

How can SMEs assess the risk of organisational knowledge?

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Abstract. Understanding how processes are executed is essential for all companies. While a certain amount of this knowledge can be explicated, a considerable amount is tacit, thus, it is in the mind of the employees. If this knowledge is not shared between organisational members knowledge loss/knowledge attrition is likely to occur. Especially SMEs have a high danger of knowledge loss as knowledge is concentrated on a limited number of individuals. To overcome this problem, we propose a risk-oriented knowledge map for SMEs. Based on the process architecture, risk of processes can be assessed. This allows identifying the knowledge risks associated with staff and thus providing the fundamental starting point for management to promote knowledge sharing as well as other knowledge management practices in the company to better cope with the danger of losing relevant knowledge.

Keywords: Organisational knowledge, Knowledge Management, SMEs, Risk evaluation

1 Introduction

Knowledge of process execution is essential for any company. But small and medium sized enterprises (SMEs) in particular often lack the capacities and time to set up a profound knowledge management system that could assist developing this understanding. This is problematic as these companies heavily rely on the knowledge of a small number of organization members [1].

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In situations in which questions/problems arise, sooner or later the organization member knowing the information is being asked, but before the person having a question wastes his/her working time and energy by asking others and/or searching through the organisation's documentation for a solution. This is not only costly [2] but it also increases the danger that organization members permanently reinvent the wheel instead of developing new knowledge. In the worst case, the firm's survivability is at risk.

SMEs typically do not have established process documentations, because either the whole organisation is still evolving, or missing time or resources keep them from establishing a systematic documentation. Additionally, it may be the case that individuals in charge are not aware of the benefits of a systematic documentation. However, at the same time people need an overview of who is working in which process, especially in firms where the processes are closely linked. Documentation is a systematic approach, a system that has to be designed and which requires people who have time for documentation. The potential of documentation, however, should not be overestimated as not everything can be documented (e.g. tacit knowledge) and thus stored. Indeed, small amounts of knowledge can be documented where necessary (explicit knowledge), but overall most of the knowledge is in the minds of the organization members (implicit and tacit knowledge) [3].

Not all knowledge is critical to organizations. Critical knowledge is typically more complex, abstract, and context dependent, so the knowledge to be retained is implicit or tacit [4]. Additionally, knowledge that has been relevant in the past may become obsolete over time or it has simply be forgotten because of time elapses [5]. Therefore, knowledge is in a constant state of change and should be continuously updated. Due to a comparably smaller number of employees, SMEs have the advantage of a reduced division of tasks within processes and thus less knowledge exchange is required between employees. However, this is also a disadvantage as knowledge may be concentrated on a limited number of employees. Those persons own a lot of knowledge but may not share it because of missing capacities and time and a feeling that they cannot gather additional knowledge outside their area of responsibility [6]. Consequently, there are key individuals who dispose of critical knowledge which in turn causes an increased danger of knowledge loss/knowledge attrition if they are not available (e.g. temporarily).

Against this background, the aim of this paper is to examine knowledge management from a knowledge at risk perspective. More precisely, the emphasis lies on knowledge risks associated with production processes. The discussion is conducted from the viewpoint of SMEs.

2 Theoretical background

2.1 Foundations of knowledge management

Knowledge can be characterized differently. For example, the distinction between explicit knowledge and tacit knowledge can be discussed [7]. Explicit knowledge consists of the means by which information is made physical, identifiable, and trans-

ferable, for example, on a compact disc or document. Explicit knowledge can be purchased, repeated, reinvented, and stolen. It dwells separately from the individual or the company. Whereas tacit knowledge “refers to the real-time, often subconscious, cognitive, or other processes that is utilized and taken for granted” [8, p. 10]. Previous experiences are combined with these processes to make a decision go forward. Despite the importance of explicit knowledge, tacit knowledge is believed to be the higher value knowledge [9], or as Haldin-Herrgard [10] regards it as the topping to reach excellence in a job. Unless shared with others, tacit knowledge dies with the individual. Tacit knowledge can be acquired through watching and replication, which often represents vocational training [11].

Kogut and Zander [12] divide knowledge into information and know-how. According to these authors, “information implies knowing what something means”, whereas know-how is “a description of knowing how to do something” (p. 386). Grant [13] discusses the types “knowing how” and “knowing about”, thereby he associates the former with tacit knowledge that is exposed through application, and the latter with explicit knowledge that is exposed through communication.

There have been some debates whether knowledge can be managed or not. Among proponents of knowledge management there is agreement that there is no single way for a firm to manage its knowledge, as the nature of the market, the intensity of competition, the firm's strategy, its product/service organization, the type of knowledge process that is emphasized, and the nature of labor the firm recruits will influence the type of knowledge management strategy suitable for the firm [14]. Based on these aspects, only a broad definition of knowledge management might be useful. Bounfour [15, p. 156] defines knowledge management “as a set of procedures, infrastructures, technical and managerial tools, designed towards creating, circulating (sharing) and leveraging information and knowledge within and around organizations”. Among the different knowledge management activities (e.g. knowledge identification, knowledge creation, knowledge dissemination etc.), it seems that knowledge creation and knowledge transfer are viewed as more important than the other activities. Markus [16], however, stresses (she talks about reuse) that the effective reuse of knowledge should take a stronger role as it is clearly associated with organizational effectiveness.

In the same vein, researchers have highlighted the link between the reuse of knowledge and developing competitive advantage [17] or in the context of innovation [18]. Consequently, one can assert that a strong consideration of existing knowledge can help firms to improve performance and thus sustain competitive advantage. Given the competitive pressure firms are facing in today's business environment, a non-utilization or waste of knowledge is not only costly [2] but also dangerous. As initiatives which are, after all, repeating already existing knowledge instead of creating new knowledge or recombining it in new ways can result in situations in which valuable resources and time are bound and thus not available to other more important business operations. Consequently, this may be damaging not only for the company concerned but also for the economy, as continuously reinventing the wheel blocks from developing. Therefore, in this paper we take a knowledge at risk perspective that is, addressing situations in which knowledge not used becomes a liability or a risk [19].

2.2 Specifics of knowledge management in SMEs

The owners' or managing-directors' centrality often found in SMEs [20] signifies that particularly these persons are responsible for the recognition of the benefits related to knowledge management as otherwise the necessary structures and systems are not supported and therefore not implemented. Additionally, day-to-day operations require high attention, resulting very often in the situation that time is missing to identify and recognise the benefit of knowledge management as well as other managerial issues [21]. This often results in situations in which knowledge is being kept in the heads of the owner and some key employees rather than physically stored [3].

Yet some SME specific characteristics speak for knowledge management implementation in SMEs. For example, employees and owner are usually close, a fact that can facilitate the flow of knowledge [22]. Additionally, informal communication and not through documentation or other written documents represents the main basis for knowledge transfer [3, 23].

The empirical studies on knowledge management practice in SMEs have indicated that they are less advanced when dealing with the topic [24, 25]. Furthermore, they are "having a more mechanistic approach to knowledge construction and relying less on social interaction" compared to large businesses [24, p. 240]. The study by Beijerse [26] showed that not a single SME had a knowledge management strategy in place. Furthermore, it appeared that the companies use a variety of instruments to evaluate, to acquire, to develop, and to share knowledge. Yet, these tools are often not considered as instruments for knowledge management. A similar result was obtained in a study conducted by Desouza and Awazu [22], they call the SMEs' way of dealing with knowledge "the humanistic way" (p. 40). Additionally, the authors found that the SMEs surveyed have a tendency to put knowledge generated immediately into practice instead of storing it. Moreover, their study stressed that smaller firms make themselves less susceptible to knowledge loss if it does not reside in the brain of only one employee. Nunes et al. [27] conducted a study that was targeted to obtain a better understanding of knowledge management awareness, perceptions, and requirements in SMEs. The results showed that these companies do not see knowledge management as a crucial function. However, even though they do not have a knowledge management strategy, guidelines and other procedures set to deal with knowledge management related issues have been observed. Additionally, the creation, storage, and dissemination of knowledge is not linked to the accessibility of appropriate IT systems. Hutchinson and Quintas [28] investigated knowledge practices in SMEs. They found that within SMEs certain processes and measures are available which indicate that they do knowledge management, but it happens mostly in an informal matter. Among the few firms having established formal knowledge management, the authors found that those interviewees themselves used the term knowledge management for their activities. Based on these insights, Hutchinson and Quintas concluded that the concept and vocabulary of knowledge management are increasingly acknowledged and applied in SMEs. Durst and Wilhelm [23], who studied how an SME cope with the danger of knowledge attrition due to personnel turnover or long-term absence, showed the influence of a precarious financial situation on activities related to knowledge management and succession planning. Even though the individuals concerned are aware of needs for improvement, their actual scope of action is centered on the execu-

tion of current orders. Wee and Chua's [29] study confirmed the central role of SME owners with regard to KM activities. Their findings also indicate that knowledge reuse is supported by close proximity of employees. These findings are in line with attributes typically associated with SMEs [20].

2.3 Importance of Risk Management in Knowledge Management

According to Bessis [30, p. 5], risks can be "defined by the adverse impact on profitability of several distinct sources of uncertainty". Risk is assumed to be calculated which displays a clear distinction to the term 'uncertainty', which cannot be calculated [31]. Risk can be divided into financial and non-financial risks. As signalled by the word 'financial', the former classification establishes a relationship with something monetary and quantifiable, whereas the latter does not. Summing up, risk management is primarily aimed at identifying, assessing, monitoring and controlling firm risks [30]. Firms should thereby focus on all types of risk and their management.

In the extant literature, it seems that knowledge is mainly discussed as something of value, i.e. an asset or a skill. Potentially negative aspects, like knowledge as a liability, apart from a few exceptions [e.g. 32, 33, 34] seem to be underestimated. Consequently, knowledge risk management (KRM) is in its infancy as well [35]. In order to address this situation, Massingham proposed a conceptual KRM model that calculates a risk score and a knowledge score. The addition of the latter is considered as a way of gaining deeper insights into the real nature of organizational risk.

Besides this promising move forward, one can determine that our discussion on knowledge is rather unbalanced. Yet companies that fail to properly manage their critical knowledge to secure its value-creation potential undergo significant risks, for example loss of expertise or reinvention of knowhow. Therefore, the need to carefully manage the downside risks of knowledge is high too. Managers and entrepreneurs cannot afford to neglect knowledge risks even though they might be more familiar with financial capital and the risks related to this asset category [19]. Given the resource constraints, an integration of a risk management approach in knowledge management activities is particularly relevant for SMEs [32].

3 Process-oriented knowledge risk map in SMEs

3.1 Overview

Business processes are essential for companies as they define how input (e.g. raw material) is transformed into output (products and services) [36]. The knowledge regarding process execution can partly be explicated and is partly tacit, i.e. within the mind of employees [37]. To determine the risk level of process-oriented knowledge, the subsequent steps have to be followed:

1. The process architecture has to be captured which describes the main connections between processes and sub-processes [38].

2. Each micro process is rated regarding its importance from a business perspective resulting in risk profiles of processes.
3. Employees possessing knowledge and explicit knowledge have to be linked to the respective processes allowing for the desired risk assessment.

3.2 Process architecture

The first step regarding the knowledge risk assessment is to identify the relevant processes, i.e. the procedural knowledge which is relevant for value creation. Processes provide the basis for assigning relevant knowledge in an organization. Nevertheless, recording processes in detail is not the objective of this step, as only the processes and their main activities are relevant for the purpose of the process architecture. The purpose of a process architecture is to describe the basic structure of an organization and the main connections between its processes and sub-processes [38]. If a significant number of processes is mapped, the illustration should comprise multiple levels. In this way, the core processes can be mapped on the top level, the more detailed processes (macro processes) on the middle level and the micro processes on the lowest level [39]. A core process can be for example “consultancy of SMEs” of a tax consultant. Macro processes of this core process can be “investment consultancy” and “tax declarations”. On the micro process level “tax declarations” can be further split into “preparing balance sheet” and “gathering documents”. The details of process execution, containing explicit work instructions, are not incorporated in the micro processes.

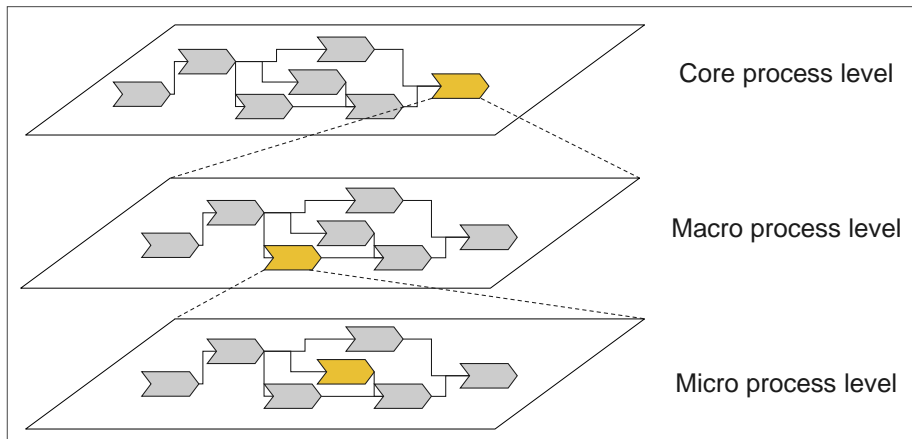


Fig. 1. Generic process architecture

Gathering the necessary information can either take place manually or electronically. In the first case, process owners have to be questioned and information has to be summarized in the above displayed structure. In the second case, electronically documented processes can be used. In such a setting, process execution is recorded by event logs which contain information on which process was executed, when and by

which employee. To set up the process architecture from such data, process mining can be applied which helps to avoid redundant and incorrect process acquisition [40].

3.3 Risk profile for processes

The second step is determining the importance of process-related knowledge. This has to be done on the micro process level and results can be aggregated on the macro and core process level. Three essential characteristics of micro processes have to be determined:

- Frequency of execution: The frequency allows evaluating how often a micro process is executed and is the first characteristic to determine importance. Using manual data, experts have to estimate the frequency or measurements have to be conducted. In the case of existing event logs, the frequency of execution of micro processes can be determined with techniques of process mining [40].
- Value added: Value added covers the cost and profit of each micro process. Activity based costing is the starting point to determine the costs for every micro process [41]. In addition, it has to be estimated how much value is added with each micro process execution. As the value might differ with products or services, this can be different for the execution within different macro processes [42]. The information about assignment of micro processes to macro processes is contained in the process architecture.
- Legal requirements: Lastly, legal requirements should be rated to identify external restrictions impacting cost of the micro processes. Importance of a micro process is enhanced if legal requirements are high and problems as well as fines can occur in case of non-conforming process execution.

Aggregating these three characteristics, risk profiles for micro processes (RPMiP) can be set up following the basic rule of multiplying the occurrence of a micro process with the value added.

Additionally, the resulting value is divided through the number of employees assigned to the process. There are three categories for assignment: Currently working in the micro process, supervising work in the micro process and having worked previously (operational or supervising) in the micro process. Employees (e) are assigned in one of the three categories to the relevant micro processes. In case of working currently in a micro process variable a is used whereas variable b is used if an employee has worked previously in the micro process but the last involvement is not older than one year.

Our formula to calculate knowledge relevant risk profiles is as follows:

$$RPMiP_x = \frac{\sum_y (Occ_{x,y} (VA_{x,y} - C_{x,y})) + (PLR_x * CLR_x)}{n(e_{x,a}) + 0.5 * n(e_{x,b})}, \quad (1)$$

$$1 \leq x \leq n(MiP), 1 \leq y \leq n(MaP)$$

Occ is the number of occurrences of a micro process, VA the value added, C the cost, PLR the probability of a legal risk, CLR the cost of a legal risk and n(MiP) is the total number of micro processes as well as n(MaP) is the total number of macro processes in which a micro process is occurring. n(e) is the number of employees being assigned to a micro process. Each micro process x receives one risk profile considering that the micro process is executed within different macro processes y.

3.4 Identification of critical organisation members

The third step is to link organisational members to micro processes. Two indicators are relevant from a risk perspective.

First, an aggregated risk score per employee is calculated, i.e. the respective RPMiP values are aggregated per employee. The aggregated risk profile formula per employee is:

$$ARPE_e = \sum_x RPMiP_{x,e}, 1 \leq e \leq n(E) \quad (2)$$

Employees (n(E) indicates the number of employees in the organisation) can be ranked according to these values, thus indicating the most critical organisation members from an aggregation point of view.

Second, it can be counted in how many cases only one employee regarding operational knowledge is available regarding specific micro processes. The number of these occurrences can be aggregated per employee, thus, employees with the highest count are more critical.

$$IRPE_e = \sum_x e \{ n(e_{x,a}) n(e_{x,b}) = 1 \text{ and } n(e_{x,b}) = 0 \}, 1 \leq e \leq n(E) \quad (3)$$

4 Discussion

The proposed process-oriented knowledge risk map has several benefits to offer. Firstly, managers and owner-managers of SMEs will obtain an in depth overview of the knowledge needed to perform the firm's business processes. This understanding will make possible a more proactive knowledge management in terms of developing and initiating training and further education of process-based knowledge and competences. On the other hand, and perhaps more critical, this understanding can help reduce risks related to the business processes, e.g. business is not disrupted in case of illness or leaving employees. Having information about process-related knowledge of critical organisation members will also provide the necessary knowledge for succession planning or contingency planning. As a consequence time and resources are gained that can be invested in business operations or strategic planning that are more relevant for the firm's organizational development. For example, the potential exit of key employees may be addressed with a reduction of individual tasks assigned to

them or with increased team or project work [43]. In order to have this kind of situation in an organization, it is important to determine the risk level of processes and the subsequent knowledge, the presented formula for calculating relevant risk profiles can help on this road.

5 Conclusions

In this paper the aim was to stress the importance of having a sufficient understanding of business processes and their execution. It was argued that this can help firms to assess the risk of knowledge loss. In view of SMEs and their specific characteristics, reducing this danger should be an area of particular interest. In order to address this topic we propose a process oriented knowledge risk map that is intended to support SMEs not only in getting a better overview of their business processes in general but also in obtaining a more fine-grained understanding of the different sub-processes and their sequences. This in turn makes visible specific areas where knowledge loss is likely to occur. Therefore, it can increase the awareness towards critical knowledge and possible costs of losing it (DeLong, 2004).

From a theoretical point of view, this study provides novel insights into the study of knowledge reuse as it draws particular attention to the downside risks of knowledge. These insights thus expand our body of knowledge regarding knowledge management in SMEs and knowledge risk management in general.

The present study also offers SMEs insights and ways of how to cope with the danger of knowledge loss in their business processes. Forward-looking SMEs that manage and distribute their process-oriented knowledge actively are those that can most successful reduce this danger.

The process oriented knowledge risk map has been developed based on a synthesis of existing literature. The present paper should therefore be viewed as a promising basis for further theorising and empirical testing. For example, an analysis of the SMEs' handling of business processes would provide a useful basis for the further development of the proposed process oriented knowledge risk map. In addition, a better understanding of SME business processes would help to develop SME-specific solutions that keep the danger of knowledge waste at a minimum. Future research may also focus on the weighting of different process specific risks.

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