

The fascination of knowledge creation : studies on knowledge interfaces in high-tech services

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A little knowledge that acts is worth infinitely more than much knowledge that is idle.

Kahlil Gibran (1881-1931)

6.1 Synopsis

In this dissertation, we have focused on knowledge creation in high-tech services. The overall objective was to uncover how knowledge is created in different knowledge interfaces within companies, interactions between companies and customers as well as interactions between customers. We investigated how companies can influence the dynamic stock of knowledge. Attention was also paid to the impact the created knowledge has on organizational performance. In the introduction, we formulated the main research problem as follows:

What is the role of knowledge interfaces during knowledge creation in high-tech services?

The main research problem was addressed in four interrelated research projects. Each project was described in one chapter of this dissertation. Chapter 2 discussed the critical antecedents of project learning and time-to-market during new mobile service development. In Chapter 3, we investigated how communication mediates the impact of memory on project learning and time-to-market in high-tech service development. Chapter 4 examined the roles of customers during knowledge co-creation and the respective impact on organizational knowledge increase. Chapter 5 dealt with the motivations of customers to co-create a service and the evaluation of customer co-created services. In sum, we have considered various antecedents and performance consequences of knowledge creation in high-tech services. Antecedents ranged from organizational design variables and innovation team characteristics within the area of intraorganizational interfaces to specific customer roles and customer motivations in the knowledge interface with customers. In terms of performance outcomes, we mainly considered 1) innovation project outcomes, 2) service innovation performance as well as 3) perceived service quality.

In this final chapter, we will present a general overview of the four projects' findings including theoretical and managerial implications. Finally, the chapter concludes with general suggestions for future research.

6.2 Organizational fascination of knowledge creation

Organizations are fascinated with knowledge creation, as knowledge is a key primary resource that can lead to competitive advantage. Companies are aware that nowadays they need to create knowledge to stay competitive. Therefore, they are interested in how knowledge is created, transferred and sustained within their organizations. We have shown that knowledge is created through activities of marketing employees with other employees in the organization and through interactions with customers. The big advantage of knowledge as a resource is that it increases with usage. The more knowledge is consumed, the wider the transfer of knowledge within the organization. As a consequence, this unique characteristic needs to be exploited. Our studies have shown that knowledge creation improves new service performance, provides an important stimulus for innovation activities and helps to raise perceived service quality. When employees learn throughout the service innovation process, and hence, build up knowledge, new service performance is considerably improved. Furthermore, when customers co-create knowledge during the delivery of electronic services, organizational knowledge is increased. Subsequently, employees can use this new organizational knowledge to improve the existing services to customers. Consequently, customers perceive the quality of the services as superior. The co-created knowledge also provides employees with an important stimulus for innovation activities, as customers communicate their current problem areas and ideas and suggestions for future services. Finally, when customers co-create services by participating, for example, in an online technical support community, they increasingly identify themselves with the service. This higher identification also leads to an improved perception of service quality.

6.3 Knowledge interfaces within the organization

The knowledge interfaces within the company have been examined during the service innovation process. The innovation task can be considered as an organizational activity directed at the creation of a knowledge base, so that the company can act on events and trends in present and prospective markets. Furthermore, in most service innovation projects employees with different functional backgrounds participate in this innovation task. Therefore, the innovation task is the ideal process to study knowledge interfaces within organizations. High-tech service companies strive for a fast time-to-market to introduce competitive services into the market. At the same time, the need to process information and subsequently learn is another important innovation project outcome. We have shown that both project outcomes are important drivers for new service performance. The seemingly existing paradox between project learning and time-to-market can be solved by encouraging innovative communication. Both time-to-market and project learning are positively influenced by innovative communication (i.e. the

exchange of creative and novel information). Innovative communication helps to create not only new services but also process innovation. In process innovation, the process itself might be shortened. Innovative communication entails creativity in problem solving and supports the effectiveness of high-quality solutions. Especially in high-tech services, companies need to exchange creative and novel information, be open to experimentation and improvisation. Despite the importance of innovative communication, coordinative communication is also important to manage the information overload that exists within the high-tech environment. Coordinative communication helps isolated employees to manage the information task.

Communication has also an important mediating function. We found that communication serves as the transformation process of existing stock of knowledge (i.e. memory) into a new stock of knowledge (i.e. knowledge creation). Without communication, memory of the service innovation team cannot result in the positive outcomes of project learning and time-to-market. Within this memory dimension, marketing theory and practice needs to distinguish between generational memory and transactive memory. Generational memory refers to the collective, existing knowledge of the service innovation team while transactive memory means that these team members are aware of other knowledge locations. For the concept of transactive memory, we have drawn on psychology literature and introduced it to the marketing domain. The communication networks within companies are expanded due to the increased usage of information technology. Hence, organizations can further exploit the transactive memory within their organization. While we have shown the importance of memory for communication, companies need to consider that in complex projects, external information becomes critical. Therefore, when project complexity is high, employees should search for information beyond the boundaries of the firm.

Not only communication is important for knowledge creation, but there should also be a match between information processing capabilities and information processing requirements. The advanced information technology of the Internet and company-wide Intranets create opportunities for better communication via e-mail and sharing material online. Thus, more information can be shared with a wider audience allowing global companies to work in world-wide teams. Furthermore, the general organizational climate should support learning behavior. Companies can stimulate a favorable organizational climate by providing slack resources and fostering active participation of employees. Some slack resources allow employees to experiment and improvise. Active participation improves employees' identification with the projects. Furthermore, learning is a social process where employees need to interact with each other. Therefore, the aspiration for knowledge creation should be institutionalized in the organizational values and norms.

6.4 Knowledge interfaces with customers

The knowledge interfaces with customers have two important dimensions: an information dimension and an experience dimension. Both dimensions are driven by the realization that customers have transformed from passive buyers to active co-creators of value. On the one hand, this knowledge interface is important for the exchange of information with the customer. On the other hand, companies can use this knowledge interface to create memorable experiences for customers.

Customers communicate their knowledge, are willing to learn, engage in active exchanges of ideas with companies, and become service co-creators. In electronic service delivery, customers are often providing the organization with a lot of information by just using the company's electronic services. Furthermore, customers increasingly provide voluntary feedback to companies. Using the services and providing feedback represent interactions between an individual customer and the company. Knowledge is also co-created in customer communities where customers do not only interact with the company but also among each other. Consequently, companies can establish mechanisms to incorporate customers' knowledge. Customers co-create knowledge during daily business and within their natural setting. Hence, companies do not need to invite customers for specific focus groups or as respondents for market research, where customers are out of their daily business situation. Rather, companies can exchange knowledge with their customers at the moment where a certain problem occurs in the customers' environment. This co-created knowledge impacts the knowledge of employees within the organization. Here, the breadth and depth of information from customers is especially important for the objective knowledge of employees. Objective knowledge represents the accuracy of knowledge. The representativeness and trust of information is critical for subjective knowledge, where subjective implies the confidence in the knowledge. Both objective and subjective knowledge help to deliver better services and provide input for the upfront innovation activities. The co-creation of knowledge in virtual communities also provides the advantage of being a platform for the promotion of new services. Hence, companies can exploit the possibilities of closer customer contact and benefit from service co-creation of customers.

We have extended the service production continuum based on Meuter and Bitner (1998) by adding a fourth production dimension (i.e. service co-creation), where customers produce services for *other* customers. Virtual customer communities provide the ideal platform for these kinds of services. In a virtual community, the problem solving interaction between customers can reduce a company's call center traffic. Moreover, the active service co-creation increases the technical knowledge of the community customers, thereby, lowering the actual level of technical support needed by customers.

The experience dimension of the knowledge interface with customers ensures that customers consume services that are memorable. Experience can be a sensation as well as a knowledge acquisition resulting from a customer's participation in daily activities. Customers participate in self-services as well as in service co-creation. However, while self-services offer customer benefits such as convenience and faster service provision, the motivation for customers to help other customers is more intrinsic in nature. We have shown that fun as well as relational embeddedness between customers are important drivers of co-creative behavior. Fun makes the service experience enjoyable in itself. Relational embeddedness connects customers with other customers and subsequently stimulates them to help each other. We found that especially relational embeddedness has a strong impact on co-creative behavior. Companies offering co-created services need to manage customer motivations. Therefore, they should encourage the connection of customers with other customers and include, for example, technological means to raise the fun factor in the community. Another important finding of this dissertation is the importance of social interaction as a driver of perceived service quality in highly participatory services. Social interaction adds a human dimension to the service that customers seem to appreciate. Companies could consider introducing a social dimension also in other services.

We included a contingency element by showing how the motivations, the impact of service co-creation by customers, and the service quality evaluation change for different states of mind identified by flow theory. In a state of flow, the customers' perceptions of the level of fun, the amount of social interaction, and the perceived service quality are substantially heightened. Introducing the contingency factor of different states of mind and the respective analysis of the subsamples shows the importance of flow theory for challenging web experiences. Furthermore, it adds to our understanding of how our proposed model and the hypothesized relationships change in different states of mind. The experience of service co-creation is highly sensitive to the balance of challenges and skills. The balance between challenge and skill is important for engaging customers in an enjoyable experience. Companies need to keep the challenges high. They should maximize the amount of new questions and discussion topics within the virtual community. Furthermore, they need to stimulate customers to develop their skills. If companies offer education and training services to customers, they could promote these services in the customer community.

6.5 A perspective on future research

Specific suggestions for future research have been discussed at the end of each chapter. We would also like to provide some general directions for future research in the area of knowledge creation in marketing, service innovation and customer collaboration.

We have illustrated how critical knowledge creation is for innovation performance. However, knowledge creation during innovation is not only important for building a competitive advantage, but also enhances the capabilities and competences of organizations. In innovation research, the distinction between incremental and radical innovation is widely accepted. Sometimes, radical innovation may obsolesce the existing knowledge stock, thereby, destroying capabilities and competences. Hence, an important area for future research could deal with issues in competence-enhancing versus competence-destroying innovations. Is there a knowledge vacuum after a competence-destroying innovation? Does competence-destroying innovation increase new knowledge creation, as the demand for knowledge is higher? Do companies also have to newly educate their customers for these kinds of radical innovations?

We have shown the importance of knowledge co-creation with customers for innovation activities in the context of electronic services. However, as markets are rapidly evolving into networks (Achrol and Kotler 1999), collaboration with suppliers can become essential as well. In our first chapter, we have shown that supplier information power might delay the fast development of mobile service development. Research on supplier involvement in innovation activities has been inconclusive with respect to the impact on time-to-market. While Eisenhardt and Tabrizi (1995) find that supplier involvement fastens innovation projects, Ittner and Larcker (1997) discover that it slows down time-to-market. Hence, future research could investigate inhibiting and contributing factors for joint development with suppliers. Furthermore, the interface with suppliers is another knowledge interface that goes beyond the boundaries of a firm. Hence, knowledge is also created in this interface. What are the conditions for knowledge creation? What roles do suppliers and the organization have to play to maximize performance outcomes? How can companies motivate their supplying firms to cooperate in innovation projects?

Despite the opportunities to co-create knowledge with customers in electronic services, as demonstrated by this dissertation, companies might also be interested in collaborating even closer with customers in developing new services. However, due to logistical reasons companies can only cooperate with a small number of customers. Therefore, they want to ensure that they cooperate with customers, who are creative and motivated. In addition, they want to collaborate with customers who represent the mass market to optimize the later adoption and diffusion of the newly developed service. The advances in Internet technology can help to identify creative and representative customers, especially in a business-to-consumer setting, as they allow for interactive communication. The electronic service delivery could support the identification of consumers appropriate for involvement in service innovation. Therefore, future research could examine how companies can identify these customers. What characteristics should

these customers have? How can they motivate these customers to collaborate in intensive innovation projects?

We identified the roles customers play in knowledge co-creation, as well as the impact on organizational (objective and subjective) knowledge. Another important issue is how this co-created knowledge is communicated within organizations? Should companies establish formal processes or rather rely on informal knowledge sharing? How can information technology help in disseminating the co-created knowledge? What are inhibiting and facilitating factors for a widespread transfer of customer co-created knowledge?

Online customer collaboration, as discussed in this dissertation, creates organizational knowledge. However, not all employees might be the right person to collaborate with customers. Some employees enjoy the close contact with customers, while others might prefer to rather work in the back office of the organization. Future research might investigate how to identify employees that are especially suitable for online customer collaboration. What characteristics should these employees fulfill? How can companies motivate these employees? How can they better train employees to cooperate with customers?

Just like employees, not all customers enjoy the active participation in, for example, virtual communities. We have shown the importance of customer collaboration for knowledge creation and performance outcomes. Companies wanting to exploit online customer collaboration need to promote participatory services to the “right” customers. Therefore, they should segment their customer base accordingly and only target those customers who enjoy online participation. Hence, future research could identify customer characteristics, customer traits as well as situational factors that influence customers’ decision to co-create electronic services.

Finally, the investigation of knowledge interfaces during knowledge creation could be further advanced by using a social network analysis approach. The knowledge interfaces within organizations as well as with customers can be considered as social networks, where individuals are connected with each other. Social network analysis could study the characteristics of the online social relations between customers and relate it to knowledge creation. Hence, social network analysis could further advance the research field of knowledge creation in customer-company networks as well as in online customer support networks.