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Knowledge Management in Health Technology SMEs

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Abstract

The purpose of this study was to examine knowledge management’s (KM) role in small and medium-sized (SMEs) health technology enterprises, which employ fewer than 250 employees. In this study, KM is understood as the ability to achieve competitive advantage by utilizing management knowledge and making it profitable. The health technology enterprises use modern technology to resolve health-related issues. The research data was acquired from Finnish health technology SMEs. The questionnaire was sent to 140 enterprises, generating 25 responses, or a 17.9% response rate. According to the results, health technology enterprises have not adopted KM concepts, nor do they have the necessary resources to do so. SMEs’ KM use is informal: information is transferred informally through human interaction, rather than through information systems. In the SMEs, KM is not perceived as important, although it is seen as associated with the enterprise’s financial performance through the potential in making the knowledge profitable.

Keywords:
Knowledge Management; Biomedical Technology; Medical Informatics

Introduction

Technological and scientific developments have changed our understanding of business. According to Freedman, Taylorism refers to scientific management focused on the work processes, such as how a certain work phase is efficiently executed. Today, the business environment is changing rapidly, and organizations that apply Taylorism principals are not able to reform quickly enough [1]. The health sector is similarly changing, facing challenges like aging, rising costs, growing demands, demographic changes, and free markets [2]. The health technology industry can offer solutions to these challenges, and could considerably affect health promotion and economic growth. According to the European Union, health technology as an industry consists of diagnostic and treatment methods, medical devices, pharmaceuticals, rehabilitation, prevention methods and supporting systems [3].

The health technology industry can provide new business opportunities and have major economic impacts. For example, in Finland, health technology is an economically significant industry. In 2014, Finnish health technology enterprises exported products and services worth 1.8 billion euros [4].

In general the KM research is in a pre-science phase and is progressing towards academic maturity and normal science [5]. It is argued that KM is affected by economics, sociology, philosophy, and psychology. Three management practices that have significantly influenced KM are information management, quality management, and human factors movement [6]. Although organizations are not aware of the information’s value, KM is a way to satisfy customer needs or even exceed customer expectations [7]. Knowledge management focuses on achieving organizational goals and making knowledge productive, which it does by motivating people and stimulating intrapreneurship, whereby employees act like entrepreneurs. Although SMEs use certain KM instruments to evaluate, acquire, develop, and share knowledge, as well as to determine the knowledge gap, the SMEs do not necessarily call managing information “KM” [8]. Traditionally, KM’s research focus has been on larger enterprises [9]. However, both large enterprises and SMEs need KM principles in order to survive in a modern, competitive society. Although the SMEs could achieve greater innovation and productivity by capturing, storing, sharing, and disseminating knowledge, their managers do not see KM investment as sufficiently profitable. The SMEs’ KM is usually informal, which means that the knowledge is processed through human interactions rather than information and communications technology (ICT) systems. The managers and owners think that KM is not a business-critical function, and that it is therefore unnecessary for business success. This conflicts with the academic literature, as studies show that both small and large enterprises should invest in KM for the sake of competitiveness maximization, as well as increasing survival probability [10].

Obviously, due to limited resources, SMEs need to be more creative in how they manage knowledge. In fact, SMEs should put effort into managing knowledge because they can use their expertise to gain competitive advantages. The SMEs tend to manage knowledge instantly and without modern ICT. Although they use ICT in various operations, technology’s KM use is limited [11]. Knowledge is a primary resource in organizations, and if managed properly, positively affects economic efficiency, innovation, and customer service [12]. Wong and Aspinwall [13] have characterized SMEs’ KM as follows:

1. SMEs lack KM understanding, especially regarding its key concepts;
2. SMEs have only slowly adapted formal and systematic KM practices because they do not see it as a high priority.

This study’s aim is to examine KM’s role in SMEs’ health technology sector. The researchers wanted to investigate how these enterprises understand KM, how constantly increasing data is managed, and whether these enterprises use information systems to process this data. To our knowledge, very few studies cover these interests. Although KM in SMEs has gained some attention in academic research, few researchers have been interested in health technology SMEs specifically. To that end, our research question was as follows:
1. What is knowledge management like in the health technology industry?

Health technology industry research is important from both a theoretical and pragmatic perspective. This paper's goal is to increase SMEs' awareness of KM.

**Methods**

For this descriptive study, a literature search was conducted using databases such as Elsevier and EBSCOhost. The aim was to find scientific papers with themes that engaged with SMEs' KM, specifically within the health technology industry. The following inclusion criteria were applied for study selection:

1. Published in peer-review journals;
2. Focus on SMEs' KM;
3. Published between 1990 and 2016.

The literature search indicated that no measurement tool was created for use in SMEs’ KM, specifically within the health technology context. Based on the literature review, a questionnaire was formed using an online survey tool called Webropol. The questions were tightly structured multiple-choice questions and Likert-scale questions. The questionnaire consisted of six demographic questions and nine wider questions concerning themes like informatics and KM. For example, the respondents were asked for their opinions about KM's role in their organization, as well as how information loss is handled in case of retirement. The questionnaire was pretested by nine testers. Some changes were made based on the testing. The survey data was acquired from the Finnish health technology industry SMEs in 2016. The survey focused on senior SME managers’ and board members’ views. The online survey was sent primarily to these groups, but snowball sampling was also executed to allow for questionnaire forwarding to other enterprise members. This study’s suitable enterprises were reached via their homepages and were included in the survey if they met the inclusion criteria:

1. The enterprises were SMEs (staff headcount < 250, turnover ≤ 50 € m);
2. Their headquarters were located in Finland;
3. They use modern technology to produce services and products that promote health.

The questionnaire was sent to 140 managers, primarily Chief Executive Officers (CEOs) and Chief Technology Officers (CTOs). The respondents received a covering letter where they were informed that their identity or enterprise could not be identified and all the collected data would be destroyed after completing the study. In total, 25 participants responded, generating a 17.9% response rate. The collected data was analyzed using IBM SPSS Statistics 21 software. Due to a relatively low response rate, the analysis used was descriptive statistics. The aim was to provide sample size summaries, such as means and medians, as well as to present demographic information, including age, sex, and education level. The summaries are described using percentages and figures.

**Results**

In this study, the SMEs were divided into three categories: micro (fewer than 10 employees), small (10–49 employees), and medium (50–250 employees) enterprises. In this study, enterprise size varied between 1–180 employees (Figure 1). A total of 40% of the respondents worked in micro enterprises, while 48% worked in small enterprises, and 12% worked in medium enterprises.

The results show that the studied health technology enterprises are male-dominated. Of the respondents, 88% were male and 12% were female. The mean age was 45.8 years, while the median age was 48 years. The youngest respondent was 26 years old, and the oldest was 63 years old. Most of the respondents were CEOs; only two respondents were Chief Information Officers (CIOs), for example. In smaller enterprises, the CEOs had other roles, such as an entrepreneur role, and areas of responsibilities (Figure 2). As the enterprise grows, CEOs can focus on their main role and responsibilities, which are clearly defined. Smaller enterprises do not have a named CIO, so the CEO handles this role. For example, in this study the largest enterprises CEOs main role is to act as a CEO while in the smallest enterprises the CEO may act as a CEO, CIO and as a board member. While the size of the enterprise grows, KM becomes more informal.
as irreplaceable. Meanwhile, 92% of the respondents had an academic degree, which supports the idea that health technology enterprises are knowledge-intensive companies that enhance human capital. In addition, 92% of these respondents stated that the networks, knowledge, and customer relationships were important enterprise resources.

The enterprises were aware of knowledge loss due to employee attrition. In the survey response, 80% of the respondents pointed out that the best way to prevent knowledge loss is to share jobs among multiple employees. Furthermore, apprenticeship was seen as a practical way for reducing knowledge attrition, as apprenticeship is a system whereby experienced and inexperienced employees work side-by-side. Beyond this, a good way to retain the enterprise’s knowledge is to cultivate team spirit, which encourages asking for help and the organization culture being open and transparent. A total of 96% of the respondents stated that their enterprise used at least one way to prevent knowledge loss, while one of the respondents stated that this has not been taken into account at all (Figure 3).

![Figure 3 - Ways to prevent knowledge loss due to employee attrition (n = 25)](image)

The respondents were asked for their opinion about KM’s role in the enterprise’s financial performance. Approximately 96% of the respondents stated that KM is associated with the financial performance, while 84% saw KM as a way to provide management models. Applying KM was seen as a way of providing practical implementation expertise. Furthermore, KM was associated with cost-efficiency, in addition to being linked to value creation and having the potential to be used for identifying strengths, weaknesses, opportunities, and possible threats. Beyond this, respondents stated that KM could be used to make knowledge profitable.

The respondents were asked to describe KM’s role in SMEs at a general level (Table 1). The aim was to examine the health technology enterprises managers’ views on KM, as well as to compare the findings with those of previous studies. It was found that action is the main way to create, share, transfer, and utilize knowledge in SMEs, with KM being adapted slowly in most of the enterprises participating in the study. The importance of KM received mixed feelings.

### Table 1 - Respondents’ views of SMEs’ KM

<table>
<thead>
<tr>
<th>Statement</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMEs lack KM understanding.</td>
<td>68%</td>
<td>16%</td>
<td>16%</td>
</tr>
<tr>
<td>SMEs slowly adapt the formal and systematic KM practices.</td>
<td>72%</td>
<td>16%</td>
<td>12%</td>
</tr>
<tr>
<td>SMEs tend to think that KM is not very important.</td>
<td>52%</td>
<td>20%</td>
<td>28%</td>
</tr>
<tr>
<td>The biggest obstacle for KM usage is lack of resources.</td>
<td>64%</td>
<td>8%</td>
<td>28%</td>
</tr>
<tr>
<td>SMEs do not utilize technology in KM.</td>
<td>60%</td>
<td>8%</td>
<td>32%</td>
</tr>
<tr>
<td>Knowledge is created, shared, transferred and utilized between human interactions.</td>
<td>88%</td>
<td>8%</td>
<td>4%</td>
</tr>
</tbody>
</table>

**Discussion**

This study’s aim was to examine the role of KM in health technology SMEs. The results show that health technology enterprises can be seen as knowledge-intensive enterprises that emphasize human capital. The enterprises’ individuals fulfill an essential role, as the enterprises are dependent on certain employees and entrepreneurs. The employees and managers’ expertise is relevant for the enterprises, and their jobs require both creativity and problem-solving skills.

In light of this study, health technology SMEs’ KM is similar to the previous literature’s findings. Health technology enterprises’ use of KM does not differ from other SME fields. The SMEs have not adopted KM concepts [8–10], and according to these results, the major obstacle to KM’s wider use is resource scarcity, which also applies to health technology enterprises.

Thus, SMEs’ KM cannot be compared with larger enterprises. Based on the results, it is assumed that SMEs’ KM is understood in different ways.

It is important to note that health technology enterprises often offer products and services designed for managing knowledge, and their business models are based on creating, sharing, using, and managing that knowledge. Despite the previous findings, the enterprises themselves have not adopted KM concepts. Based on these results, in some enterprises, product development and marketing absorbs the vast majority of the available resources, which results in scarce resources available for KM.

Beyond this, SMEs’ KM tends to be informal, with knowledge being processed in human interactions rather than formally in ICT systems. Although the managers and owners think that KM is essential for their enterprise’s success, the resource scarcity forces them to focus on other functions. In this study, health technology SMEs have slowly adapted formal KM practices and do not take full advantage of information technology. Health technology enterprises should invest in KM because it allows the enterprises to gain a competitive advantage [9, 10] and because it is related to financial success and thereby considered an important business function. Applying KM principles can make knowledge productive [7, 11]. It is also essential to recognize that KM can aid in satisfying, or in some cases, even exceed customer expectations [6].

Although the response rate was relatively low, all the respondents completed the questionnaire with no missing data. Therefore, researchers concluded that the questionnaire was well.
designed and it functioned properly. The low response rate may originate from the lack of respondents’ resources, such as time. It is our assumption that the managers of SMEs are very busy and they do not necessarily have time for extra activities. On the other hand, it is essential to ask, are themes concerning knowledge management somewhat sensitive?

Despite the response rate, this study provides new findings related to the role of KM in SMEs. This study provides insight as to how knowledge is managed in the industry that applies modern technology in a health care setting. It would be necessary, in a further investigation, to carry out surveys and interviews, e.g., mixed methods studies applying quantitative and qualitative data. This method would deepen the understanding of KM in SMEs. In addition, further research should collect data internationally to generate more observations. At the time that our data was collected, Finland had 300 health technology enterprises. In the near future, this number could rise significantly, as the global need grows for high-quality yet affordable health care. Beyond this, technology keeps evolving, and we cannot know for sure what is possible in the future.

In this study, it is worth noting that only 12% of the managers were women. Further studies could examine why women rarely act as managers. Is it because of women’s own lack of interests, or perhaps because of general attitudes towards women as managers? It is important to realize that, for example, in Finland, the majority of health care employees are women. It could be necessary to survey more women health technology industry managers and collect their views as well. It is also important to study what kind of efforts are required to manage rapidly increasing rate of new information and how this affects the decision-making in the health technology enterprises. Further studies could also examine how to manage this information overload and how to transfer it into services and products. Examining KM in the health technology sector could enhance our knowledge and help KM progress towards academic maturity [4].

Conclusion

In this study, we examined KM’s role in health technology SMEs. We were able to define KM’s role in these enterprises. We conclude that these enterprises want to focus on their core business and that due to lack of resources KM is not fully utilized. We believe that it is essential in informatics to examine privately owned health technology enterprises because it is plausible that these enterprises will increasingly process and maintain our health information. As their role in health care grows and as technology evolves, it is essential to require these enterprises to pay more attention to KM processes in order to create, share, use, and properly manage knowledge.

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References

[4] Finnish Health Technology Association (FIHTA), Health technology trade in