would be important in spillover occurrence to the locally owned firms. At their setting the institutions played an important role in industrial development.

Due to the economic crises of late 1970s and 1980s import substitution policy was dropped and outward-oriented policies adopted by mid 1980s meant to re-orient industrial production in favour of exports. This was done together with a whole range of other policies contained in the SAPs as advocated for by the neo-liberal architects. There was improved performance but only for a short period due to the government's failure to show continued commitment in the liberalisation measures it was undertaking.

Further structural reforms were therefore undertaken in 1993 to reverse the declining trend. This was without much success due to more problems as explained in chapter 3. During this period, FDI inflows continued to decline but maintaining high stock levels in manufacturing which continued to generate high levels in employment, revenue generation, value added, export performance etc. There was however increased effort to promote exports and stimulate FDI. This was through several new institutions established to attract FDI; to promote exports by formulating marketing strategies, export culture and identify export opportunities and finally to administer industrial property rights. FDI examined in the context of institutions such as EPZA and IPC showed that FDI dominated in performance on many fronts such as value added, exports, skilled employee and imports of machinery and equipment etc. This reinforced our argument of their useful role in industrialisation – industrial capability development. Although these institutions (including those established during the import substitution period) played an important role in industrialisation, their performance was severely constrained with multiple problems ranging from lack of adequate finance, lack of required skills, sometimes poor governance and weak systemic co-ordination. This institutional failure was aggravated by reduced government support on the institutions.

Despite inconsistencies in policies pursued and other structural problems, the analysis and findings of Chapter 3 showed that FDI played an important role in Kenya's industrialisation process. Similarly, despite the constraints faced, institutions established played some facilitation role in this process. The implication of this is that FDI contributed to industrial capability development through positive spillover occurrence in Kenya's manufacturing which needed to be ascertained concretely. The findings of this

¹⁹⁸ As outlined in Chapter 2 and 3, Kenyanisation programme was intended to Africanise commerce and industry in the country since these were dominated by foreigners before and at Kenya's independence in 1963.

¹⁹⁹ Studies done showed that in 1967, FDI in Kenya's manufacturing was 32.4 % while the average for the whole of Africa was 18.8 %. Similarly, at the same time, FDI was shown to have dominant control in value added and total manufacturing sale in Kenya with 71 % and 72 % respectively.

chapter, therefore, motivated our study to attempt a more rigorous empirical investigation by using econometric techniques and case studies to analyse technological spillovers.

8.4.2 Empirical Results Obtained Using Data from Secondary Sources

The empirical objectives outlined in Chapter 4 were examined using unpublished firm level data collected from secondary sources. For the purpose of our analysis, an 8 year panel database for the period 1994-2001, was created comprising 175 foreign firms and 245 locally owned firms. The objectives considered in the chapter enabled us to generate a wider set of results for a comparative behaviour among firms and with other existing spillover studies based on productivity. This was important given the existing divergence in spillover analysis and conclusions as outlined in Chapter 3.

The comparative behaviour undertaken in the period (1999-2001) showed that foreign firms continued to enjoy higher shares than locally owned firms in virtually all the economic activities. Analysis done using some of the key indicators in manufacturing showed that foreign firms dominated in productivity (in terms of value added, labour productivity, raw material productivity, capital intensity and skill intensity). T-test analysis done confirmed empirically that foreign firms were more productive than locally owned firms. Foreign firms also dominated in factors of production, processing capability and in human capital (taken in terms of skilled labour force). Similarly, foreign firms controlled in market performance as illustrated by the high shares observed in output sales and exports. On the basis of other indicators, foreign firms were noted to be older, bigger in size and utilised higher capacity than locally owned firms. Interestingly and on the contrary, the analysis showed that locally owned firms had a better performance than foreign firms on the basis of growth rates recorded. While foreign firms recorded declining growth rates with virtually all their variables, domestic firms had positive growth rates in several variables that included; valued added (2.9%), labour productivity (2.2%), skilled labour (2%) and employment (1%). These findings were quite fascinating as they implied that the locally owned firms were gradually catching up with foreign firms.

Further comparative analysis done by manufacturing sector revealed that manufacturing sectors were different with regard to foreign presence. Foreign firms were noted to be concentrated in only a few sectors. These sectors were identified as: food, beverages and tobacco; machine and engineering and chemical, petroleum and plastics industry. On the bases of the same variables, the activities of foreign firms demonstrated a skewed distribution in that they were also concentrated in just a few sectors. Interestingly, these were the same sectors with high foreign presence noted earlier. As in above, annual growth rates showed that while foreign firms tended to decline in real terms, locally owned firms tended to rise as supported by the positive growth rates computed in the period 1994-2001. This supported the gradual catching up phenomenon with foreign firms in the three sectors. Annual growth rates examined for a long time series data, 1963-2000, confirmed that the three sectors identified to have high foreign presence were the same sectors that continued to do well with regard to growth rates and performance shares. In this case there was some kind of correlation that could be drawn linking FDI and manufacturing performance. In essence this could be viewed as a process that translates directly and indirectly in industrial development.

The analysis of FDI effect on productivity was examined using total factor productivity. Foreign presence was considered at both firm 'foreign participation' and sector level. Foreign participation had the expected results which were consistent and robust with and without time and industry specificities. These results implied that foreign equity participation at the firm level influenced productivity positively – suggesting productive benefits from foreign owners.

The findings obtained in the case of foreign presence at the sector level were quite interesting. Two sets of results emerged depending on the methodological approach adopted. Results estimated following 'early contributors' supported spillover occurrence while analysis based on 'new developments' failed to support spillover occurrence. This showed that the existing divergence in the spillover literature could be viewed in the Kenyan context. Estimations done taking size and technology gap into consideration produced a similar kind of results. Given the advancement with the new developments approach we would be tempted to conclude in their favour that technological spillovers do not occur in Kenya's manufacturing. We decided not to stop at that point but rather to probe further. It could be the case that sectors with negative effect or low effect due to foreign presence offsetted those with strong positive impact making the resultant effect neutral sometimes negative hence insignificant results. This was possible in Kenya's manufacturing since results based on comparative behaviour showed that foreign presence was not uniformly distributed. These results, therefore, begged for an alternative framework as discussed in Chapter 2. As noted earlier, this approach largely failed to demonstrate a dynamic mechanism or link through which spillovers impact productivity. Given the tacit nature of knowledge and technology, productivity may depend on technological capabilities and effort of locally owned firms and not entirely on FDI, hence underestimating the role of recipient firms. The broader system of innovation plays an equally important role which must not be assumed. Thus results of Chapter 4 were very important in that they motivated our study to use an alternative framework, beyond productivity techniques, by taking sectors and sub sectors into consideration through in depth firm interviews supported by case studies illustrations. This was attempted in Chapter 5 conceptualising spillovers in terms of technological learning and capability building.

8.4.3 Empirical Results Obtained Using Data from Survey Sources

The analysis and findings of Chapter 4 inspired the next step of our study to attempt an alternative and a more rigorous approach in examining spillovers in Kenya's manufacturing. From the alternative framework outlined in Chapter 2, we developed an index, spillover index, conceptualising spillovers in terms of learning and capability building which resulted from technological changes. Preliminary descriptive analysis done in Chapter 5 on the basis of spillover occurrence mechanisms resulted in the following findings: *First*, a high proportion of locally owned firms faced very stiff competition compared to the foreign firms. *Second*, foreign firms had higher proportions of firms with both backward and forward linkages compared to locally owned firms. *Third*, all firms were observed to have gained and/or lost some of their professionals and managers, engineers and scientists, and skilled and technically trained workers to other firms. Interestingly, locally owned firms were observed to be employing more of these professionals and skilled workers than they lost to the foreign firms and joint ventures. Another interesting finding was that a high proportion of workers from foreign firms left their jobs to start their own firms compared to that of the locally owned firms. The consequence of this was that foreign firms in Kenya's manufacturing were acting as

breeding grounds for domestic entrepreneurs. *Fourth*, that demonstration effects also existed in the two industries. Both domestic and foreign firms had high levels of demonstration effect but foreign firms had higher. This is expected given their high capacity in terms of financial resources and human capital that can be translated into imitation and innovation. The preliminary descriptive analysis confirmed that spillovers mechanisms were present and active in the manufacturing.

(i) *To what extent do technological spillovers occur in Kenya's manufacturing industry?*

Using the spillover index developed, spillover occurrence from foreign firms as well as from locally owned firms was determined; jointly and/or separately. First, the results of spillover derived from both foreign and locally owned firms jointly showed that both food and machine engineering industries combined had a spillover index of 3.30. This suggested an "average" technological spillover occurrence in Kenya's manufacturing. The findings supported existence of knowledge spillovers in Kenya's manufacturing industry. Interestingly, more spillovers appeared to occur in machine engineering (3.36) than in food processing industry (3.25). The spillover index computed for the two industries from foreign firms was 3.48 and that from locally owned firms was 3.11. From the ordinal scale, these results indicated a relatively "high" spillover occurrence from foreign firms and "average" from locally owned firms. Comparison done by T-Test confirmed statistically that the spillover indexes computed by foreign and locally owned firms were significantly different. This confirmed our hypothesis that foreign firms generated more technological spillovers than locally owned firms. The index computed for food processing was 3.45 with foreign firms and 3.05 with local firms, while that of machine engineering was 3.53 with foreign firms and 3.19 with locally owned firms. This implied that more spillovers from foreign firms occurred in machine engineering than in food processing.

(ii) *To what extent does the presence of foreign firms stimulate technological spillovers to local manufacturing enterprises?*

Using the spillover index, we determined the extent to which foreign firms stimulated spillover occurrence to the locally owned firms. The results produced an average spillover index of 3.31 for the two industries – from both foreign and local firms. Food processing had 3.27 while machine engineering had 3.35. These indexes suggested average spillover occurrence into the two industries. However, the spillover index computed for locally owned firms in the two industries from foreign firms was 3.44 while that from locally owned firms was 3.19. By industry, food processing had an index of 3.40 while machine engineering industry had 3.46 with foreign firms. Index computed from locally owned firms had an index of 3.14 for food processing and 3.23 for machine engineering industry. These results showed that locally owned firms in machine engineering industry enjoyed more spillovers from foreign firms in comparison to locally owned firms in food processing industry. Moreover, the spillover indexes showed that foreign firms generated more spillovers in the two industries in comparison to the locally owned firms. These findings were very interesting in that based on the alternative framework considered, they supported our hypothesis that knowledge spillovers occurred in locally owned firms from FDI. The findings supported observations and arguments made in Chapter 2, 3 and 4.

(iii) *What kind of technological spillovers occur most?*

Analysis of the kind of technological spillovers occurring showed that knowledge spillovers occurred most in products and in process. The consequence of this is that there were a lot of technological changes and learning taking place in products and

processes as a result of spillovers. This would be interpreted as high technological capability building in the two compared to the other technological changes considered. These two were followed by marketing strategy. Interestingly, management and organisation, and repairs and maintenance had the lowest levels of spillovers occurrence. Interestingly also, in all these kinds of technological changes, foreign firms generated higher spillovers compared to the locally owned firms further supporting our argument that spillover benefits existed from FDI to food processing and machine engineering industries. It would be extremely difficult to generalise due to the sectoral differences in foreign presence noted.

(iv) What are the mechanisms through which technological spillovers occur?

Examination of spillover mechanisms done showed that the highest level of technological spillovers was generated by competition and demonstration effects. Statistical comparison by T-Test analysis showed that while there was no statistical difference due to competition and demonstration effects there was statistical and significant difference between them and both linkage and labour mobility. This implied that the first two mechanisms were more important mechanisms for spillover occurrence than the latter two in the Kenyan context. These findings were very relevant for enhancing industrial policies pertaining to spillovers. The competition results supported Schumpeterian argument of creative destruction while demonstration effects supported the East Asian imitation and reverse engineering models. Low levels of spillover occurrence by linkage and labour mobility indicated weak linkage systemic cohesion (with low knowledge flow), and labour mobility that generated low technological changes in the system. The results also indicated immature, inefficient and less supportive institutions and business associations in the manufacturing industry. These results motivate policy interventions in future if the industry must benefit spillovers through linkage and labour mobility mechanisms.

(v) What are the determinants of spillover occurrence? Results of econometric analysis obtained using binary and ordered logit techniques.

Determinants of spillover occurrence were examined using binary and ordered logit estimation techniques. The two techniques enabled consistency checks of the results obtained. Results from our analysis showed that foreign presence had a positive correlation with spillover index – implying that an increase in foreign presence increased spillover occurrence in firms. These findings supported our hypothesis that foreign presence generated positive technological spillovers in Kenya's manufacturing industry.

Our analysis showed that virtually all of the spillover determinants had the expected signs, were statistically significant and made intuitive sense. Firm characteristics such as firm size, firm age and age of the machinery had significant and positive influence on spillover occurrence. These results strongly supported the alternative framework formulated and presented in Chapter 2. These findings suggested that spillovers were more likely to occur in large firms than in the small firms; in old firms than in young firms and in firms with old production machinery than with young machinery. As noted, large firms are endowed with the necessary resources to spread over technological changes incurred while age reflected experience accumulated over time. Interestingly, results obtained with age-squared produced a negative correlation that tended to imply a non-linear "inverted-U" spillover occurrence pattern. This meant that more spillovers to the middle aged firms than in the young and old firms. Another important finding obtained showed that Kenyan Asian firms enjoyed more spillovers compared to non-Asian firms in Kenya. This was not surprisingly in that as outlined in Chapter 2 and 3

firms owned by Asians in Kenya were more advanced in terms of resources and sophistication than those owned by indigenous Africans. This placed them in a better position to absorb and assimilate technological spillovers.

The variables for infrastructure, institutional support and interactions produced the expected results. This supported our hypotheses that interactions with business, private and public institutions stimulated spillover occurrence. Similarly, absorptive capacity was important for spillover occurrence. This supported our hypothesis that skilled personnel are important for spillover absorption and assimilation. The results of low technological gap were in line with our hypothesis that low technology gap influences on spillover occurrence in Kenyan manufacturing. This finding was also in accordance with the proponents of low technology gap – certain minimum threshold for spillover occurrence.

The results obtained with firm strategy were as expected. A firm with strong strategy to constantly modify and upgrade its processing technology was more likely to obtain high spillovers than one without such a strategy. This would be expected since the process of constant modification and upgrading improves a firm's absorptive capacity. Similarly, it emerged that a firm with a strong training strategy was more likely to have high spillover occurrence than one without a strong training strategy. This supported our hypothesis that the more a firm undertakes technological training in the more the spillovers were likely to occur.

The results estimated with trade orientation were contrary to expectation. While the results estimated for imports were as expected those estimated for exports were contrary to expectation. The marginal effects estimated for exports implied that exports had a negative influence on spillover occurrence. This seemed to suggest that none exporting firms were introducing many technological changes with lots of things to learn. Results of imports suggested that participating in imports increased spillover occurrence in firms.

The results of labour market conditions were as expected. The variable wages representing labour market conditions had a negative influence on spillover occurrence. This was in line with spillover literature where good labour market conditions such as payment of efficiency wages, fringe benefits and prudent human resource development practices translates into reducing the mobility of workers hence reducing spillover occurrence.

8.4.4 Empirical Results Obtained from Case Study Analysis

(i) Case study Illustrations from Foreign Firms

Analysis of spillover occurrence was examined from the angle of foreign firms using ten detailed case studies selected on the basis of analysis done in Chapter 4 and 5. The case studies were done in line with the analytical framework designed in Chapter 2.

Analysis of the case studies showed that local personnel in the firms considered acquired skills and accumulated experiential knowledge from trainings offered and through learning by doing. Due to their endowment in resources these firms had well organised training supported with good training facilities. On labour market conditions, the firms studied observed good labour ethics; allowed workers to have a union, high wages, transportation, better terms and conditions of service etc. In many cases, skills acquired and knowledge accumulated resulted in an upward intra-firm mobility, hierarchical, of

the local staff. The analysis done in Chapter 6 presented cases where many locals were promoted to become senior managers and professionals after acquiring work experience.

The case studies discovered existence of tremendous labour mobility from these firms to locally owned firms. Interestingly, this mobility involved professionals, engineers, and technically skilled workers who gave up their employment to take up new appointments with locally owned firms. This was an important phenomenon in the development of the ICT in industry, (see Ernst et al. 1998). Another interesting finding was that some left to start own firms which suggested that FDI played an active role in the industry as a breeding ground for local entrepreneurs. From the case study firms, such entrepreneurs were able to function due to the skills they acquired while working in these firms. These findings showed that spillovers were occurring through labour mobility from foreign firms. These findings also indicated that FDI was playing an active and positive role in the human capital development effort of the industry and thus the country.

The analysis showed that firms mainly relied on international sources for the supply of processing and product technology. The implication of this was that no serious process or product R&D was conducted in-house. Foreign firms are known to conduct little or no R&D in host countries (Lall, (1979: 1980); Cantwel, 1995; OECD, 1998; Patel and Vega, 1999; Amsden, Tschang and Goto, 2001). Nevertheless, all the firms maintained strong technical departments and quality control laboratories. The analysis showed that when products were locally developed, parent companies were usually involved as they provided technical support. The foreign production technology and participation in production activities played a role in human capital development. It enabled local employees to accumulate tacit and experiential knowledge gathered from on-the-job training and learning by performing. The processing machinery and technology obtained were often complex, implying that locals had to be trained to operate, maintain and repair them. Technological trainings often commenced with plant lay out and process installation including commissioning and would entail process operations, process adaptations and maintenance procedures etc. The same case happened with product technology where locals had learnt how to make products including the ones produced under foreign license. Hence, the interesting finding in this was that, through learning by using and by doing; enabled locals to learn from foreign process and product technology.

Analysis of linkages had interesting findings. Cases were identified where demand created by foreign firms through pecuniary linkages with locally owned firms helped the growth of local firms by providing them with capital for growth, investment and expansion. The effort to improve their orders helped them to improve on their capabilities. Non-pecuniary linkages included machine engineering linkages and technical assistance. Reliance on foreign suppliers of machinery and technology reduced local technical links to only maintenance, repairs and sale of machine engineering equipment. Many benefits were noted through these links. Foreign firms engaged local firms in intermediary activities sometimes positioning some of their staff in the local firms to supervise and oversee the processing activities. In such cases, local firms enjoyed spillovers in information sharing, trainings on quality control and production management.

Interactions with institutions and business associations resulted in skills and knowledge sharing and in some cases technical assistance. This was however limited due to the weaknesses of the institutions discussed in Chapter 3. For instance, the cost of finance with the industrial development banks was extremely high. Technology and innovation support was almost not there. In addition, the infrastructure remained poorly facilitated.

This, it was noted had a negative implication for local firms in the spillover process. However, in some associations foreign firms were observed to have direct and active participation, e.g. KAM. In many cases the firms were active members of KAM with their chief executives holding board membership or chairmanship positions in sectoral committees charged with specific tasks. The chief executives were often foreigners with enormous experience, including international exposure and thus their interactions with other KAM often resulted in knowledge and expertise sharing in areas such as labour ethics, trade disputes, corporate governance, policy lobbying technique, technology transfer, formation of linkage, strategic alliances and mergers and acquisitions, intellectual property rights etc.

Foreign firms participated in the broader national human capacity development by offering fellowships to students in engineering and computing courses as well as professional courses like marketing and business management. Some foreign firms worked closely with government bodies such as Directorate of Industrial Training (DIT), Kenya Polytechnic and Mombasa Polytechnic in developing special training programmes. Foreign firms also allowed students from tertiary institutions to do their industrial internships.

Competition between foreign firms and locally owned firms was stiff – mainly for market. Competition was exacerbated by the onset of liberalisation with increased import into the country. As noted from the foreign firms, the competition pressure forced locally owned firm to introduce technological changes in their operations. This resulted in learning and capability building. Similarly, locally owned firms benefited demonstration effects from foreign firms. This happened as they copied and imitated production processes or products of foreign firms. From the foreign firms' point of view, local firms benefited from a wider set of product portfolio presented to them without having to conduct a prolonged search for products. On the basis of case study illustration, we conclude that foreign presence stimulated spillover occurrence to locally owned firms in Kenya's manufacturing.

(ii) Case Study Illustrations from Locally Owned Firms

The findings of our case study illustrations from locally owned firms supported the empirical analysis done in Chapter 5 and 6. Analysis of the 8 case studies done showed that FDI in the two industries played a role in learning, capability development, innovation and performance in locally owned firms. This confirmed spillover occurrence from foreign firms to the locally owned firms.

Although locally owned firms offered training, it was not comparable to the foreign firms training. As a result of resources, employees in foreign owned firms enjoyed better training programmes and superior training facilities. This included exchange programme with foreign firms' parent companies. Locally owned firms still had a lot to learn from foreign firms pertaining to labour market conditions. With regard to labour mobility, interesting cases were identified where professionals, engineers and technically skilled workers had joined locally owned firms from foreign firms. Expatriates from abroad were also observed (**MCTL2** and **MCTL4**). Spillover occurrence as a result of labour mobility was confirmed. The skills and knowledge acquired while in MNCs were extremely useful and applicable in locally owned firms - many technological changes in process, product, organisation and marketing etc were introduced.

Locally owned firms relied on international sources for their process and product technology. These firms did not conduct process or product R&D but only maintained technical departments and laboratories for quality control checks and to ensure smooth running in the process. It was interesting to find out that local firms were able to learn and build capabilities based on process and product technology from abroad. The on-job training and learning by doing enabled accumulation of tacit and experiential knowledge hence human capital development.

Spillovers were noted with both pecuniary and non-pecuniary linkages discovered. Pecuniary linkages were important to the firms in that the demand they created helped the local firm to grow and expand as a result of finance obtained. International linkages with suppliers of production technology were characterized by trainings during plant initialisation or during interaction whenever major machine repairs and maintenance have to be undertaken. Technical support was also offered in making products or adopting them to the local setting (**FBL4**, **FBL2**, **FBL3** and **MCTL4**).

Spillovers were also discovered in the context of backward linkages. This took place when locally owned firms obtained production machinery, products, marketing and distribution network from foreign firms in Kenya (**FBL1**). Due to the trainings involved, it amounted to acquisition of technological spillovers. High level of human capital and availability of finance enabled these firms to enjoy such spillover benefits. As a result, the firm learns, accumulates production capability and becomes innovative. Indirect cases of spillover occurrence were noted when spillovers occurred to locally connected firms. Foreign firms buying from locally owned firms created demand that enabled firms to grow, expand and build technological capability as a result of learning from the orders placed by the foreign firms. The strict conditions offered to the supplying firms forced firms to learn and improve their skills. For example, MNCs encouraged locally owned firms to achieve ISO certification and improve their efficiency. Indirect cases of spillover occurrence were also noted with forward linkages.

Local firms' interactions with institutions and business associations did not result in any significant technical, financial, skills or knowledge gain. Institutions in Kenya were weak and performed inefficiently partly due to neglect by the government. As a result of poor support, poor coordination emerges; all of which increases transactions costs lowering spillover occurrence. Interactions with and within business and marketing associations were a bit better as firms indicated to have shared knowledge and expertise in areas such as labour ethics, trade disputes, corporate governance, policy lobbying technique, technology transfer, formation of linkage, strategic alliances and mergers and acquisitions, intellectual property rights etc.

Competition pressure forced locally owned firms to undertake technological changes and learn to innovate. They were also forced to operate more efficiently and introduce new technologies earlier than what would have otherwise been the case. Locally owned firms benefited tremendous demonstration effects from foreign firms through copying and imitation of processes, products etc from foreign firms. This is beneficial as it presents a wider set of process or product portfolio without having to do R&D for process or process development. The process also involves learning, trials and errors and in the process, accumulation of capability to innovate. On the basis of these findings, FDI in Kenya's manufacturing is noted to be playing an important role in industrial development through spillovers occurrence that results in learning, accumulation of technological capability, innovation and enhanced performance.

8.4.5 Conclusion

In light of the above summary, several conclusions emerge: *First* that, the results obtained in most spillover analyses are largely determined by the theoretical and analytical methodology used. Thus, alternative methodologies must be taken into consideration before concrete conclusion can be drawn pertaining to the spillover process. *Second*, that FDI mainly from Britain pioneered in Kenya's manufacturing industry making the country enjoy an early experience from FDI, mainly British firms. *Third*, that FDI in Kenya's manufacturing was more dominant on the basis of key indicators of manufacturing performance. However, locally owned firms performed better, tended to be catching up with foreign firms, as observed from the positive growth rates computed. *Fourth*, that conceptualising technological spillovers in terms of technological learning and capability building, presence of FDI in manufacturing stimulates spillover occurrence in food processing and machine engineering industries. These results may not be generalised since FDI presence was not equally distributed in all manufacturing sectors and thus each sector need to be examined separately. Furthermore, the technological changes as a result of spillovers were different. The implication of these findings is that through spillover occurrence, FDI plays an important role in stimulating technological learning and capability building. This appeared to be the case not only in the firms but also in the institutions. *Fifth*, that despite constraints facing institutions designed to support industrial promotion they played a facilitation role in the spillover occurrence process. As a conclusion; given the importance of technological learning and capability in the innovation process, we can then argue that FDI directly and indirectly promotes innovation in Kenya's manufacturing industry. These findings were supported by the case study illustrations done in the perspective of foreign and locally owned firms. In sum, the analysis and findings of this study supports our claim that FDI plays an important role in Kenya's industrialisation process.

8.5 Policy Implications of the Study

This study has shown that FDI plays an important role in industrial development in the country. In light of this, the analysis done generates some important lessons with wide ramifications for government policy which can be outlined as follows:

(1) Policy Consistency

The analysis done showed that manufacturing policies pursued were changed and/or reversed erratically (as was the case since the introduction of SAPs in mid 1980s). A combination of erratic policy changes, inefficient institutions and poor infrastructure makes operations and transaction costs extremely high. This interferes with the technological learning and capability building process as it cannot thrive under circumstances presented by such an environment. It also makes investors (including FDI) shy away from investing locally. This emphasises the importance of having consistent and carefully formulated industrial policies based on wide consultations among all the stake holders. Clear long term policies allow firms to formulate long term planning horizons to achieve long term goals.

(2) *Promotion of Linkages*

The analysis showed that linkages did not generate substantial spillovers implying that existing linkages were less in content in terms of information, technology, knowledge, skills etc. Borrowing experiences from other countries (e.g. Taiwan or Malaysia in East Asia), industrial linkages have played a vital role in spurring spillover occurrence for industrial capability development. The government should therefore come up with more definitive policies geared towards promotion of linkages. Due to the overwhelming task involved in this process, the government should create a national linkage promotion programme to deal with all issues related with linkages nationally and internationally. Such a programme can be referred to as "*Kenya National Linkage Promotion Programme (KNLPP)*". The programme would then deal with issues such as promotion of linkage formation between and among firms, sectors and institutions. This could also include match making domestic firms with MNCs abroad etc. International linkages would also have to be promoted where embassies and other foreign missions abroad could all be incorporated to assist in this programme. Through this programme, MNCs willing to forge linkages should be identified and given first priority. In addition to promoting linkage formation, the programme would also promote deepening the linkages formed in terms of their content. As an example the linkages should be rich in information, technology, finance, knowledge flow etc.

(3) *Absorptive Capacity.*

From our study, absorptive capacity was noted to be an important factor for spillovers to occur. Absorptive capacity can be viewed in terms of human capital and technological capability of firms. First, human capital was very important for spillovers to occur i.e. a pool of well-trained personnel such as professional and managers, scientist and engineers was needed in the firms and institutions. Hence the government need to formulate policies, focused at human capital accumulation particularly in science, technology and engineering. This should be done at firm and national level. Establishment of a stable pool of human capital stock has added advantage "vicious cycle advantage" in that in the long run it would lead to a more entry of FDI seeking skilled labour. Second, in order for the firms to increase their ability to absorb and assimilate spillovers, they need to develop a strong culture of technology development. Policies should be focused at supporting firm learning and innovation in order to build technological capabilities. There should be increased effort in terms of policy to facilitate and encourage formal R&D in firms. The industry lacked a strong guiding policy and one that encourages an R&D and innovation culture – only through a culture of vibrant R&D and innovation that technology and industrial development can be propelled and in the long-run economic growth. In sum, this would go a long way towards creating science, technology and innovation culture; whose consequences in detecting, absorbing and assimilating spillovers are positive not only to the firm but to the national system of innovation in the country.

(4) *Weak and Missing Institutions*

It was noted that the role played by institutions in the spillover process would have been much higher were it not for their weaknesses in capacity to perform. This implied reduced role in science, technology and other supportive institutions in industrial capability development. Due to the weakened facilitation and coordination role by the institutions, the government needs to re-address its role and come up with policies which will ensure sound running and performance of these institutions. Interviews indicated that the supportive role of the government was declining. We therefore recommend that the government reconsiders its policy stand taking institutional cases, case by case. For

instance, institutions offering finance for industrial promotion must be supported by the government either by providing finance or acting as a guarantor for the loans obtained by such domestic institutions from international financing organisations²⁰⁰. Also institutions dealing with industrial R&D should be empowered in terms of broad capacities i.e. human capital and finance to support such R&D related activities. Through these efforts and much more, this is the only way to promote endogenous industrial capabilities necessary for catching-up. No country can claim to have long-run growth without solid industrial capabilities. Finally, the government should provide coordination guidelines to encourage orderly and coordinated development of manufacturing industry. Coordination among institutions (private, public, business associations etc) in manufacturing industry would remove operating bottlenecks, enhance efficiency and stimulate spillovers from FDI.

(5) *Poor Infrastructure*

Poor infrastructure emerged to be one of the biggest problems facing firm operations in the country. This makes operation and transaction²⁰¹ costs extremely high. The consequence is that it lowers interactions among firms and reduces willingness to invest or expand (this makes FDI reduce or decline from investing). Thus poor infrastructure hinders technological spillovers from occurring. As an example, bad roads and high cost of telephone reduces interactions and thus sharing of information, knowledge etc. The government should therefore provide basic infrastructure in earnest [examples include transport and telecommunication, and stable provision of basic utilities such as water and electricity power]. Much has been said on this in the Kenyan context; hence the government should do something once and for all. The success story of East Asian countries shows us that a government that does not offer continuous support and effective industrial facilitation often fails its own entrepreneurs.

(6) *Interactions with Institutions and Business Associations*

Formal and informal interactions with institutions and business associations were important factors in the spillover occurrence process. For instance, interactions created an atmosphere where local entrepreneurs share manufacturing experiences, market information, skills and technological knowledge with foreign firms. The government should therefore encourage more of such interactions (formal and informal interactions). It should encourage and facilitate more and routine manufacturing exhibitions, trade fairs and agricultural shows. This should include international exhibitors who in this case could be technology, machinery and equipment suppliers or just ordinary manufacturing firms. It should encourage product, process and marketing promotions by foreign and local manufacturers. It should encourage firm and institutional visits. Joint activities such as learning and training should be encouraged. Encourage informal collaborations in activities which reach SMEs and the local communities, through community responsibility programmes, such would widen scope of spillover occurrence. These are just a few examples as cases of useful interactions are endless.

(7) *Competition Policies*

Although the findings in our study showed that competition played an important role in the spillover process, it is also noted that high competition from foreign firms could

²⁰⁰ The interest rates should be maintained at low levels favourable for industrialists. Only then we can talk of industrial promotion.

²⁰¹ Most firms noted cited examples whereby due to poor infrastructure that things moved from South Africa to Mombasa port faster than they did from Mombasa to Nairobi industrial area. Or better still from Japan to port of Mombasa port than from Mombasa port to Nairobi industrial area.

crowd out domestic investment. Hence an institution (bureaucratic institution) should be established to deal with competition regulation in manufacturing. From the interviews, the existing competition regulatory body under the Ministry of Finance has been blamed as inefficient and weak in performance hence a new, semi-autonomous institutions “*Kenya Competition Regulatory Body (KCRB)*” should be established. It should have the capacity to determine the prevailing competition levels and implement corrective measures in advance. It should assess FDI so that only MNCs with high potential of generating technological spillovers of capability development without crowding out domestic firms are approved to invest in the country. It should have the capacity to examine the complementary capabilities between foreign and domestic firms. The institution should be highly dynamic with continuous analysis of the investment climate and technology foresight so that it can adjust its recommendations to the government from time to time. It should collaborate intensively with other institutions.

Examples of countries that benefited a good balance between FDI and competition levels can be invoked. Some NICs triggered endogenous capability development process by opening up to FDI gradually and only letting more FDI entry with increase in local firms’ technological capability. This was in line with the infant industry protection theorem where competition is allowed strategically to exert pressure on the local firms to learn and accumulate technological capabilities. However, a strong bargaining position possessed by some MNCs (and multilateral organisations) is acknowledged but we strongly argue that government must be in a position to select and regulate its manufacturing industry by controlling monopolies, offering incentives through tax imposition etc. For instance, only FDI that conforms to the country’s industrial promotion agenda should be permitted. As an example, when Korea was developing its manufacturing industry before 1970s, its FDI policy was specifically concerned with project eligibility criteria, foreign ownership criteria and investment scale criteria. Foreign ownership and investment scale were regulated by a ceiling level. On eligibility, projects which would disrupt domestic demand and supply of raw materials and intermediate products were ruled out. Also ruled out were projects which would compete in foreign markets with domestic firms (Koo, 1984: p. 69).

(8) Trade Orientation

Our study showed that imports were important in the spillover process. Import of capital goods by NICs enabled them to deepen their technology base. The Kenya government should remove import barriers of capital goods, technology, machinery and equipment that could serve as sources of learning and capability development through imitation, replication and reverse engineering. Also, although exports failed to correlate spillover occurrence in Kenya, participation in exports should be encouraged as that would force domestic firms to learn and increase their technological effort in order to compete effectively in the international global market.

(9) Labour Market Conditions

Good labour market conditions are important for industrial growth and development. Hence the government should promote them and in addition promote a culture of labour mobility.

8.6 Recommendation for Further Research Works

The study has several suggestions for further future research work, which can be outlined as follows: *First*, although this study used a substantial amount of data set from secondary sources; with more resources a longer time span and more firms than was

used in this study can be considered. A large data set spanning a longer time series is expected to be more illuminating. Such was not available at the time of this study and thus it would be appropriate to repeat the study in future.

Second, the survey focused on only two sectors in manufacturing. There is a need to undertake a more detailed study including more manufacturing sectors especially those with relatively high foreign presence. A case in point is chemical and pharmaceutical industry. Special economic zones such as export processing zone should be equally studied. In addition, future study should be extended to include more case studies as they were observed to be more revealing. Aggregate analysis did not reveal how spillovers translate to productivity treating the entire process as a black box. Such an approach is however expensive, time consuming, requiring many people and much effort and thus time factor and resources constraint limited us.

Third, it would also be interesting to conduct similar studies in other Sub Saharan countries applying the conceptual and analytical framework designed. Other developing and technically backward countries in other parts of the world can also be studied in order to draw comparisons. With the application of this analytical framework, international comparisons of the findings can be made.

Fourth, given the tremendous shift observed in FDI²⁰² e.g. the shift to service sector; the conceptual and analytical framework can be extended to these sectors for the examination of FDI and spillover occurrence. In Kenya for instance, service sectors with significant FDI can be traced to tourism and hotel sectors, finance and insurance sectors as well as in building and construction industry. The approach could also be extended to the agriculture especially the flourishing and successful case of horticulture sector in Kenya. Analysis of FDI and spillovers would shed more light into a wider economic standpoint in Kenya.

Fifth, since we focused on production capabilities and complementary capabilities (marketing, management and organisation capabilities); there is a need to broaden the study and include other kinds of technological capabilities such as investment and linkage capability. Again this is an enormous and daunting task.

Sixth, since this study did not examine technological spillover occurrence from the perspective of FDI origin, there is a need to conduct a study which enables spillover comparisons by MNC's origin. This recommendation follows an argument and observation that spillovers from MNCs of different countries could be different. That is MNCs from Europe would be different from America as would do from Asia. Even then, MNCs from the same continent say for instance MNCs from Germany and Britain could also have different spillover experiences. Further, a comparison between MNCs from developed countries and those from advanced developing countries could also be studied for comparisons.

²⁰² UNCTAD (2004)

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The United Nations
University

INTECH

Institute for New Technologies

**FOREIGN DIRECT INVESTMENT, SPILLOVERS AND INNOVATION IN
THE KENYAN MANUFACTURING INDUSTRY**

**SURVEY OF FOOD AND BEVERAGES PROCESSING
AND
MACHINE ENGINEERING INDUSTRIES**

Research Group:

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CONFIDENTIALITY

Please note that complete confidentiality is assured with this survey. The information provided will not be divulged to other persons or institutions without your permission. Similarly all the information will be used in an aggregate form only.

August 2003–February 2004

1.0 GENERAL FIRM INFORMATION

- 1.1 Name of the firm: _____ Year of establishment: _____
- 1.2 What is the ownership structure of your firm?
- (a) 100 percent state owned ☐
- (b) 100 percent foreign owned ☐
- (c) 100 percent locally owned ☐
- (d) Joint Venture ☐ → Local equity _____ %
foreign equity _____ %
- 1.3 Does your company have any affiliates overseas/abroad? (a) Yes ☐ (b) No ☐
- 1.4 What was your firm's total fixed assets in 2002? _____ KShs.
- 1.5 What is the nationality of firm owner(s)?
- (a) Kenyan African ☐ (b) Kenyan Asian ☐ (c) Asia/Middle East ☐
- (d) Europe ☐ (e) U.S.A ☐ (f) Others (*specify*) _____

2.0 BASIC INFORMATION ON FIRM PERFORMANCE

- 2.1 What was your firm's average capacity utilisation in 2002? _____ %
- 2.2 Please list the THREE main activities or products of your firm.

Products	Percentage
(i) _____	_____
(ii) _____	_____
(iii) _____	_____

- 2.3 Does your firm export?
- (a) No ☐
- (b) Yes ☐ → If *yes* for how long? _____ Years
→ If *yes* what are your main export markets? _____

- 2.4 What is your firm's estimated annual output, input and sales (*Value in KShs.*)?

Output, Input, Sales and Exports	2002
Gross output	_____
Gross inputs	_____
Total sales	_____
Export sales	_____
Sales to domestic exporting companies	_____

- 2.5 What was the value of your imported raw materials without including machinery and equipment in 2002? _____ KShs. What was this value as percentage of the total raw materials consumed by your firm? _____ %.

3.0 HUMAN RESOURCE DEVELOPMENT AND MOBILITY

3.1 Please provide your firm's employment figures for 2002.

CATEGORY OF EMPLOYMENT	KENYANS	NON - KENYANS
Regular employees	Number of Employees	Number of Employees
<i>3.1.1 Managerial</i>		
Technical		
Non-technical		
<i>3.1.2 Non-managerial</i>		
Technical		
Skilled		
Semi-skilled		
Others (e.g. clerical)		
TOTAL		

3.2 Has your firm offered training of any kind to the workers in the last THREE years?

(a) No

☐

(b) Yes

☐ → Estimated cost as a percentage of payroll _____ %

3.3 Are your firm workers unionised?

(a) Yes

☐

(b) No

☐

3.4 Is the owner of the firm also the manager? (a) Yes

☐

(b) No

☐

3.5 What is the educational level of the firm owner(s)? (*Multiple answers can be provided*).

(a) University

☐

(b) High school

☐

(c) Tech/Vocational

☐

(d) others

☐

3.6 Give the proportion of your staff with the following

(a) University/College _____%

(b) High School

_____%

(c) Tech/Vocational _____%

(d) Lower/Elementary

_____%

3.7 Has your company ever lost some of its workers to other competing firms in the past?

(a) No

☐

(b) Yes

☐

→

In general terms what caliber of workers were they?

Managers and professionals

☐

Engineers and technicians

☐

Others (*please specify*)

3.8 If your answer to Q 3.7 above was *yes*, what kind of firms did they join (*Multiple answers can be provided*)?

(a) Foreign firms

☐

(b) Joint ventures

☐

(c) Local firms

☐

(d) Start their own firms

☐

3.9 If you cannot tell whether the firms in Q 3.8 above are foreign firms, joint ventures or local firms, please provide their names, a maximum of FOUR names only.

(a)

(b)

(c)

(d)

- 3.10 How severe is lack of skilled workers (qualified engineers and technicians) to your firm?
 (a) Not severe ☐ (b) Average ☐ (c) Very severe ☐
- 3.11 What is the policy of your firm regarding employment of skilled qualified workers: e.g. scientists, engineers, technicians and other professionals (*Please circle your rank 1 to 5 – from WEAK policy to very STRONG policy*)? Multiple choices can be provided.

Category of Employees	Ranking by Importance				
To employ graduates from poly-technique/vocational institutions	1	2	3	4	5
To employ fresh university graduates	1	2	3	4	5
To employ experienced workers from other local firms	1	2	3	4	5
To employ experienced workers from foreign firms in the country	1	2	3	4	5
To employ experienced workers from outside the country (abroad)	1	2	3	4	5
Others (<i>please specify</i>)	1	2	3	4	5

- 3.12 If your firm has employed workers from other firms before what kind of workers were they?
 (a) Managers and professionals ☐ (b) Skilled scientists and engineers ☐
 (c) Technicians, craftsmen & artisans ☐ (d) Others (*please specify*) ☐
- 3.13 What kind of firms did they come from (*You may give more than one choice*)?
 (a) Foreign firms ☐ (b) Joint ventures ☐
 (c) Local firms ☐ (d) others (*specify*) _____
- 3.14 If you cannot tell whether the firms in Q3.13 above are foreign firms, joint ventures or local firms, please provide their names, a maximum of FOUR names only.
 (a) _____ (b) _____
 (c) _____ (d) _____
- 3.15 If your answer to Q 3.13 above is **(a) or (b) or both of them**: How would you rate the contributions of such workers to your firm in the following aspects (*Please circle your rank (1 to 5 – from WEAK contribution to very STRONG contribution)*)?

Contribution to the Firm	Ranking by Contribution
Assisted in the development of new products or improvement of existing products to market needs.	0 1 2 3 4 5
Assisted in the processing activities, raw material and quality control, upgrading machinery and equipment stretching to save energy, cost, raise productivity etc.	0 1 2 3 4 5
Assisted in repair and maintenance of physical capital, inventory control etc.	0 1 2 3 4 5
Strengthened our marketing department with new ideas, skills, and knowledge of existing local and foreign markets for exporting.	0 1 2 3 4 5
Contributed to the organisational changes that brought in better management and implementation of production & routine activities enhancing firm's efficiency.	0 1 2 3 4 5
Others (<i>please specify</i>).	0 1 2 3 4 5

- 3.16 Please provide your firm's estimated total payroll in 2002 _____ KShs.

- 3.17 If your answer to Q 3.13 above is (c) or (d) or both of them: How would you rate the contributions of such workers to your firm in the following aspects (Please circle your rank (1 to 5 – from WEAK contribution to very STRONG contribution)?

Contribution to the Firm	Ranking by Contribution
Assisted in the development of new products or improvement of existing products to market needs.	0 1 2 3 4 5
Assisted in the processing activities, raw material and quality control, upgrading machinery and equipment stretching to save energy, cost, raise productivity etc.	0 1 2 3 4 5
Assisted in repair and maintenance of physical capital, inventory control etc.	0 1 2 3 4 5
Strengthened our marketing department with new ideas, skills, and knowledge of existing local and foreign markets for exporting.	0 1 2 3 4 5
Contributed to the organisational changes that brought in better management and implementation of production & routine activities enhancing firm's efficiency.	0 1 2 3 4 5
Others (please specify).	0 1 2 3 4 5

4.0 PROCESSING AND PRODUCT TECHNOLOGY

- 4.1 Does your firm have quality assurance certification?
(a) No ☐ (b) Yes ☐ Which one? _____
- 4.2 What quality control system(s) does your firm use? (You may choose more than one)
(a) Statistical quality control ☐ (b) Technical benchmarking ☐
(c) Statistical process control ☐ (d) Others (specify) _____
- 4.3 When did your firm last make and/or introduce new product(s)?
(a) 0-1 year ☐ (b) 1-2 years ☐ (c) 2-5 years ☐ (d) Over 5 years ☐
- 4.4 What was the estimated cost of making and/or introducing this product(s)? _____ KShs.
- 4.5 Were the new products new to?
(a) Your firm ☐ (b) Local market ☐ (c) Regional market ☐ (d) Global market ☐
- 4.6 Has your company undertaken any improvements on any of its already existing products in the last FIVE years? (a) Yes ☐ (b) No ☐
- 4.7 What was the source of your core production machinery?
(a) Locally fabricated ☐ (b) Combination of local and foreign ☐
(c) Fully Foreign ☐ → Main foreign country source _____
- 4.8 What is the estimated age of your core production machinery? _____ Years.
- 4.9 What is the estimated value of your core production machinery? _____ KShs.
- 4.10 When did you last make new investment in production equipment?
(a) 0-1 year ☐ (b) 1-2 years ☐
(c) 2-5 years ☐ (d) Over 5 years ☐
- 4.11 Do you have foreign technical partners? (a) Yes ☐ (b) No ☐

4.12 Have you carried out any modifications on your machinery in the last FIVE years?

(a) No ☐

(b) Yes ☐ → how would you regard it? (a) Major ☐ (b) Minor ☐

4.13 In doing modifications on your machinery did you get assistance from

(a) Local consultants? ☐

(b) In house? ☐

(c) Foreign technical partners? ☐

(d) Others? _____

5.0 INFRASTRUCTURE AND BUSINESS ENVIRONMENT

5.1 How would you rate provision of the following infrastructure? *Please circle the appropriate number: 1 = Very poor; 2 = Somewhat poor; 3 = Good; 4 = Very good; 5 = Excellent.*

Physical Infrastructure	Ranking by Usefulness				
Transport services (e.g. roads)	1	2	3	4	5
Water supply	1	2	3	4	5
Electricity/power supply	1	2	3	4	5
Telecommunication network (e.g. telephone)	1	2	3	4	5
Public health facilities	1	2	3	4	5

5.2 What types of technical support have you received and from which government and private agencies?

Type of Technical Support	Government	Business Assoc.	Private Sources	NGOs	Others (Specify)
Information					
Standards & Training					
Quality control					
R&D services					
Others (specify)					

5.3 How do you rate the quality of the following institutions? *Poor → Excellent*

Institutions	Ranking by Quality				
Coordination from basic government institutions	1	2	3	4	5
Access to capital / credit	1	2	3	4	5
Legal system and Judiciary	1	2	3	4	5
Technical training institutions	1	2	3	4	5
University education	1	2	3	4	5
R&D scientists and engineers	1	2	3	4	5
Incentives for R&D activities	1	2	3	4	5
R&D institutions	1	2	3	4	5

5.4 What was your firm's estimated cost of marketing including advertisement in 2002 as a percentage of total firm sales? _____%

5.5 Has your firm received any marketing support from either government, private or business associations on marketing information, intelligence or training?

(a) Yes ☐

(b) No ☐

5.6 On a scale of 1 → 5 (1 = *WEAKEST* and 5 = *VERY STRONG*), how would you rate export & marketing support from?

- (a) Government ☐ (b) Private ☐
 (c) Business associations ☐ (d) Others (*specify and rank*) _____

5.7 How has your company benefited from the services offered by the following business organisations? *Poor* → *Excellent*

Business Associations	Ranking by Quality				
Kenya Association of Manufacturers (KAM)	1	2	3	4	5
Capital Markets Authority (CMA)	1	2	3	4	5
Export Processing Zone Authority (EPZA)	1	2	3	4	5
Export Promotion Council (EPC)	1	2	3	4	5
Federation of Kenya Employees (FKE)	1	2	3	4	5
Kenya Industrial Property Office (KIPO)	1	2	3	4	5
Kenya National Chamber of Commerce and Industry (KNCCI)	1	2	3	4	5
Others (<i>Specify</i>)	1	2	3	4	5

5.8 To what extent has your firm benefited from both formal and informal interactions with the following? *Very little* → *Very Much*

Institutions & Business Associations	Ranking by Usefulness				
Machinery suppliers and consultants	1	2	3	4	5
Other participants during local exhibitions & trade fairs	1	2	3	4	5
Government and private institutions	1	2	3	4	5
Universities and technical training institutions	1	2	3	4	5
Industry and business association	1	2	3	4	5
Investment and export promoters	1	2	3	4	5
Raw material suppliers, buyers and distributors	1	2	3	4	5
Others (<i>specify</i>)	1	2	3	4	5

6.0 ACCESS TO CAPITAL AND FINANCE FOR INNOVATION

6.1 Did you obtain any finances (e.g. loans) before?

- (a) Yes ☐ (b) No ☐

6.2 Do you maintain a relationship with your formal lenders?

- (a) No ☐ (b) Yes ☐ If *yes* for how long (*in years*)? ____ Years.

6.3 If your answer to Q 6.1 above was yes, what is your main source of finance (*please indicate in %*)?

Source of Finance	Capital %	Source of Finance	Capital %
Private domestic banks		Loan from friend & relatives	
Development bank		Own money	
Special government credit		In-house	
Other sources (<i>specify</i>)		Other sources (<i>specify</i>)	

6.4 How do you rate financial support as a constraint?

- (a) Very severe ☐ (b) Severe ☐ (c) Not severe ☐

- 6.5 What are the main obstacles that generally hinder you from obtaining finance?
 (a) Lack of collateral ☐ (b) High interest rates ☐
 (c) Others (specify) _____
- 6.6 For what types of investment have you required financial support in the last THREE years?
 (a) New machinery (b) Expansion to new products (c) Exports
 (d) Organisational change (e) Others (specify) _____
- 6.7 If your firm undertakes research and development (R&D) how much did you spend on R&D in 2002 (*You can provide figures in Kenya Shillings*)? _____ KShs.
- 6.8 What is the nature of your R&D activities (*e.g. quality control, materials and chemical analysis, reverse engineering, adaptive engineering, trouble-shooting etc.*)?
 (a) _____ (b) _____

7.0 LINKAGE WITH OTHER FIRMS AND INSTITUTIONS

Backward co-operation with suppliers of raw materials, services, machinery & equipment etc.

- 7.1 Does your company maintain relationship with its suppliers (e.g. suppliers of machinery and equipment, raw materials and services etc.)?
 (a) Yes ☐ (b) No ☐
- 7.2 If your answer to Q 7.1 above is *yes*, who are your main suppliers (*You can chose more than one answer*)?
 (a) Foreign firms ☐ (b) Joint ventures ☐
 (c) Local firms ☐ (d) others (*specify*) _____
- 7.3 Please provide about FOUR names of your main suppliers?
 (a) _____ (b) _____
 (c) _____ (d) _____
- 7.4 To what extent has the relationship between you and your suppliers affected the following: (*If your answer to Q 7.2 above was (a) or (b) or both of them*)? Please circle your rank (1 to 5 – from WEAK effect to very STRONG effect).

Suppliers Effect	Ranking by Importance
Improving your products, develop new products, copy/imitate their products etc.	0 1 2 3 4 5
Improve processing techniques, raw material & quality control, upgrade our machinery & equipment stretching to save energy, cost, raise productivity etc.	0 1 2 3 4 5
Repair and maintenance of physical capital, inventory control etc.	0 1 2 3 4 5
Improve and strengthen our marketing department by new ideas, skills and knowledge of existing local and foreign markets for exporting.	0 1 2 3 4 5
Undertake organisational changes for better management and implementation of production & other routine activities that enhance the firm's efficiency.	0 1 2 3 4 5
Others (<i>provide technical training, finance etc. please specify</i>).	0 1 2 3 4 5

- 7.5 To what extent has the relationship between you and your suppliers affected the following: (If your answer to Q 7.2 above was (c) or (d) or both of them)? Please circle your rank (1 to 5 – from WEAK effect to very STRONG effect).

Suppliers Effect	Ranking by Importance
Improving your products, develop new products, copy/imitate their products etc.	0 1 2 3 4 5
Improve processing techniques, raw material & quality control, upgrade our machinery & equipment stretching to save energy, cost, raise productivity etc.	0 1 2 3 4 5
Repair and maintenance of physical capital, inventory control etc.	0 1 2 3 4 5
Improve and strengthen our marketing department by new ideas, skills and knowledge of existing local and foreign markets for exporting.	0 1 2 3 4 5
Undertake organisational changes for better management and implementation of production & other routine activities that enhance the firm's efficiency.	0 1 2 3 4 5
Others (provide technical training, finance etc. please specify).	0 1 2 3 4 5

Forward co-operation with buyers/distributors etc.

- 7.6 Does your company develop and maintain relationship with its buyers/distributors?
 (a) Yes ☐ (b) No ☐
- 7.7 If your answer to Q 7.6 is yes, who are your main buyers/distributors (You may choose more than one answer)?
 (a) Foreign firms ☐ (b) Joint ventures ☐
 (c) Local firms ☐ (d) Others (specify) _____
- 7.8 What proportion of your buyers/distributors are directly involved in production activities (value added to the products bought)? _____ %
- 7.9 Please provide FOUR names of your main buyers/distributors?
 (a) _____ (b) _____
 (c) _____ (d) _____
- 7.10 To what extent has the relationship between you and your buyers affected the following: (If your answer to Q 7.7 above was (a) or (b) or both of them)? Please circle your rank (1 to 5 – from WEAK effect to very STRONG effect).

Buyers/Distributors Effect	Ranking by Importance
Improving your products, develop new products, copy/imitate their products etc.	0 1 2 3 4 5
Improve processing techniques, raw material & quality control, upgrade our machinery & equipment stretching to save energy, cost, raise productivity etc.	0 1 2 3 4 5
Repair and maintenance of physical capital, inventory control etc.	0 1 2 3 4 5
Improve and strengthen our marketing department by new ideas, skills and knowledge of existing local and foreign markets for exporting.	0 1 2 3 4 5
Undertake organisational changes for better management and implementation of production & other routine activities that enhance the firm's efficiency.	0 1 2 3 4 5
Others (provide technical training, finance etc. please specify).	0 1 2 3 4 5

- 7.11 To what extent has the relationship between you and your buyers affected the following: (If your answer to Q 7.7 above was (c) or (d) or both of them)? Please circle your rank (1 to 5 – from WEAK effect to very STRONG effect).

Buyers/Distributors Effect	Ranking by Importance
Improving your products, develop new products, copy/imitate their products etc.	0 1 2 3 4 5
Improve processing techniques, raw material & quality control, upgrade our machinery & equipment stretching to save energy, cost, raise productivity etc.	0 1 2 3 4 5
Repair and maintenance of physical capital, inventory control etc.	0 1 2 3 4 5
Improve and strengthen our marketing department by new ideas, skills and knowledge of existing local and foreign markets for exporting.	0 1 2 3 4 5
Undertake organisational changes for better management and implementation of production & other routine activities that enhance the firm's efficiency.	0 1 2 3 4 5
Others (provide technical training, finance etc. please specify).	0 1 2 3 4 5

8.0 COMPETITION

- 8.1 How would you rate the competition faced by your firm as a result of imports into the country by competing firms?
 (a) None ☐ (b) Moderate ☐ (c) Stiff ☐ (d) Very stiff ☐
- 8.2 How would you rate the competition faced by your firm from competing firms domestically?
 (a) None ☐ (b) Moderate ☐ (c) Stiff ☐ (d) Very stiff ☐
- 8.3 Who are your main competitors (You can chose more than one answer)?
 (a) Foreign firms ☐ (b) Joint ventures ☐
 (c) Local firms ☐ (d) others (specify) _____
- 8.4 Please provide about FOUR names of your main competitors?
 (a) _____ (b) _____
 (c) _____ (d) _____
- 8.5 How does your firm manage to contain such competition pressures especially from foreign or joint venture firms (If your answer to Q 8.3 above was (a) or (b) or both of them)? Please circle your rank (1 to 5 – from WEAK effect to very STRONG effect).

Competition Effect	Ranking by Importance
Improving your products, develop new products, copy/imitate their products etc.	0 1 2 3 4 5
Improve processing techniques, raw material & quality control, upgrade our machinery & equipment stretching to save energy, cost, raise productivity etc.	0 1 2 3 4 5
Repair and maintenance of physical capital, inventory control etc.	0 1 2 3 4 5
Improve and strengthen our marketing department by new ideas, skills and knowledge of existing local and foreign markets for exporting.	0 1 2 3 4 5
Undertake organisational changes for better management and implementation of production & other routine activities that enhance the firm's efficiency.	0 1 2 3 4 5
Others (please specify).	0 1 2 3 4 5

- 8.6 How does your firm manage to contain such competition pressures especially from local firms and others. (If your answer to Q 8.3 above was (c) or (d) or both of them)? Please circle your rank (1 to 5 – from WEAK effect to very STRONG effect).

Competition Effect	Ranking by Importance
Improving your products, develop new products, copy/imitate their products etc.	0 1 2 3 4 5
Improve processing techniques, raw material & quality control, upgrade our machinery & equipment stretching to save energy, cost, raise productivity etc.	0 1 2 3 4 5
Repair and maintenance of physical capital, inventory control etc.	0 1 2 3 4 5
Improve and strengthen our marketing department by new ideas, skills and knowledge of existing local and foreign markets for exporting.	0 1 2 3 4 5
Undertake organisational changes for better management and implementation of production & other routine activities that enhance the firm's efficiency.	0 1 2 3 4 5
Others (please specify).	0 1 2 3 4 5

- 8.7 On what aspect do you compete keenly? (What is your competitive strength?) (Rank the importance of each source). Please circle the appropriate number: 1 = Not important at all; 2 = Somewhat important; 3 = Important; 4 = Very important; 5 = Most important).

Source of Competitive Strength	Ranking by Importance
Price (e.g. due to low overhead costs)	1 2 3 4 5
Product experience (<i>Quality of our products</i>)	1 2 3 4 5
Marketing experience (<i>Quality of our services to our customers, advertisement, promotion campaigns and distribution</i>).	1 2 3 4 5
Reliability of services provided to our customers	1 2 3 4 5
Volume capacity (<i>Scale of our production</i>)	1 2 3 4 5
Efficiency and flexibility (<i>Speed of delivery, ability to accommodate changes in customer tastes and preferences</i>).	1 2 3 4 5
Others (Please specify)	1 2 3 4 5

- 8.8 What is the current strategy of the firm for instance to deal with competition and other problems/ factors that affect your firm? (Please circle the appropriate number: 1 = Least likely; 2 = Somewhat likely; 3 = Likely; 4 = Very likely; 5 = Most likely).

Planned Strategy	Ranking by Importance
Diversify into other products	1 2 3 4 5
Acquire new processing techniques	1 2 3 4 5
Undertake workers training	1 2 3 4 5
Relocation to lower wage-cost countries	1 2 3 4 5
Improve market strategies (serve other markets)	1 2 3 4 5
Improve organisation and management structure	1 2 3 4 5
Form joint ventures	1 2 3 4 5
Others (please specify)	1 2 3 4 5

9.0 DEMONSTRATION EFFECTS

Demonstration effect refers to a wide range of things that your company copies/imitates or adopts from other companies some of which could be your competing companies or companies linked to your company. A few examples of things that are often copied/imitated or adopted from other companies include products, production techniques, management and organisation techniques, marketing techniques etc.

- 9.1 Has your company ever introduced or adopted new products and new techniques observed from other companies. *(New techniques include production techniques, management and organisation techniques, marketing techniques and strategies).*
 (a) Yes ☐ (b) No ☐
- 9.2 If your answer to Q 9.1 above is *yes*, what kind of firms are they *(You may choose more than one)?*
 (a) Competing firms ☐ (b) Ordinary firms ☐
 (c) Supplying firms to your company ☐
 (d) Processing firms that buy your products ☐
 (e) Firms that distribute your products ☐
- 9.3 If your answer to Q 9.1 above is *yes*, was your company able to make similar but own products?
 (a) Yes ☐ (b) No ☐
- 9.4 If your answer to Q 9.1 above is *yes*, what kind of companies are they *(You may chose more than one answer)?*
 (a) Foreign firms ☐ (b) Joint ventures ☐
 (c) Local firms ☐ (d) others *(specify)* _____
- 9.5 Please provide FOUR names of such companies?
 (a) _____ (b) _____
 (c) _____ (d) _____
- 9.6 How has demonstration effect especially from foreign and joint venture firms affected the following activities in your firm *(If your answer to Q 9.4 above was (a) or (b) or both of them)?* Please circle your rank (1 to 5 – from WEAK effect to very STRONG effect).

Demonstration Effect	Ranking by Importance
Improving your products, develop new products, copy/imitate their products etc.	1 2 3 4 5
Improve processing techniques, raw material & quality control, upgrade our machinery & equipment stretching to save energy, cost, raise productivity etc.	1 2 3 4 5
Repair and maintenance of physical capital, inventory control etc.	1 2 3 4 5
Improve and strengthen our marketing department by new ideas, skills and knowledge of existing local and foreign markets for exporting.	1 2 3 4 5
Undertake organisational changes for better management and implementation of production & other routine activities that enhance the firm's efficiency.	1 2 3 4 5
Others <i>(please specify)</i> .	1 2 3 4 5

9.7 How has demonstration effect especially from local firms and others affected the following activities in your firm (If your answer to Q 9.4 above was (c) or (d) or both of them)? Please circle your rank (1 to 5 – from WEAK effect to very STRONG effect).

Demonstration Effect	Ranking by Importance
Improving your products, develop new products, copy/imitate their products etc.	1 2 3 4 5
Improve processing techniques, raw material & quality control, upgrade our machinery & equipment stretching to save energy, cost, raise productivity etc.	1 2 3 4 5
Repair and maintenance of physical capital, inventory control etc.	1 2 3 4 5
Improve and strengthen our marketing department by new ideas, skills and knowledge of existing local and foreign markets for exporting.	1 2 3 4 5
Undertake organisational changes for better management and implementation of production & other routine activities that enhance the firm's efficiency.	1 2 3 4 5
Others (please specify).	1 2 3 4 5

END

IF YOU WANT A COPY OF THE OUTPUT OF THIS RESEARCH, PLEASE PROVIDE US WITH YOUR CONTACT ADDRESS AND E-MAIL.

Thanking you in advance for your time and kind cooperation.

SAMENVATTING (SUMMARY IN DUTCH)

De brede doelstelling van deze studie is de rol van FDI in industriële ontwikkeling in Kenia te onderzoeken. Er werd gesteld dat de investering in de vorm van FDI de potentie heeft om ontwikkeling in een gastland te versnellen door een ondersteunende rol te spelen of door als aanvulling op lokale investeringen en innovatie te fungeren. In bepaalde omstandigheden kan FDI dienen om de industriële ontwikkelingsinspanning van gastlanden en hun concurrentievermogen te verbeteren, door sommige wenselijke eigenschappen zoals beste praktijken in productie, nieuwe vaardigheden en opleidingen, leading-edge of nieuwe technologie, nieuwe bestuurs- en marketing know-how te brengen, en zodoende levering- en kennisnetwerkvorming te vergemakkelijken.

Dergelijke netwerkvorming vergemakkelijkt de verspreiding van vaardigheden en informatie in de economie en zou op die manier de bestaande ondernemersinspanningen door demonstratie-effecten kunnen katalyseren. Verder, FDI zou kunnen helpen lokale systemen van innovatie binnen ontwikkelingslanden te versterken wanneer de dochtermaatschappijen van multinationale ondernemingen (MN0) de lokale O&O instituten aanmoedigen om de commercialisatie van hun geaccumuleerd vermogen te verbeteren. Deze studie komt daarom voort uit de noodzaak om te begrijpen hoe FDI de industrialisering in Kenia beïnvloedt, met bijzondere nadruk op de invloed van MN0 in het bevorderen van een dynamische verwerkende industrie, door het stimuleren van leerprocessen, de opbouw van vakmanschap en innovaties. De specifieke doelstellingen van deze studie werden geschetst als volgt:

- (1) De mate te onderzoeken waarin de aanwezigheid van MN0 spillovers aan lokale verwerkende ondernemingen in Kenia bevordert.
- (2) De voorwaarden te bepalen waarop de spillovers in Keniaanse verwerkende ondernemingen tot stand komen.
- (3) Te onderzoeken hoe de spillovers van MN0 technologische innovaties op het ondernemingsniveau in de Keniaanse verwerkende industrie beïnvloeden.
- (4) Om sommige lessen en beleidsimplicaties voor een spillovers gedreven industriële ontwikkeling in Kenia te trekken.

De thesis wendde een empirische benadering aan die in drie stadia werd ontworpen; geaggregeerde en bedrijfsniveauanalyses die officiële gegevens gebruiken, bedrijfsniveau-analyse die onderzoek gebruikt en tenslotte casus-studie analyses die tot doel heeft het verschaffen van diepere inzichten in de onderliggende kwesties. Drie literatuurstromingen werden gehanteerd: spillovers, cluster en netwerkdynamica, en technologische innovaties. De gemaakte vergelijkende analyse met gebruik van officiële gegevens toonde aan dat de buitenlandse firma's in vrijwel alle economische activiteiten overheersten. Wat ook opviel was het feit dat buitenlandse firma's slechts in enkele sectoren geconcentreerd waren. De analyse heeft interessante bevindingen aan het licht gebracht: ze toonde aan dat de plaatselijke firma's betere prestaties hadden dan buitenlandse firma's op basis van waargenomen groeipercentages. Terwijl buitenlandse firma's dalende groeipercentages vertonen met vrijwel al hun variabelen, de binnenlandse firma's hadden positieve groeipercentages in verscheidene variabelen, hetgeen impliceert dat zij geleidelijk de buitenlandse firma's aan het inhalen waren. Om een bredere reeks resultaten voor vergelijking te hebben, hebben wij besloten een productiviteitsanalyse uit te voeren. De bevindingen over de aanwezigheid van buitenlandse op het sectorniveau zijn interessant. Twee reeksen resultaten werden verkregen, afhankelijk van de gevolgde methodologische aanpak. De geschatte resultaten op basis van "vroege bijdragers"

bevestigen het bestaan van spillovers terwijl analyse die op "nieuwe ontwikkelingen" gebaseerd is geen spillovers effect toont. Dit toonde aan dat de bestaande divergentie in de spilloverliteratuur ook in de Keniaanse context waargenomen kon worden. Wij besloten om niet op dat punt op te houden maar verder te onderzoeken. Het zou het geval kunnen zijn dat sectoren met een laag of negatief effect van de aanwezigheid van buitenlandse ondernemingen het positieve effect van sectoren die wel voordeel hebben van buitenlandse aanwezigheid teniet doen zodat het resulterende effect verwaarloosbaar of zelfs negatief wordt. Dit was mogelijk in Kenia aangezien de op gedragsvergelijking gebaseerd resultaten aantoonde dat de buitenlandse aanwezigheid niet uniform was verdeeld. Deze resultaten vroegen daarom om een andere analytisch raamwerk dan de gebruikelijke productiviteit technieken.

De analyse van onderzoeksgegevens verzameld uit 180 bedrijven in de voeding en drankensector en de machine-industrie toonden aan dat de aanwezigheid van buitenlandse bedrijven spillovers naar lokale bedrijven stimuleerde. Deze spillovers vinden plaats vooral in producten en processen maar ook in marketingstrategie. Opvallend genoeg, management en organisatie alsook reparaties en onderhoud hadden de laagste niveaus van spillovers. Het onderzoek van spillovermechanismen toonde aan dat deze spillovers hoofdzakelijk door concurrentie en demonstratie-effecten werden veroorzaakt. Op de derde plaats kwam arbeidsmobiliteit gevolgd door onderlinge verbindingen tussen bedrijven. De determinanten van spillovers werden onderzocht met gebruikmaking van binaire en geordend logit schattingstechnieken. De resultaten van onze analyse toonden aan dat de buitenlandse aanwezigheid een positieve correlatie had met spilloverindex, hetgeen impliceert dat een uitbreiding van buitenlandse aanwezigheid de kans op spillovers naar lokale firma's verhoogde. Deze bevindingen bevestigen onze hypothese dat de buitenlandse aanwezigheid positieve technologische spillovers in de verwerkende industrie van Kenia produceerde.

Onze analyse toonde aan dat de vrijwel elke van spilloverfactoren de verwachte tekens hadden, statistisch significant waren en ook intuïtieve waren. Bedrijfskenmerken zoals grootte, leeftijd en de leeftijd van de machines hadden significante en positieve invloed op spillovers. Deze bevindingen betekenen dat spillovers eerder in grotere dan in kleine firma's plaatsvinden, eerder in oudere dan in jonge firma's, en eerder in firma's met oude productiemachines dan in die met jonge machines. Zoals opgemerkt, de grote bedrijven beschikken over de noodzakelijke middelen om in te spelen op technologische veranderingen, terwijl de leeftijd duidde op deaccumuleerde ervaring in de loop der tijd.

Het kwadraat van leeftijd leverde een negatieve correlatie op, hetgeen op een niet-lineair, "omgekeerd-u" patroon van spillovers duidt, met meer spillovers bij firma's van gemiddelde leeftijd dan bij jonge en oude firma's. De Keniaanse Aziatische bedrijven hadden meer spillovers in vergelijking met niet-Aziatische firma's in Keniaanse productie. Dit was geen verrassing aangezien de Aziatische firma's in Kenia over meer middelen en technologische verfijning beschikken dan die in handen van inheemse Afrikanen. Een dergelijk voordeel plaatst Aziatische firma's in een betere positie om spillovers te absorberen en te assimileren. De variabelen voor infrastructuur, de institutionele steun en de interactie produceerde de verwachte resultaten. Bijvoorbeeld, het resultaat van interactie bevestigde onze hypothese dat interacties met zakelijke, privé en publieke instellingen spillovers bevorderen. Op dezelfde manier, kleinere technologische verschillen tussen Keniaanse en buitenlandse bedrijven hadden invloed op de mogelijkheid van spillovers naar lokale bedrijven. Dit duidt op een minimale drempel van technologische ontwikkeling van bedrijven om van spillovers te kunnen profiteren.

De resultaten over bedrijvenstrategie waren ook als verwacht. Bedrijven met sterke training strategieën hadden een grotere kans van spillovers voordelen in vergelijking met bedrijven zonder een dergelijke strategie. Op dezelfde manier, bedrijven met sterke strategieën om procestechnologie constant te moderniseren hadden een grotere spillover kans dan firma's zonder dergelijke strategieën. Deze bevindingen bevestigen de stelling dat opleiding in bedrijven en constante aanpassing en verbetering van processen de algemene absorptiecapaciteit verhoogt. Met betrekking tot handelsoriëntatie, onze bevindingen waren verrassend. Terwijl de resultaten geschat met betrekking tot de invoer zoals verwacht waren, die voor de uitvoer waren strijdig met de verwachting. Deze resultaten zouden dan impliceren dat de uitvoeroriëntatie de spillovers negatief beïnvloedt, in de zin dat niet-exporterend firma's meer spillovers aantrokken dan exporterende firma's. Tot slot, de resultaten van arbeidsmarktomstandigheden waren zoals verwacht en in overeenstemming met de spilloverliteratuur: goede arbeidsmarktvoorwaarden zoals betaling van efficiencylonen, de koelkast voordelen en voorzichtig human resource management beleid vertalen zich in verminderde mobiliteit van arbeiders en zo verminderen de kans op spillovers. In overeenstemming met dit argument, de lonen, als surrogaat voor arbeidsmarktvoorwaarden hadden een negatieve invloed op de kans op spillovers.

De case studies bevestigden de spillovers en verlenen steunen aan onze stelling dat FDI in de Keniaanse fabrieken een essentiële rol heeft gespeeld in de industriële ontwikkeling. Op basis van de gemaakte analyse en door spillovers te conceptualiseren als technologische leerprocessen en capaciteitsopbouw, komen wij tot de conclusie dat de buitenlandse aanwezigheid spillovers heeft bevorderd in de twee bestudeerde industrieën. Nochtans kunnen deze resultaten niet veralgemeend worden voor de volledige verwerkende industrie, aangezien de buitenlandse aanwezigheid niet gelijkmatig verdeeld is in alle sectoren. Voorts, de technologische veranderingen als resultaat van spillovers zijn verschillend per sectoren. Elke verwerkende sector vereist eigen en afzonderlijke behandeling. Niettemin, de implicatie van deze bevindingen is dat door spillovers, FDI een belangrijke rol speelt in het bevorderen van het leren, capaciteitsopbouw, hetgeen innovatie heeft bevorderd zowel direct als onrechtstreeks in de verwerkende industrie van Kenia.

Samenvattend, de analyse en de bevindingen van deze studie steunen onze stelling dat FDI een belangrijke rol speelt in industrialisering van Kenia. Het analytische kader dat we hier ontwikkelen stelt de bestaande benaderingen in spilloveranalyse in vraag. De bevindingen van deze studie produceren verscheidene lessen met belangrijke implicaties voor overheidsbeleid. Onze analyse toonde aan dat om industriële ontwikkeling en capaciteitsopbouw te stimuleren door buitenlandse investeringen en spillovers verscheidene factoren moeten worden overwogen. Daarom pleit deze studie voor een uitvoerige reeks beleidsmaatregelen.

De beleidsimplicaties die daaruit voortvloeien kunnen daarom als volgt worden geschetst: Ten eerste, de overheid moet met consistentie te werk gaan in het formuleren van industrieel beleid. Duidelijke, lange termijn beleidsformulering geven bedrijven een kader waarin ze hun lange termijn doelstellingen kunnen formuleren, plannen en bereiken. Ten tweede, de overheid zou met meer duidelijk beleid op de proppen moeten komen ten behoeve van bevordering van onderlinge bedrijfverbanden. Wij adviseren dat een nationaal programma in het leven wordt geroepen om bedrijvenverbanden te bevorderen en alle kwesties te behandelen die zowel nationaal als internationaal verband

houden met deze verbindingen. Ten derde, de overheid moet beleid formuleren om zijn menselijke kapitaal accumulatie te verbeteren. Voor firma's om hun absorptiecapaciteit en spillovers assimilatie te kunnen verhogen is een sterke cultuur van technologieontwikkeling vereist. Bijgevolg, het beleid zou zich moeten focussen op het ondersteunen van leerprocessen op bedrijfsniveau, capaciteitsopbouw en innovatie. O&O op bedrijfs- en industriële niveau zou moeten worden aangemoedigd en vergemakkelijkt. Ten vierde, wegens een zwakke facilitatie en coördinerende rol die door instellingen wordt gespeeld, de overheid moet met beleid op de proppen komen dat het correcte functioneren en prestaties van deze instellingen verzekert. Bijvoorbeeld, de instellingen die industriële O&O behandelen zouden verbeterd moeten worden in termen van het uitbreiden van hun capaciteiten, met name door meer menselijk kapitaal en financiële middelen om O&O en daaraan gerelateerde activiteiten te steunen. Vijfde, de overheid zou voorzichtiger moeten zijn door operationele knelpunten in deze instellingen aan te pakken door middel van continue coördinatie en efficiëncystimulatie. Zesde, de slechte infrastructuur maakt operationele en de transactiekosten uiterst hoog en zo vermindert de bereidheid te investeren, de interactie onder firma's en belemmert zo de kans op spillovers. De overheid zou daarom basisinfrastructuur moeten verstrekken.

Het succesverhaal van de zogeheten nieuwe industrielanden (NICs) in Oost-Azië toont ons aan dat een overheid die geen ononderbroken steun of efficiënt industrieel facilititeit geeft, vaak haar eigen ondernemers in de steek laat. Zevende, de formele en informele interacties tussen bedrijven, instellingen en bedrijfsverenigingen leiden tot een atmosfeer waarin de lokale ondernemers productie-ervaring, markt informatie, vaardigheden en technologische kennis met buitenlandse firma's delen. De overheid zou daarom meer van dergelijke interacties moeten aanmoedigen. Achtste, hoewel de concurrentie een belangrijke rol speelt in het spilloverproces, men moet nochtans oppassen dat de hoge concurrentie van MNO binnenlandse investering niet verdringt.

Wij adviseren het opzetten van een nieuwe, semi-autonome, regulatorische (bureaucratische) instelling met de bevoegdheid om de optimale concurrentieniveaus te bepalen en correctieve maatregelen op tijd ten uitvoer te leggen. Negende, onze studie toonde aan dat de invoer belangrijk was in het spilloverproces. De overheid in Kenia zou de invoerhindernissen van investeringsgoederen, technologie, machines en materiaal die als bronnen dienen van het leerproces, of capaciteitsopbouw door imitatie, strategisch uit de weg moeten ruimen. De participatie in de uitvoer zou moeten worden aangemoedigd omdat deze participatie binnenlandse firma's zou dwingen om hun technologische inspanning te verhogen om effectief te kunnen concurreren op de globale markt. Tot slot, de goede arbeidsmarktvoorwaarden zijn belangrijk voor de industriële groei en ontwikkeling. Daarom zou de overheid ze moeten bevorderen maar daarnaast een cultuur van arbeidsmobiliteit bevorderen.

De studie heeft verscheidene suggesties voor verder toekomstig onderzoekswerk. Ten eerste, aangezien het onderzoek zich op slechts twee sectoren concentreerde, is er een behoefte om de studie te verbreden om andere sectoren met vrij hoge buitenlandse aanwezigheid ook te onderzoeken. Bovendien zouden de toekomstige studies meer case studies moeten omvatten aangezien zij duidelijk meer inzichten verschaffen. Een dergelijke benadering is nochtans duur, tijdrovend, en vereist veel arbeidskrachten en grote inspanningen. In deze studie, de tijd factor en de middelenbeperking beperkten ons werkgebied.

Ten tweede, het zou ook interessant zijn om het hier ontwikkelde analytische kader toepassen om gelijkaardige studies in andere landenten zuiden van de Sahara woestijn uit te voeren. Op dezelfde manier kunnen ook andere ontwikkelingslanden in de rest van de wereld worden bestudeerd voor internationale vergelijkingen. Ten derde, gezien de enorme verschuiving die in FDI wordt waargenomen, bijvoorbeeld de verschuiving naar de dienstindustrie, de toepassing van dit onderzoekskader kan eveneens tot de dienstindustrie worden uitgebreid voor spilloveranalyse. De dienstsectoren met hoge buitenlandse aanwezigheid omvatten toerisme en hotelsector, financiën en verzekeringssector evenals de bouw en bouwnijverheid. Bovendien, de benadering kan tot landbouw worden uitgebreid, vooral de bloeiende succesvolle tuinbouwsector in Kenia. Ten vierde, aangezien deze studie zich op productie en bijbehorende capaciteiten concentreerde, kan de studie worden verbreed om andere technologische capabiliteiten te omvatten zoals investering en verbindingsmogelijkheden. Tot slot, aangezien deze studie geen analyse vanuit het spillover vanuit het perspectief van de oorsprong van FDI heeft uitgevoerd, is er een behoefte om een studie uit te voeren die spilloversvergelijkingen door de oorsprong van MN0 toelaat. Deze aanbeveling volgt een bestaand begrip dat het totstandkomen van spillovers van MN0 uit verschillende landen verschilt. Namelijk MN0 van Europa zouden van Amerikaanse MN0 verschillend zijn zoals MN0 van Azië ook anders zouden zijn. Zelfs voor MN0 van het zelfde continent, bijvoorbeeld MN0 van Duitsland en Groot-Brittannië, verschillende spilloverservaringen zijn mogelijk. De vergelijkingen tussen MN0 van ontwikkelde landen en die van gevorderde ontwikkelingslanden zouden een interessante studie voor vergelijkende doeleinden ook kunnen vormen.

CURRICULUM VITAE

Geoffrey G. Gachino was born in Nyandarua on 1 June 1968. After his primary school education at Rutara Primary School, Mr. Gachino joined Nyahururu High School for his ordinary level education and Saint Patrick's High School Iten for his advanced level education. He obtained a Bachelor of Science degree (B.Sc. with honours) in Mathematics and Statistics from Kenyatta University in 1994. In 1995, he joined the Ministry of Planning and National Development (MP&ND) as an Economist Statistician/Planning Officer. In the Ministry Mr. Gachino worked at the Central Bureau of Statistics (CBS) and was involved with providing economic planning, analytical, statistical and demographic among other related services.

Between 1996 and 1998, he took a study leave to study a Master of Philosophy (M.Phil.) degree in economics from University of Ghana where he graduated with a distinction majoring in public finance, monetary studies and econometrics. His Masters thesis was on public finance and was entitled 'Fiscal Policy and Economic Growth in Kenya: An Econometric Approach'. Fellowship award to undertake the Masters programme was provided by African Economic Research Consortium (AERC). Upon completion of his programme, Mr. Gachino returned to his job with the same Ministry in Kenya where he was granted another study leave after winning a fellowship to study Ph.D. at United Nations University in Maastricht, Netherlands. He joined the UNU-MERIT Ph.D. programme in September 1999.

Mr. Gachino's research interests include Foreign Direct Investment (FDI), technology accumulation and capability building, globalisation, competitiveness and innovation. Mr. Gachino has participated and presented papers in several international conferences. He has published in refereed journals, book chapters and working papers.