

Integration and differentiation in a hospital's logistical system

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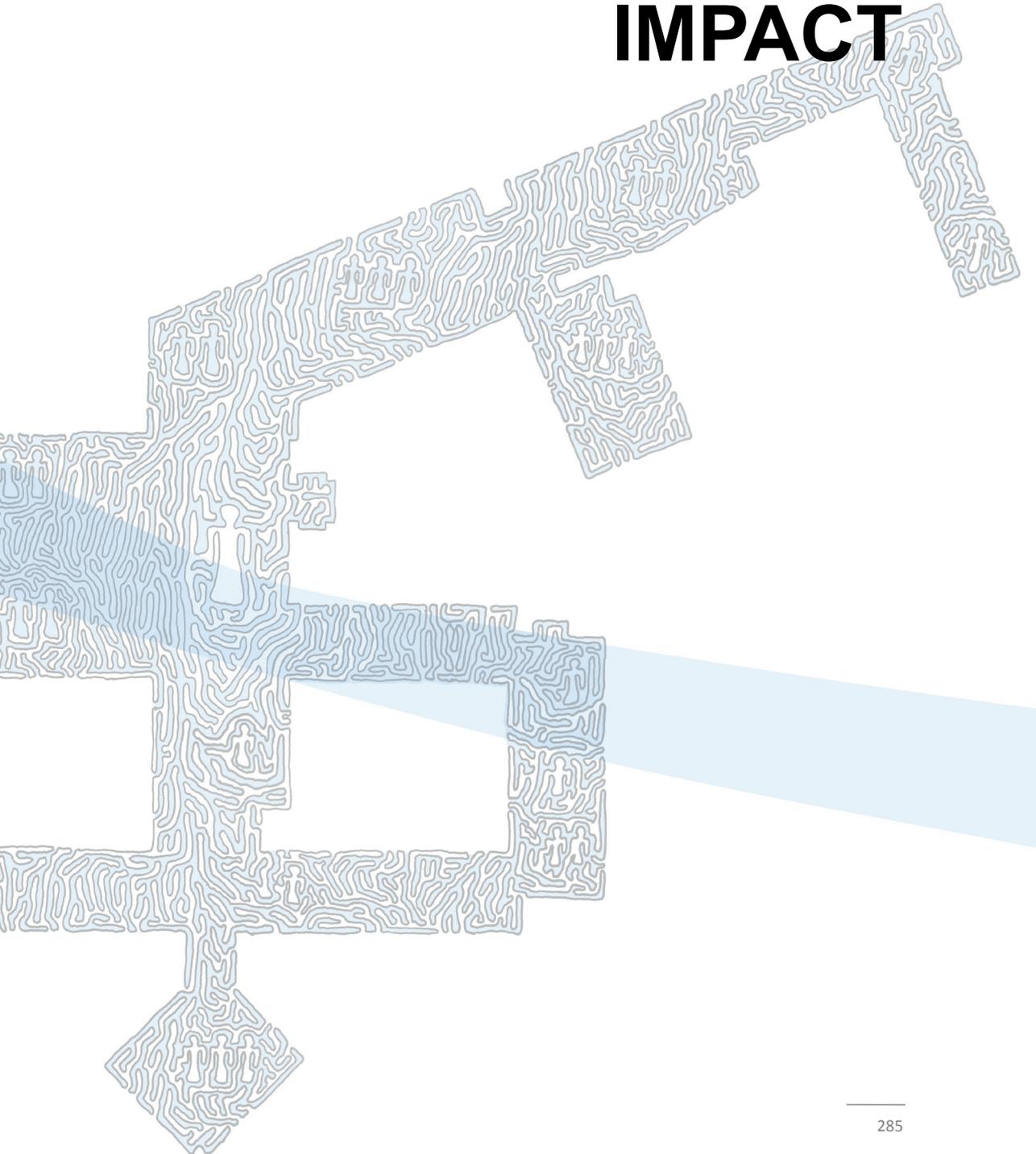
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IMPACT



IMPACT

“I showed up on time on the date of the meeting which I had agreed to join for observation. Ten minutes before it was supposed to start, someone told me that the meeting had been rescheduled and they had arranged for me to join the logistical workers in the OTC central storage room, now! I felt somewhat disturbed and confused, as I was not able to prepare myself for observing logistical workers and didn't know right away exactly what I wanted from the observation. This happens quite often during this research: things are cancelled and then rearranged at the same time and on the spot. I worry a bit that I may look like an ill-prepared idiot. But, probably, the best thing is to accept it as part of the experience, to open my eyes and ears, write it all down, and then learn from it.”

This personal diary note, made on 29 January 2018, illustrates what it means to be working in a dynamic environment. For people, who are used to working with plans and concepts - researchers, consultants, (project) managers and others like them - the dynamics in hospital operations can be overwhelming and the seeming lack of control can be hard to accept.

The concerns regarding this way of working are not unfounded, given the widely felt need to increase the affordability and accessibility of healthcare services (Chapter 1) and hospitals in particular. Hospitals are a major cost item in healthcare systems, and during the Covid-19 pandemic hospitals were stretched beyond their capacity to such an extent that it had a major impact on societies worldwide. Many researchers consider the concept of integration important for improving hospital performance. Integration involves aligning and coordinating activities from a hospital-wide perspective to make sure that patients, materials and staff flow smoothly through hospital processes. Activities are integrated when, for example, for a surgery that is planned by the outpatient department, also a bed is also planned for by the nursing ward, both for before and after the surgery is performed.

Although several theories on integration exist, the question of how integration is achieved in hospital practice is relatively unaddressed. A full understanding of factors that determine the course of things in hospital practice is important to be able to effectively transform hospital logistics and operations. The aim of this thesis, therefore, is to thoroughly understand how a hospital's logistical system works, in particular, integration. Theory states that for effective hospital's integration, i.e. alignment and coordination and differentiation, i.e., the division of tasks throughout an organization, are both required.

To what degree activities can be performed independently of other activities, thereby not requiring integration, depends on the demands that the environment puts on the organization.

The question of how integration is achieved in hospital practice is relatively unaddressed and considered difficult, or even problematic by researchers. This thesis, therefore, contributes to thoroughly understanding how a hospital's logistical system works, in particular with regard to integration and differentiation. This is important, because like for any other system that requires improvement, knowing how the system works, and why, is essential. From the findings of this thesis, an approach is proposed that includes both elements of deliberate, conscious planning based on standards and, also, of adaptability that is based on mutual adjustment. In this chapter the societal and scientific impact and the dissemination and the future of the results in this thesis are explained.

SOCIETAL IMPACT

First and foremost, from this study we know how a hospital and, in particular, its logistical system works in practice from a system-wide perspective, more particularly for performing surgeries and all that is required to arrange for that. It has become clear that differentiation is more or less 'programmed' or comes naturally because the division of tasks and departments in hospitals is based on medical disciplines, patient characteristics and length of stay. Integration largely emerges through agents who observe potential instability, e.g., unnecessary waiting, a lack of materials or staff for surgeries or patient care, and who mutually adjust in social networks. Most importantly, several of the ways of working and coordination mechanisms found in this study turned out to be insensitive to change. After the hospital planning centre (HPC) was introduced several intended performance improvements were not achieved and open loops and mutual adjustment remained. As a consequence the potential causes for hospital instability seem to have remained.

We believe that the findings on how hospitals function is important for anyone who works in, for, or with hospitals. Whether you work in a hospital daily or work on design and change projects, knowing how and why the system functions is essential to be effective. First, this study provides detailed descriptions of processes, tasks, agents who perform tasks, which rules are used and what interactions that take place. Second, this study shows that integration is achieved by healthcare professionals and a few coordinators and that they coordinate mainly through standardization of work and mutual adjustment,

based on, often, local and undocumented rules. Third, given the complexity and variability of hospital operations, this thesis proposes a more deliberate, conscious and dynamic approach towards integration and differentiation. This includes stepwise learning aimed at system stabilization under changing circumstances. Fourth, social network analysis and naturalistic inquiry offer concepts and methods for evaluating changes in hospital performance, and these can be used by a diverse audience.

For hospital staff, this thesis can be used to create system-wide awareness on what happens outside their own workplace and department, so that they understand how the system functions as a whole and how they can contribute to this most effectively. It could also be used for preparing future staff, i.e. students in medical and nursing education, to understand the position they will be in as a physician, nurse or coordinator when working in a hospital.

Clearly, for (future) hospital leadership a system-wide understanding of hospitals is important in order to be able to effectively lead and manage smaller or larger parts of the hospital. They need to be aware and understand that changes in one part of the hospital may impact hospital performance as a whole or in other departments. Furthermore, they should play an important role in more deliberately organizing integration and differentiation. This includes monitoring and aligning the hospital's environment on a strategic, tactical and operational level, detecting improvement areas, setting performance goals and deciding on any new ways of working, systems or organizational structure. When they know the social structure of their hospital, they are able to involve the right agents for this. Social network analysis identifies the central agents who can be of help in influencing the network and taking care of any disconnections between agents that are needed to reshape the network. Hospital leadership can also be of great value for central agents who face the challenge of connecting subsystems, thereby continuously solving conflicts. If the leadership explicitly supports or rewards these central agents, their task will be less challenging.

Agents who provide services to healthcare professionals, either externally or internally, can use this thesis for agents designing, developing and implementing for example organizational policies, information technology solutions, financial models, human resource management programs, building designs housing and/or facility services, etc. Their solutions or models can only effectively support the hospital system when they support agent's working processes. In order to do so, integration, differentiation, rules and coordination mechanisms must be understood.

The same applies to agents outside hospitals, such as policy makers, insurance companies, management consultants and supply chain partners, i.e. nursing homes or material suppliers.

RESEARCH IMPACT

For this thesis, a case study approach including data triangulation, social network analysis and the hospital-wide approach were combined. Similar to the aforementioned stepwise hospital improvement, hospital-wide research should also be conducted in a stepwise manner.

For a hospital-wide case study, research data should be collected from multiple sources, e.g. the hospital information system, documents, observations and interviews. Data, accordingly, need to be analyzed in an iterative manner, thus discussing findings repeatedly with hospital staff. Clearly, the hospital-wide approach comes with the challenge to achieve results within a restricted period of time. Selecting an aspect system, i.e., the part of the hospital system that services surgery patients, proved valuable, while at the same time, the limitations are recognized.

Social network analysis facilitates analyzing hospital-wide integration and differentiation. Using data triangulation, social networks for each task can be constructed, combined into a hospital-wide network and, most importantly, visualized. The concepts and metrics that social network theory offers can be used to detect integration and differentiation, with the main metrics being density, the number of cliques, clique overlap, betweenness centrality and centralization. Social network analysis should be accompanied by naturalistic inquiry in order to establish the coordination mechanisms and rules that explain network structures.

In future research, social network analysis and naturalistic inquiry can be used for replication of this study in other hospitals and for evaluating organizational changes that have been implemented. By evaluating performance, more knowledge will be developed on effective network structures and governance of networks. Social network theory can, accordingly, be developed further by connecting its concepts and metrics to the concepts of integration and differentiation.

For researchers, the findings of this research are also relevant for the way research is conducted in hospital practice. As illustrated by the diary notes, doing research in hospitals requires mutual adjustment and adaptability skills from researchers. In particular, planning interviews and observations requires a flexible attitude, as these can be rescheduled or rearranged on the spot. For this, a well-prepared research plan is required, which includes both clear and well-defined objectives and research questions, and facilitates agility in doing the research. For example, by preparing interview topic lists for interviewees from all departments beforehand, the researcher is able to conduct any

interview at any time. At the same time, such topic lists may require adjustment when interviews that were held provide new insights.

DISSEMINATION OF FINDINGS

Various channels have been used to disseminate the findings of this research. Three out of four papers have been published in international peer reviewed journals, and the fourth paper (Chapter 5) has been submitted for publication as well. The published papers have all been published open access and are accessible to anyone free-of-charge.

In addition to that, the findings of this research have been shared mainly with a practical audience. Naturally, during the case studies, intermediate and final results were shared with Slingeland Hospital, either via email or personally. A ‘thank-you’ note was given to all Slingeland Hospital staff that participated in the first case study (Chapter 2) and in it the position of the note recipient was highlighted. From the response, it was clear that this was not only appreciated, but several staff members indicated that this made them more aware of their (in that case often central) position. In July 2021, the findings of this research were presented to Slingeland Hospitals Board of Directors and middle management.

For a wider audience, 44 blogs were published between 2017 and 2021 on www.squrious.nl, presenting the research results and reflections on these. The blogs were well read by over a thousand different people, mostly working in or for hospitals. Throughout the entire PhD research, several workshops and presentations were held with consultancy firms and hospitals, among others, often as a result of a blog or through personal relationships in the Dutch healthcare sector of the researchers involved.

Research findings were also presented in a book chapter of ‘Capaciteitsplanning in de zorg’², which was published in 2021 and written for a professional audience of managers, boards, physicians, students and other people involved in healthcare operations management. Also, this research was presented to a professional audience in master classes on capacity planning 2021.

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