Development Areas in Knowledge Management Processes in Social and Health Care Services: A Pilot Study

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Abstract: Knowledge management is about providing the right information for the decision maker at the right time, in the right format. This is equally essential in public sector as in the private sector enterprises. However, it is often easier said than done where and how the development schemes are to be directed. More data and information is needed. Public sector's social and health care has a number of data sources where knowledge management could make difference both in operational side, i. e. the care function and also in the management of the function, i. e. resource allocation. However, these are quite often planned some time ago and in the need of rethinking. The paper explores the possible points to be developed based on the knowledge management process, how to combine the two for a better outcome.

1 INTRODUCTION

Knowledge management (KM) is a holistic and systematic process that integrates technology and human aspects, enabling genuine dialogue in the management of organizations (Girard and Girard, 2015). In the process of KM, different stages can be distinguished in which information and further knowledge are processed from data (Choo, 2002). Knowledge is collected, organized, stored, shared, and utilized in a way that improves the decision-making and functioning of the individual and the organization (Vitt et al., 2002). However, there are several challenges in KM, due to, for example, technical infrastructure, poor quality data, human bias in thinking, reluctance to share knowledge, or inefficient practices and processes (Väyrynen et al., 2017). Thus, the possibilities to develop the operation are case-specifically many. It is plausible to assume that costs are one centric way to guide the flow of scarce resources for process development, especially in the public sector, where the funds are from a shared source and functions are regulated. Also there are often political pressures and ambitions in the way how the issues are to be approached. As the development towards improved efficiency but also 'better' outcome is concerned, the data regarding the costs are in a crucial role to direct development schemes. In retrieval of this knowledge a KM process will prove to be useful.

The aim of this paper is to identify the development areas at different stages of the knowledge management process in social and health care sector (SHC). The article seeks to answer the empirically weighted research question "What kind of development areas in knowledge management SHC operations can be identified at different stages of the knowledge management process model?" The context of the article is social and health care sector and the empirical research has been conducted through a pilot case study in that area. Through the analysis of the pilot case, the article contributes to knowledge management process literature. However, as the empirical case of this study is highly

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specialized in nature, further generalizations based on the results must be done with caution.

The structure of the article is as follows: After the introductory chapter, Chapter 2 is followed by a concise theoretical overview of the basics of knowledge management. The focus of the article is on the presentation of empirical pilot case study and the analysis of the results, so the theoretical part is followed by Chapter 3, which presents the methodological choices and the pilot case study, and Chapter 4, which presents the main results of the case studies. Chapter 5 summarizes the results of the article and contains an evaluation of the study and presents topics for further research.

2 KNOWLEDGE MANAGEMENT PROCESS

The purpose of knowledge management (KM) is to collect, process, organize, store, share and utilize knowledge in a way that improves the decision-making and activities of the individual and the organization (Jääskeläinen et al., 2020). With KM we can identify our organization's tacit knowledge and combine it with explicit knowledge, also from external sources, thus supporting the organizational problem solving, decision making and strategic development. KM is a holistic and systematic process that integrates technology and human aspects (Valkokari and Helander, 2007).

Knowledge, which is ultimately used in human decision-making and action, is processed from data through information into knowledge by adding structure and meaning to it (Choo, 2002; Thierauf, 2001). This chain from data to knowledge emphasizes the need for data processing and the nature of enrichment. Thus, knowledge does not appear from scratch, but is created by enriching data and information. In order to make good, knowledge-based decisions, data and information must be of high quality and easily accessible in a form that is understandable to decision-makers as timely as possible (Vilminko-Heikkinen and Pekkola, 2017). To ensure the functioning of this chain, it is necessary to coordinate both the more technical side of KM and the more human side in organizational structures, processes, and practices (Jääskeläinen et al., 2020).

One practical tool for this knowledge processing is the so-called knowledge process model, which is comprised of following six phases: Knowledge need identification; Knowledge retrieval and creation; Knowledge maintenance and storage; Knowledge sharing; Knowledge use; and Measurement and learning.

The process usually begins with defining the knowledge needs. The knowledge needs are first identified so that they can later be met as well and efficiently as possible. At this stage, knowledge is obtained both from external sources (e.g. competitors and customers), and internal sources (e.g. information systems (IS) and communities of practice). The knowledge created and collected from different sources will be organized and maintained in the organization's repositories. This means the stage of analyzing and organizing the knowledge, which facilitates the next stages of the process, i.e. knowledge sharing. However, knowledge only gains its final value when it is used, for example, applied in decision-making and operational development, and when real changes occur in the organization's operations. By assessing the changes that have taken place and learning from the proceedings and thereby identifying new development needs, the cycle starts over. It should be noted that the process is in fact an iterative process and that the variation between phases is not always straightforward.

The process of KM presented above, and its various stages include both the technical and the human angle to knowledge (Jääskeläinen et al., 2019). The model may be criticized as too a mechanistic way to structure such a complex phenomenon as KM is. In practice it is often the case that some basic model is needed to identify the challenges of knowledge management and to develop best practices. Nor does applying the process model of knowledge management to practice mean focusing on the process rather than dialogue. On the contrary, dialogue can be better built into organizations when a clear framework is built. The different stages of the process include both technical and human aspects, thus the model serves as a good analytical tool for identifying the challenges and opportunities of knowledge management (Hellsten and Myllärniemi, 2019). The analysis of the stages in the process makes it possible to improve the understanding of public sector organizations of their own skills, knowledge and knowledge resources and to support the use of knowledge in problem solving, decision-making and strategic development, as stated in traditional KM literature (Dalkir, 2017; Grant, 1996; Hislop et al., 2018).

3 METHOD

Knowledge management (KM) process is studied through an empirical case from Finnish SHC. The aim was to develop a practical tool for assessing the cost-effectiveness of utilising a gerontechnological application in home care for the elderly (Colnar et al., 2020a). The starting point for the pilot was a previously developed cost-effectiveness assessment model (CEAM) (Sillanpää and Korhonen, 2022), which was to be tested and developed further. In the pilot planning, it was important to understand the purpose of home care, the services and operations, and where the expected impacts could be visible (for example, home care service processes or customer well-being). Secondly, it was necessary to find out where the data and information needed to assess the effectiveness of the gerontechnological application are located (e.g. the information system and the parties managing the data and information, or the entities producing data and information). A home care operating area that had been offering gerontechnology (medication dispensing robot) to its customers for a long time was chosen to act as a pilot. The home care administration selected the participants in the pilot.

The next step was to identify changes that occur in the implementation or in the use of a new gerontechnological application by the customer. To explore the changes, three participatory workshops were conducted in spring 2022 for 70 healthcare and home care professionals. Based on the results, a critical question emerged as to what the core information is needed to verify technology-influenced changes in the CEAM. In addition, consideration was given to how the necessary data could be collected from the organisation's various IS's. To find answers, seven semi-structured interviews were conducted with the management and professionals of the SHC support services. The interviews were recorded, transcribed and analysed using qualitative content analysis. After the interviews, more workshops were held in summer 2022 with appropriate interviewees to find out how to refine the data and information needed. The next step was to define the indicators for the evaluation and to develop a CEAM together with researchers and city coordinators (financial planning representative, report designer and telecare technology expert). The pilot dealt with client and health data in home care for the elderly, so special attention was paid to the information security of technology and personal data; researchers were provided with anonymized data from which individual participants could not be identified. (Acosta et al., 2022)

Indicators identified and utilised in the literature in assessing the cost-effectiveness of digital remote monitoring services include hospital days, clinical visits in primary or specialised health care, and the number and costs of first aid visits. In home care, cost indicators may include home visits by healthcare professionals (nurses), number of contacts, and direct costs of remote monitoring or remote access (e.g. technology rental costs, user fees, Internet access costs) (Polisena et al., 2009; Seto, 2008; Upatising et al., 2015). To identify the effects of digital services, in addition to direct costs, it is necessary to identify the process requirements for new home care practices and the costs related to process changes (Askedal et al., 2017).

In the pilot, the indicators to be evaluated in the CEAM were identified from workshop results, interviews and literature, as well as from previous research by Sillanpää & Korhonen (2022). The researchers formulated guidelines for the use of the CEAM, and the model was ready to be piloted in home care for the elderly on the use of a medication dispensing robot. The pilot was carried out with data produced by the City, which made the actual data and reports on the use of home care services, the number of users of the technology and costs available for the whole year. The pilot consisted of ten users of medication dispensing robots (hereinafter referred to as "medicine dispensing robot in use") and ten respondents of not using the medicine dispensing robots (hereinafter referred to as "medicine dispensing robot in NOT use). Customers with the same level of functional capacity were invited to participate in the pilot in both control groups medicine dispensing robot in use/medicine dispensing robot NOT in use), the selection was not based on defined medical diagnoses. The CEAM makes it possible to define a follow-up period (e.g. quarterly), which makes it possible to obtain information on the development of service production, operations and costs by means of visualization (e.g. graphic images) with the data of the monitoring period.

4 EMPIRICAL RESULTS

The basic idea of the model is to compare the cost-effectiveness of a technology-assisted service for two elderly home care customer groups, a medicine dispensing robot: a medication dispensing robot for groups in use and a medicine dispensing robot not in

use. The costs were assessed from the service provider's point of view, and customer fees were excluded from the CEAM. The template is based on a spreadsheet program that contains three separate pages. The first page contains instructions on how to use the model: instructions to support the use are recommended so that the indicators to be evaluated in the model are understood and how the measurement is utilized (Jääskeläinen et al., 2020, 2013). The instructions are important for the measurement and the calculation principles of the background data to be the same regardless of the time of measurement or the person using the model. In addition, the page contains the indicators of the model, the sources of data or other information used (quantitative, qualitative, and financial information), instructions for calculating costs, the service provider's service-specific price, and the persons responsible for the information needed for the meters, which is used on page two of the spreadsheet program.

There is also a form to which data and information from the organization's IS's were added (e. g. McKlin et al., 2001), in the pilot the data were entered manually. The data and information needed to implement the pilot, instructions for obtaining the necessary information, and ownership of the data and information had to be defined. The indicators to be evaluated and entered were the use of home care services/number of clients (searchable from the patient IS), the number of home visits in physical home care and the costs of visits (to be retrieved from the service provider's financial administration). The home care did not separately record remote visits during the review period, but the remote visit was recorded as a physical visit, so remote home care visits as a separate examination were excluded from the pilot. Indicators were also the number and cost of emergency calls and the number of hospital days. Resource-based information from home care staff is important to illustrate how technology can support resources and reduce peak-hour physical home care home visits. Therefore, home care visit times had to be classified and the number of visits in the time frame had to be manually entered in the table. The operating costs of the medicine dispensing robot were classified into two categories: direct and indirect costs. Direct costs derive from the price of the equipment (e.g. lease or rental costs) and general costs of service activities (e.g. general IT costs). Indirect costs include technology support services for both home care staff and clients: training costs related to the use and administrative costs of the technology used by the customer (e.g. customer and service production data), as well as the number of service-related calls or contacts.

The number of clients working with home care services is essential information, and the customer months during the year may be of different lengths in the control group (e.g. not all clients are necessarily home care customers for the entire follow-up period, which was one calendar year). For this reason, the customer months had to be made commensurate with the calculation formula in the spreadsheet so that the number of customer months in the two groups being compared is proportionate.

The aim of the pilot was to test the developed CEAM with the actual service usage and cost data of the home care service provider for the elderly, and to obtain preliminary results on the cost-effectiveness of the medication dispensing robot in home care for the elderly. The CEAM provides a tool for assessing the economic impact of the use of technology. However, evaluation is a combination of several indicators and the context of the evaluation influences the set indicators to be evaluated, and therefore the limitations of the model must be taken into account when considering the results. In general, technology is expected to have an impact on the well-being of the elderly and the well-being of employees at work. In the pilot, qualitative impacts were identified (e.g. RAI (Resident Assessment Instrument) system for mapping of clients' functional capacity and service needs, 15D indicator for assessment of the effectiveness of treatment, but the qualitative impacts were not measured in this pilot. The CEAM makes it possible to measure the economic and quantitative impacts of the use of technology, but qualitative assessment of client and home care personnel is also needed.

5 DISCUSSION AND CONCLUSIONS

Making the knowledge management process to work requires seamless cooperation between the technical infrastructure and human factors, so that knowledge management can truly create value for public administration actors and citizens (Jääskeläinen et al., 2019). This means also simultaneously know-how requirement for the personnel and in our case also for the other side of the table, the customers as they are recently called. In addition to this, the process is advised to be familiar for the decision makers as the phases while interconnect often have their own features and actions that can offer improvement. In

summary both the overall picture is needed but also the individual phases need to be known. KM process model offers detailed enough picture to be used for further development targeting and possibly even schemes on issues in the practice.

Much of the previous public sector knowledge management research has focused on issues related to either IS's, data quality, or specific aspect of knowledge management. Less frequently, the various stages of the entire knowledge management process have been illustrated, from information needs to information acquisition, analysis and sharing, and its utilization to offer basis for process development. In this paper, we have sought to look at this whole process of knowledge processing and, through the pilot case study, have identified development areas of knowledge management in SHC. The key empirical findings concerning each of the KM process phases are illustrated in next Table 1.

Table 1: Key empirical findings.

KM process phase	Development area
Knowledge need identification	Identification of qualitative data indicators, not only quantitative. On both clients and personnel.
Knowledge retrieval and creation	Permits process, various IS's, data comparability, automation needed to retrieve data from different IS's, newer data sources
Knowledge maintenance and storage	Automated systematic identification of customer relationship classification, data accessibility
Knowledge sharing	Data acquisition and information sharing between the parties, esp. decision-makers, policies and procedures on the matter.
Knowledge use	Ownership, management and development must be designated.
Measurement and learning	Development and usage of the CEAM must be strategic, defined key performance indicators

The paper emphasizes the utilisation of data and information, especially in SHC and home care for the elderly, by showing that data can create value for organisations and employees if relevant data and information are identified from data flows, who in the organisation manages the data or owns the data, and also for what purpose the data and information is used and who benefits from the data and information. After identifying these elements, the CEAM described in this article can provide visualized information to support decision-making, and the information can guide the actors in the organization to react to situations in their daily operations.

Although this study succeeded in presenting one example of a CEAM with illustrative results, the study has some limitations. First, the sample of the pilot study was small and limited to a specific location and a specific, individual gerontechnology in Finland. Secondly, home care for the elderly is publicly funded in Finland, although clients are charged for services. For this reason, the results cannot be widely generalised because, for example, the different wellbeing areas may have different service fees and the provision of services at different prices, or because the model may have to be modified, for example, for each wellbeing services sector (e.g. indicators defined differently regionally). In addition, the results cannot be compared with private sector healthcare service production, such as health insurance -based service production. In the future, research with a larger sample and the context of home care for older people at national level with uniform indicators will be needed to formulate larger picture of the development ideas. In future studies, it should also be taken into account that home care clients may use several gerontechnologies, and it would be important and interesting to be able to assess the use of several gerontechnologies and their combined impact on the client's health and well-being as well as the service provider's operating costs. However, this requires, among other things, the automatic identification of customer relationships from IS's, which has been included in the development proposals. The aim of this study was to develop the previous CEAM towards a more extensive cost-effectiveness assessment and to implement the evaluation in practice. The pilot identified several qualitative effects of technology on both home care clients and employees but measuring them at this stage proved challenging. However, the model can be

used to illustrate changes in operational capacity (RAI values, number of emergency visits), and thus the customers' ability to function in everyday life has been included in the model. More research is needed to add qualitative indicators alongside the economic factors of the CEAM (Colnar et al., 2020b; Colnar and Dimovski, 2020; McKlin et al., 2001). However, it would be at least as important to raise a debate on the issues of principle, such as policies, rules of the game, and processes that should change to enable genuine knowledge management. Moreover, it should always be borne in mind that knowledge management is not an end, but only a tool - the goal is to create value together and sustainably better than before.

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