Exploring the Role of Process Orientation in Healthcare Service Innovation; The Case of Digital Night Surveillance

Full Paper

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Abstract

The purpose of this article is to close a gap in the literature on the role of process management for service innovations in the eHealth setting. We conducted an explorative case study of the nature and impact of process orientation for service innovations in the context of eHealth. Interviews and surveys over two subsequent years were combined and revealed that the relevance and importance of process orientation grew as the project progressed. Process documentation, support from management, knowledge on process improvement and use of IT tools, and a culture supporting process work appeared as challenges to service innovations. Surveys to informants from the organizations participating in the project, over two successive years, allowed a further test of how the dimensions of process orientation could explain the level of service innovations experienced by the participants. We found significant correlations between process culture and service innovations, and other project related outcomes.

Keywords

Healthcare, process orientation, service innovations, process change, eHealth.

Introduction

Currently, health care systems in most countries are facing many challenges. In Europe, there are declines in birth rates, rise in life expectancy, increase in chronic deceases and multi-morbidity conditions (Onder et al., 2015). These changes challenge the sustainability of the health care system and call for improvements in today's services. On the other hand, the frequent innovations in information systems and technology (IT) create a substantial potential for transforming the delivery of care through improvements in efficiency, quality, productivity, collaboration and reach within the healthcare system itself.

Moen et al. (2012) list four groups of challenges to eHealth development in Europe: policy, technology, organization and professionals, where barriers are related to legal issues, national funding and standards, interoperability, integration of ICT solutions, conflicting interests between private and public sectors, and differences in professional clinical practice. Others, including the European United4Health project (www.United4Health.eu), point to other challenges for example that the lack of documented examples of clinical benefits creates a barrier to eHealth adoption, along with a lack of training as well as few new healthcare services designed to take advantage of new ICT solutions. In this study, we will specifically focus on this latter challenge related to the act of designing new or redesigning existing healthcare services. We will do this by focusing on the healthcare service providers’ capability to redesign and improve internal processes in service production as a means of realizing benefits from digitalization.

Whereas there is a lack of studies of process redesign in the eHealth setting, there has been a considerable growth in studies of this phenomenon in the literature on business process management that focuses on
the ability of the organization to analyze and improve their processes. More specifically, one approach describes the many challenges related to the organization’s ability to improve business processes as process orientation (Kohlbacher & Gruenwald, 2011). Despite the growth in the business process management literature (op cit.), there is a gap in the literature on process management within the eHealth setting (Niehaves, Plattfaut, & Becker, 2012; Cleven et al., 2016). This raises uncertainty and questions as to whether the literature on business process management and process orientation is generalizable to the highly specialized eHealth setting, or if not, how is the nature of process orientation and its influence on service improvements in the eHealth context?

To gain more insight into how digitalization can be achieved through process redesign in healthcare services, we will adopt the perspective of process orientation and contribute to closing this gap in the literature. Due to the lack of studies in the health setting, we will first explore the conceptual relevance of the general process orientation concept and use this insight in a systematic evaluation of process orientation in the health context. This leads to two research questions:

1. What is the role of process orientation (PO) in organizations’ healthcare service innovations?
2. To what extent can process orientation explain the ability to innovate healthcare processes?

The remaining sections are organized as follows. First, we present the theoretical framework of process management and PO. Then, we describe the methods used to provide the information that can shed light on our research questions that are both qualitative and quantitative in nature, and we present the intermunicipal project as our case that provided us with our empirical data. The next section presents the results from qualitative interviews on the role of process orientation. These findings along with the dimensions of PO are then systematically tested in a quantitative survey to informants from the municipalities involved in the project that is the basis for our case study. Finally, we analyze and combine this data and conclude with a discussion of theoretical and practical implications as well as limitations to our work.

**Theoretical framework**

The ability to transform inputs as raw materials and information into outputs as products and services has usually been depicted as a process and has been extensively researched for many years and in many contexts (see McGormack et al., 2009). The process itself where many roles in an organization interact to transform inputs into outputs has been described under different names including workflow, work processes and business processes, but the main challenge for organizations in their efforts of improving their processes has been to implement process principles into their operation (Skrinjar and Trkman, 2013) including for example total quality management, continual service improvements, and business process reengineering (BPR). One approach, Business Process Management (BPM), describes how management includes different principles in the act of improving processes (Armistead and Machin, 1998; Lee and Dale, 1998). BPM as a management strategy implies that the organization is process oriented and has adopted a process view of its operations. In conceptualizing such a process view, or process orientation (PO), Kohlbacher and Gruenwald (2011) define the concept as the ability to focus on business processes, as a dynamic capability of the whole organization, as a concept, PO is comprised of seven dimensions including design and documentation of business processes, management commitment towards PO, the role of the process owner, process performance measurement, a supportive corporate culture, a focus on continuous improvement, and a process oriented organizational structure (Kohlbacher and Gruenwald, 2011). As a multidimensional construct, PO is composite in nature meaning that an organization’s PO is expressed by its composite score on the relevant dimensions of PO. The nine dimensions included in the model are: (1) process design and documentation; (2) management commitment; (3) process owner; (4) process performance measurement; (5) corporate culture in line with the process approach; (6) organizational structure in line with the process approach; (7) people and expertise; (8) process-oriented HR systems; and (9) coordination and integration of process projects (op cit.).

Some studies from the health sector exist where some similar dimensions of the PO construct have been found. For example, in a case study of cooperation in two hospitals in Germany, Blondiau (2014) found many process related challenges to inter-departmental cooperation to create holistic healthcare pathways. Of process related challenges observed were clear defined responsibilities in the care processes, degree of standardization and formalization of internal processes, and involvement of employees.
In a multiple case study in Sweden based on actor network theory, Hellman et al. (2015) found several factors that could explain failures as well as success in process orientation. By following healthcare processes in three hospitals over time, Hellman and colleagues found that process improvements were difficult when medical priority was low, and that top management involvement was not necessarily sufficient when other actors were involved at the operative level.

Garmann-Johnsen and Eikebrokk (2014) reviewed the literature on inter-organizational process collaboration and found 11 studies from the eHealth context. In these studies, several factors similar to dimensions of PO were found including culture as represented in the degree of information sharing and involvement, and standardization of processes. In a follow-up study, the authors explore the drivers of eHealth service performance in the context of inter-organizational process collaboration between hospitals and municipalities delivering healthcare services in Norway (Garmann-Johnsen and Eikebrokk, 2017). More specifically, they found that eHealth service performance in a collaborative setting was influenced by factors like the dimensions of the PO construct, including clear process goals, process ownership, and management and employee involvement.

Previous studies have found that business process orientation is positively related to performance (McCormack and Johnson, 2001; Skrinjar et al., 2008). In a literature review of process orientation integrating both qualitative and quantitative studies, Kolbacher (2010) found empirical evidence that a process-oriented organizational design may result in a positive influence on organizational performance. Reported outcomes of process orientation in several studies include improved market responsiveness, customer satisfaction, cost reductions and quality improvements. Similar benefits were found by Movahedi and Miri-Lavassani (2016) in their review of the literature and subsequent empirical study of intra- and inter-organizational business process orientation in 3,200 for profit organizations.

Research methods

To contribute to closing the gap in the literature and gain insight into the role and importance of PO in healthcare service innovation, we followed a case over three years and combined information from documents, interviews and surveys to answer our research questions. We followed a two-step procedure where we first explored the process work taking place to understand the role and content of PO in this setting. Then, as step two, we systematically tested the status on the dimensions of PO that were explored in step one, and then investigated the relationship between the status on the PO dimensions and innovations in service production.

The case of Digital Night Surveillance in Norwegian municipalities

Eight Norwegian municipalities decided to cooperate in a joint project where the goal was to take advantage of new technology to improve digital night surveillance. The municipal services are nursing homes and home care units, and the project has involved support units and extensive cooperation with the technology suppliers, who are identical with the developers of the technology. The technology mainly included sensor technology connected to a web-based portal which was delivered by a network of small and medium-sized businesses. The joint project was limited in time and spending.

The motivation and the initiative for increased use of technology as means of improving the health care services, varied in the municipalities, from cost saving to political pressure towards being proactive and curious. A common motivation was to limit the number of night visits to patients, as these represent a level of intrusion in private life. Another important motivation was to limit the number of such routine inspections to save time and transport for caregiving personnel. The implementation was organized as projects in the various municipalities, with a project group and project manager. These projects were in turn organized as a network of projects, which included the suppliers of the technology and two research institutions. The network has met on a regular basis for workshops, where they have discussed common issues and challenges in the implementation process. Although the pilot tests were initiated top-down, they focused on cooperation and included employees on several levels right from the start.
Phase one - Interviews

We interviewed project managers, top and middle managers, as well as super-users and IT-support services in the municipal healthcare services, in addition to technology suppliers. Observation was conducted in meetings, during training and in workshops with other municipalities. A total of 18 semi-structured interviews were conducted. The interview guide is included in appendix 1.

Regarding transcription and coding, the interviews were transcribed verbatim and coded using codes from the operationalization of the seven dimensions of PO, following Kohlbacher and Gruenwald (2011): Design and documentation of business processes; management commitment towards PO; the process owner role; process performance measurement; a corporate culture in line with the process approach; application of continuous process improvement methodologies; and process-oriented organizational structure. Furthermore, the authors and researchers coded the interviews in an explorative and inductive fashion in order to be open to additional findings.

Phase two - Survey

The interviews revealed that process orientation and the PO construct is relevant in the context of eHealth in municipalities. The authors gained a deeper insight into how contextual factors might influence service improvements and innovations, including the quality of the technology and the role of the technology supplier, and the feeling of urgency in the project. To complement the insight gained from interviews in context, the authors wanted to systematically explore the relationship between the PO dimensions and the outcome of the project in terms of service innovations. To account for changes related to learning and process maturation during the project, data were collected in two subsequent years. The interviews revealed that two of the seven dimensions of PO in Kohlbacher and Gruenwald (2011) were not relevant in this context: “application of continuous process improvement methodologies” and “process oriented organizational structure” and were thus not included in the survey. The remaining five dimensions of PO were operationalized following Kohlbacher and Gruenwald (2011).

Service innovations were operationalized following Kohlbacher (2010) who reviewed the literature on effects from process orientation. The authors included informants’ views on whether the project led to improvement in the speed and quality of services, customer satisfaction, and whether services were reorganized. Based on feedback from the interviews, we also included employee satisfaction, learning of process work and general ability to improve services, and achieve project goals.

The survey instrument was pretested with feedback from five informants, which led to simplifications in wording to better fit the municipal context. In 2015, 94 potential informants from the eight municipalities were invited to participate. In the follow-up survey in 2016, 74 potential informants were invited. The final survey instrument is included in appendix 2.

Results

The nature and role of process orientation

The factors influencing the ability to improve processes of service production that we found in the interviews are detailed below.

It became evident throughout the implementation project that the municipalities lacked documentation of how the services are organized. In the workshops, they worked on one particular task and found it very useful. The need for documentation became apparent when they started to develop routines for using the new technology. This work was, however, made routinely only in a few municipalities.

Support from management varies from strong support to a positive, but disinterested attitude. In several of the municipalities, resources are not allocated on management level, neither for project management nor for line management, to this particular project and implementation.

There is a lack of knowledge of process improvement, of use or access to process management IT-tools, and of exchange of knowledge between service areas – which appears to be non-existent. The project requires extensive cooperation between the IT support department and the healthcare service, and this emerges in the data from the interviews, as problematic. Also, in several municipalities they do not use experience-
based knowledge within their own service area. There are, for example, repeated examples of municipalities that build new nursing homes without building on experience from the Digital Surveillance project through involving employees. Consequently, although there appears to be a strong culture of cooperation within the teams and within the service, the culture does not seem to support learning and development in a wider circle, cross departmental borders.

Contextual factors, like government guidelines and regulations on public procurement, additionally hinder the use of previous experience as building blocks.

In terms of measurement and outcomes, a few of the municipalities systematically monitor their service delivery. The rule is however, that monitoring the services either happens randomly or because of government demands. What indicators they measure also seems randomly selected. One municipality monitors how often the employees access the intranet for information about procedures, for example. Due to the relatively short life of the project, it is in several cases premature to ask for quantitative measures and outcomes. There are some exceptions, like one municipality that has documented a radical reduction of the personal surveillance on the night shift.

On the other hand, there are numerous testimonies of outcomes related to learning in the project. One IT-consultant, employed in the health care service itself, said that this is not so much a case about technology; it is more about “organizing, routines and screening”. Furthermore, there is a common perception that the project has been a success, particularly in terms of increased safety for both patients, employees and families, and one municipality reports economical savings. The success is also tied to the project learning that has taken place in the municipalities, and this is relevant in terms of process orientation.

Although the concept of process orientation and process management did not appear to be immediately relevant for the case at hand, as management awareness of PO seems low, the implementation project itself contributed to a raised consciousness on how the service is delivered, along several dimensions, ex post.

The need for documentation and monitoring arose in the outlining of new processes, and the challenges in the cooperation with the IT support department showed the need for cooperation. The narratives from the interviews highlight the distant role of the management and the influence of contextual factors like national government guidelines (or sometimes lack of guidelines).

The importance of process orientation for healthcare service innovations

In general, the interviews revealed that the relevance of the dimensions of process orientation varied in the municipalities, and that this relevance grew during the project. Phase two further explored through surveys whether and how the PO-dimensions were related to project outcomes including service innovations. In 2015, 29 of the 94 informants invited answered the survey, representing a response rate of 31%. In 2016, 74 informants were invited and of these, 28 responded to the survey, representing a response rate of 38%.

To explore to what extent the dimensions of the PO construct are related to service innovations and outcomes that were created because of the project, we created indexes of the indicators used to reflect the respective dimensions of PO. Table 1 shows the correlations between the dimensions of PO and outcomes as service improvements in digital night surveillance, and changes in learning and ability to improve services. Other outcomes included were the perception that employees were satisfied with the project, and that the project had been a success. For each of the PO dimensions, there are correlations for 2015 and 2016. These values represent the correlation between PO in either 2015 and 2016 and the value for project related outcomes in the corresponding year.

As the correlations show, process culture reported in 2016 is significantly and positively related to service improvements also reported in 2016 (2016: 0.42, p=0.03). None of the other PO dimensions were significantly related to process innovations. We also see that process culture is positively related to project related outcomes as employees’ satisfaction with the digital night surveillance project (2016: .45, p=.02; 2015: .38, p=.045) and the perception that the project has been a success (2016: .39, p=.04).
Table 1: Spearman’s correlations between process orientation, service innovations and project related outcomes

We also found that management commitment was significantly and positively related to the perception that the municipality had learned about service improvements (2016: .60, p=.00) and that the ability to improve services had improved (2016: .85, p=.00).

Some correlations were near significant. Management commitment correlated positively with the perception that the project was a success (2016: .30, p=.10). The more service processes were documented, the higher the ability to improve services (2016: .36, p=.07). As performance monitoring increased, so did the perception that the project was a success (2015: .45, p=.07) and the ability to improve services (2016: .34, p=.09).

All dimensions of PO showed significant inter-correlations except for process competence, as illustrated in Table 2. Process competence showed no significant correlations with any of the other dimensions of PO or with any of the reported project related outcomes, possibly indicating a measurement issue with this dimension.

Table 2: Spearman’s correlations between the dimensions of process orientation

Discussion and conclusion

This section reviews the findings considering the research questions. It then discusses the study’s contribution to theory and practice and suggests areas for further research. First, a summary of the results related to our research questions:
What is the role of process orientation (PO) in organizations’ healthcare service innovations?

Some dimensions of the PO construct were observed in the studied organizations, like “customer”-, or user focus, at least at the operational level (people and expertise), and management involvement, at least in early phases of the tests. Other concepts emerged as pragmatic adaptations as the pilot test progressed, like the need for documenting new routines and systems, the need for knowledge on process improvements and how it can be measured.

Some other dimensions of the PO construct were not easily observable in the early phases of the project work (including a clear process design and documentation; management commitment throughout the whole implementation process; process ownership; process performance measurement; organizational structure in line with the process approach; process-oriented HR systems; and coordination and integration of process projects). As the project progressed, we observed that more municipalities found process related dimensions relevant, but to a varying degree. Even though the relevance of process orientation increased during the project work, the process focus in most of the municipalities seemed lacking, unsystematic and partly motivated by external demands.

To what extent can process orientation explain the ability to innovate healthcare services?

Based on the interviews alone, it was difficult to observe any clear relations between process orientation capabilities and project related outcomes, including service innovations, process competence and ability to improve processes. Based on exploratory survey data over a two-year period involving a broader set of informants than those interviewed, we identified positive correlations between management commitment, process culture, and service innovations, thus indicating that some of the PO dimensions were both relevant and able to explain variability in observed service innovations in our case study.

The two dimensions of the PO model, process documentation and process competence, were clearly missing in the context as evident in our empirical data, and there was only weak evidence of any systematic process performance measurement activity. The organizations involved in our case study seemed immature on PO and only able to provide weak answers on the importance of their process work. The correlation patterns that emerged between the PO dimensions and project outcomes as evident in Tables 1 and 2, support the basic assumption that process orientation represents an important capability for process management and process improvement, also in the eHealth context. Moreover, the empirical data shows that the capability to improve service processes is gradually emerging in our context, but still at a rather immature level. This is supported by our interview data where informants express the need to improve their process capabilities and mention that not only would performance benefit, but also the adoption rate for new eHealth technologies would rise, opening for the potential gains for both society and health care quality. It is also supported by the fact that the most influential dimension of PO, as measured by the correlation patterns, was a supporting process culture.

Our study has several contributions. First, it contributes to closing a gap in the process management literature (pointed to by Cleven et al., 2016) by documenting through triangulation of interviews and survey data, that process orientation is both relevant to the eHealth context and able to explain process improvements. Further theorizing and model testing are needed to more fully understand the role of process orientation for eHealth. One approach could focus on the emergence of process orientation in relation to different business and service model approaches in e-health. One starting point could be to compare approaches found in the Scandinavian context with similar countries following similar as well as different national strategies.

Further research should thoroughly test construct validity of the PO construct in this setting. Our data was limited and did not allow any systematic test of construct validity and quality of the instrument based on Kohlbacher and Gruenwald (2011) and Kohlbacher (2010). The interviews in our context showed that most organizations are not able to improve in all dimensions of process orientation simultaneously. Therefore, process orientation will become composite in nature and formed by the subset of the PO construct of interest to the individual organization. Construct and instrument validation, and hypotheses testing must
reflect that methods based on inter-correlations are less relevant because of the composite nature of process orientation.

Second, our study has practical contributions in highlighting how organizations could convert their eHealth efforts into improved healthcare services. Clearly, transforming healthcare service processes using new technology and related business concepts is a complex task. This study shows that developing the capability to innovate services is a process that managers could start by initiating the first small steps towards increased process orientation through process awareness and process competence, and thus develop the process culture that is important for further development towards service innovations.

**Limitations**

Our exploratory study has several limitations. Since very few studies of process orientation exist in this context, there is a lack of evidence regarding instrumentation and testing that could inform our empirical study. This was observed in the dimension of process competence that was not related to any of the project related outcomes or to the other PO dimensions, possibly indicating problems in operationalization and measurement in our context that were not discovered during pretesting. Moreover, our case study could only provide a limited number of informants that also limited the ability to conduct thorough tests of measurement validity as well as hypotheses testing based on more elaborate statistical procedures.

Since our case study is limited to one example of process improvements enabled by new technology in a network of eight cooperating municipalities in Norway, our findings have limited external validity and should be complemented by other studies from other contexts, involving other eHealth technologies and organizations.

**REFERENCES**

Appendix

Appendix 1: Interview guide Digital Surveillance (DS).

Biographical details: Position, Education/experience, Seniority, Character of tasks and responsibilities? What are your tasks and responsibilities in the project? Please explain.

Knowledge of IT: How will you describe your basic knowledge of IT? (MS Office, Internet, etc.) Do you have any education, courses or training in the use of IT systems? Please explain.

Use of IT systems in your daily work: What IT systems are in use and how are they used? In what situations do you use the IT systems? Have you been trained to use the technology and what are your thoughts on the training? What is the number of installations of DS and who is responsible for the maintenance?

Implementation of Digital surveillance (DS): What motivated the implementation and what changes were you hoping for? When was the system implemented and who was included in the decision process? What preparations did you do before the project started? Can you describe the implementation process? How long did it last? What challenges have you had (training, work load, technical problems etc.)? How were the challenges handled and how was experience shared? How was the support from the supplier and to what degree were the patients and families involved?

Changes after the implementation process: What are the consequences of the implementation process in terms of routines in practice (skills, knowledge, new tasks, tasks made redundant etc.). Please explain. Has DS influenced the cooperation between colleagues, patients and families? Please explain. What is the largest gain in the implementation of DS? What is the biggest challenge and what barriers do you experience? What functionality do you feel that the technology lacks and what is the most important functionality?

Cooperation with other municipalities, suppliers, R&D institutions in the process: Do you cooperate with other municipalities, suppliers and/or researchers on DS? If yes, how? How are the guidelines and the experiences shared between the various stakeholders/actors in the project?

Process organizing and learning: What previous knowledge did you have of DS? How do you obtain information and knowledge of DS (from colleagues, orally transmitted information, codified information, internet, social media, blogs etc.)? What guidelines have you used in the DS project (local, national etc.)?

Service innovation: In what way do you work differently? Can you give an example?
Ethical reflections: To what degree does DS work as a support for elderly in need of care, for employees and for next of kin?
How does DS influence the interaction between the caregivers and the patients?
How is ‘holistic nursing’ influenced by the use of DS?
How is the patient’s privacy, autonomy, security and dignity secured?

Appendix 2: Survey instrument (Response format: 1. Totally disagree...5. Totally agree)

Management Involvement

Our management actively supports the work with process improvements in our services
Our management is very clear in their involvement in the process work
Our management gives precise feedback on the progress with the process work
Our management signals clearly how important the process work is
Our management champions projects that will improve service production

Process documentation

My municipality has documented well how services are organized today
My municipality has developed models that show how services are produced from a to z

Process performance monitoring

Our municipality systematically monitors how the production of services is organized
Our municipality regularly measures the quality of its services
Our municipality works systematically and continuously to improve service production

Process culture

There is an organization of services that focuses on the satisfaction among users of the service
There is a culture that supports cooperation for the best organization of services
There is a culture that strongly prioritize learning and development
There are incentives that stimulate the delivery of better services
Our employees are concerned with quality

Process competence

Our municipality uses specialized tools (e.g. Aris, Visio, QualiSoft)
Our municipality has a lot of knowledge on how to improve work processes
Internal process specialists are used when services are improved
We are good at using knowledge we already possess on process improvements

Outcomes of process improvements

Digital night surveillance has led to a better service to the user
The project has improved employee satisfaction
All in all, digital night surveillance has been a success
During the project period, the municipality has learned a lot on how to improve services
During the project period, the municipality has improved its ability to improve services