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Investigation of the key success factors of knowledge management in the case of German consultancy firms

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Investigation of the key success factors of knowledge management in the case of German consultancy firms

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Abstract

This study investigated the underlying dynamics behind knowledge management and the key success factors for driving effective knowledge management within consultancy firms. For consultancy firms, knowledge is the key to competitive advantage and enduring success. This study aimed to provide a holistic view of knowledge management activities and their relationship to knowledge management success, as well as the drivers for participation in these activities. Consequently, the study first analysed knowledge management activities and their contribution to knowledge management success. It then investigated key success factors for motivating consultants to participate in these knowledge management activities. The study was conducted through a questionnaire of purposively selected managers and senior consultants at medium and large-sized German consulting firms. The results implied that knowledge management practitioners should focus their activities on codification and sharing of knowledge. To motivate consultants to participate in knowledge management activities, they should implement appropriate technology, attach the name of the creator to knowledge and encourage leaders to reward participation in knowledge management activities. Further research should focus on the relationship between knowledge creation and knowledge codification and sharing, as well as the connection between knowledge management systems and career progression in consulting firms.

Keywords: knowledge management, learning, success factors, consultancy

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Chapter 1—Introduction

1.1. Background of the study

"Knowledge itself is power"—Francis Bacon (1857)

Throughout human history, knowledge has been a source of power. Today, knowledge—and not brute strength—determine success and status in society. Over the course of the 20th century, knowledge has become more than a sociological differentiator. The means of production have moved from factories and resources to knowledge and patents. Knowledge production, or knowledge development, has become a significant result of business conduct (Fuller, 2012). This led to entire industries that were founded around the idea of creating knowledge, codifying it and making it available to others: Consulting firms (Anand et al., 2007). Knowledge management (KM) is a key concern for these firms (Guo et al., 2018). However, even the large scale of KM research has not led to a substantial breakthrough that lets practitioners fully understand the mechanics underlying organizational learning and the associated process of knowledge development in these organisations (Schwartz, 2006). There are few studies on KM in consulting firms that provide general guidance around the use of processes, people and systems to improve KM success (Ambos and Schlegelmilch, 2009; Bordia et al., 2006; Scott-Kennel and von Batenburg, 2012). However, there is no clear guidance as to which KM strategy is most promising and which key success factors should be implemented.

This motivated the author of this study, who has been a practitioner in both implementation consulting and strategy consulting firms to conduct a quantitative study of key success factors of KM. This study focused on both implementation consulting firms (e.g., Accenture, Deloitte, EY, KPMG, and Pwc) and strategy consulting firms (e.g., Bain, BCG, and McKinsey). The outcome was a framework to direct investment in KM activities (i.e., is it more valuable to focus on knowledge codification or knowledge sharing?) and a model of key success factors that will help practitioners increase the motivation of their organization to participate in KM activities. Both were meaningful additions to knowledge, as there was no quantitative study at the time of writing of this study, which had applied the full KM process to a larger sample of consulting firms.

To summarize, the study asked two questions: (1) "Which KM activities contribute to KM success from the view of relevant actors in consulting firms?" And (2) "Which factors motivate consultants to participate in KM activities?"

1.2. Justification for the study

Research shows that knowledge is an important predictor of organizational success (Bogner and Bansal, 2007). In a society that has moved away from manual labour, knowledge workers are leading organizations and creating value by employing new methods of non-routine problem solving when tackling problems and looking for solutions (Dunning, 2002). Consultancy firms are specialized in acquiring highly concentrated knowledge and providing it to organizations that lack the necessary commitment. However,

most of these companies constantly struggle to develop the required capacities to win in their target markets, as knowledge is intangible and volatile (Sveiby, 2001). This is especially relevant for companies focusing on implementation consulting whose main asset is the extensive methodology and market-specific knowledge that they sell to their customers (Birasnav, 2014; Watson and Hewett, 2006). Consequently, state-of-the-art KM is the key to success for these companies. Many companies face a frequently observed problem: Knowledge is seen as a form of currency that is excessively collected, but only very reluctantly shared, in a process that is largely out of the control of management (Wang et al., 2013). The results are largely untapped collections of highly specialized information that are kept in distributed knowledge stores throughout the company. Employees looking for knowledge for specific use cases are denied access, thus negating vast potential. Increasing KM performance will give consulting firms a significant competitive advantage (Taminiau et al., 2009). Through the outcome of this study, practitioners were given guidance to better direct their KM investments and significantly increase the output of their most valuable resource. Simultaneously, this study gave more insight into knowledge creation and innovation processes that helped shape further studies.

1.3. Aims and objectives

This study investigated the underlying dynamics behind KM in consulting firms and investigate key success factors to increase the motivation of consultants to participate in these activities. To this end, it intended to fulfil the following objectives:

a) Critically review the relevant literature on knowledge, KM, KM activities and KM success
b) Examine existing theoretical frameworks for KM and KM success factors in consulting firms and identify a suitable theoretical framework for this study
c) Create and execute a research approach to test and verify this theoretical framework against a representative sample of consulting firms in the German market
d) Provide scientific and managerial implications of this study

1.4. Research approach

The study adopted a quantitative approach heavily grounded in postpositivism. An appropriate instrument for obtaining quantitative data in management research is the survey (Bryman, 2006). Therefore, a survey was designed in alignment to the KM process research model and divided into five sections: (1) knowledge creation, (2) knowledge codification, (3) knowledge transfer, (4) innovation, and (5) demographics. The survey consisted of a combination of positive and negative questions answered on a five-point Likert scale. A five-point Likert scale was selected because it fit the context of sampled participants. This was considered suitable because extensive research conducted by Matell and Jacoby (1971) did not find any indication that a higher number of points on a Likert scale improved the statistical validity of responses.

The choice of the German context was purposive. This was because Germany had the largest consulting industry in Europe (134.000 employees within the

consulting industry) and consistently showed the strongest growth (FEACO, 2016). The expectation was that experienced consultants and their managers were more likely to have valuable insights into the KM process, especially since research has shown that knowledge sharing benefits career progression in consulting firms (Galunic et al., 2014). Consequently, the participants were purposively sampled from the shortlisted firms. The purposive sampling technique used relied on a sample of the population that best fulfilled the research goal (Teddlie and Yu, 2007). Since the goal of this research was to understand how consulting firms in Germany can maximize their KM success, the study relied on maximum variation sampling to gather data from as many different types of consulting firms as possible (Etikan et al., 2016). Appropriate candidates were selected using international career network LinkedIn and German career network Xing. This search returned 340 consultants with appropriate professional experience (> 2-4 years) and tenure within relevant consulting firms. The main advantage of this selection was that the targeted consulting firms represent both high-level strategy consulting and more operative forms of consulting, such as implementation consulting. While strategy consultants generally favour a personalized strategy, other consultants prefer codification to make use of scale effects (Hansen et al., 1999). By focussing on both groups in this purposive sample, all approaches were adequately represented.

1.5. Structure of the thesis

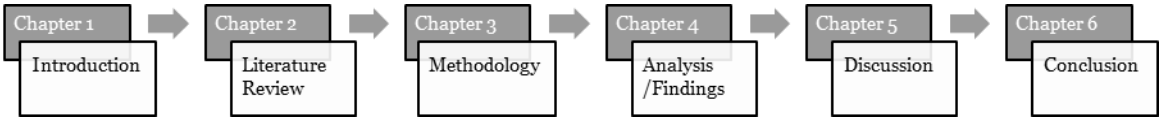


Figure 1-1 Structure of this doctoral thesis

This doctoral thesis was structured in six chapters:

Chapter 1 is the introduction, in which the background, justification, aims, research approach and structure of the thesis are laid out.

Chapter 2 is the literature review. Appropriate definitions, the frameworks for KM activities, the definition of KM success and the frameworks for KM key success factors are identified. The chapter is closed with a description of the identified research gap, the research questions and the research models that were identified from the literature.

The methodology, including the paradigm, ontology and epistemology underlying this research is described in Chapter 3. The research design, including the survey instrument, the population, the sample and the data analysis approach is contained in this chapter as well.

Analysis and findings are described in Chapter 4. The data underlying both research models and the outcome of statistical testing are presented as well.

The findings for both research models are discussed in Chapter 5. Then, the research questions that were presented in the literature review are answered.

The study is closed in Chapter 6. Managerial implications, research implication and limitations of the study are identified. Finally, the outcomes

are reconciled with the aims and objectives laid out in the beginning of the thesis.

Chapter 2—Literature Review

2.1. Introduction

KM literature has expanded exponentially since the concept was first presented. Ragab and Arisha (2013) have proposed to leverage the theory of "theoretical saturation" to simplify the analysis of KM research. This theory omits studies that add little value and focusses on articles that deliver meaningful insight to a field (Mitchell and Boyle, 2010). Following this logic, Ragab and Arisha (2013) identified five categories in KM literature. Figure 2-1 shows these categories.

Figure 2-1 KM literature categories (Ragab and Arisha, 2013)

This literature review followed these categories. It introduced the ontology of KM. The terms "knowledge" and "KM" were defined to create mutual understanding between the researcher and the reader. After the core concepts had been established, the literature review explored the concept of a KM system. This section follows the four activities that make up a KM system according to Alavi & Leidner (2001): Knowledge creation, knowledge codification, knowledge sharing and innovation. These activities served as the basis of the majority of KM research, as shown by a meta-analysis of KM literature, which found that 40% of selected KM articles published between

1997 and 2009 focused on KM processes (Serenko and Dumay, 2015). A second, larger study of articles published between 1961 and 2015 confirmed that the majority of articles followed the framework of knowledge creation, codification, sharing, and application or innovation (Gaviria-Marin et al., 2019). While the number of citations should not be seen as the confirmation of a fact, they can serve as the basis for further study (Martin, 1996).

Next, Ragab and Arisha (2013) recommended sections on "knowledge measurement" and "KM success". This literature review joined both into one section, since measurement and success are often combined in KM research (Wong, 2005). Similarly, the literature review merged the next two sections on "role of information technology" and "managerial and social issues". The literature showed that various drivers influence the success of KM, including information technology, managerial and social issues. Most authors did not differentiate between technological drivers and managerial and social issues (Martin, 2008; Mehrizi and Bontis, 2009; Wang and Noe, 2010). Furthermore, cultural drivers were frequently listed as significant variables for KM success (Javidan et al., 2005; Li and Scullion, 2006; Søndergaard et al., 2007). This literature review therefore covered four groups of drivers: cultural drivers, management drivers, social drivers and technological drivers. Managing these drivers for competitive advantage was the second-most covered topics of recent KM research (Serenko and Dumay, 2015).

The literature review then revealed the gap in the current state of KM research based on the current state of research into KM activities, KM drivers and KM success.

2.2. Ontology

2.2.1. Definition of knowledge

The nature of knowledge and knowledge creation needs to be understood to research KM. The understanding of knowledge is a central question in research, which aspires to contribute to knowledge. This section will define the concept of knowledge in detail, starting from the ancient Greek philosophers and ending with the management research of today. It intends to explore the concept of knowledge and why it is seen as one of the deciding factors for failure or success in modern management theory. This section will then give a quick overview of the different research streams that lead to the philosophical and managerial definition of knowledge. In the end, it will suggest a common definition of knowledge that will be the basis of this study.

According to Nonaka and Takeuchi (Nonaka and Takeuchi, 1995, p. 22) and Kakabadse et al. (2001), the earliest definition of the term "knowledge" stems from discussions between Plato (Robinson, 1953) and Aristotle (Ross, 1928), who defines knowledge as “justified true belief”. Schwartz (Schwartz, 2006, p. 10ff) notes that Aristotle further differentiates between *phronesis*, or self-knowledge, which is employed to conduct and facilitate social interaction, and *techne*, which describes specialized technical skillsets (Heidegger, 2003, pp. 22–29). The concept of the division of labour, which was developed by Adam Smith in the 18th century, introduced a management component to the Aristotelian view of knowledge: Workers had to be educated to perform the necessary technical tasks, making turn-over costs caused by training workers relevant to business conduct and turning workers into a capital asset

(Drucker, 2007, p. 127). These first steps in the discipline of KM are documented in the works of Taylor (1914), a “pioneer of KM” (Land, 2009), who maintained that all members of the chain of production had to be thoroughly educated about their respective responsibilities.

There is no single, unified definition of knowledge in management research, as the term is constantly redefined to include newly discovered aspects (Land, 2009). Some authors even use the terms “knowledge” and “information” indistinctly (Bartol and Srivastava, 2002). Nevertheless, since the vast majority of researchers in the field of KM segregate the terms “knowledge”, “information” and “data”, the following sections explore the differences between these concepts, beginning with the underlying definition of “knowledge” that forms the basis of KM.

Today, knowledge is the most important asset and a key success factor in an increasingly competitive globalized economy (Alavi and Leidner, 2001; Du Plessis, 2005; Halal, 1999). Possessing knowledge is a major advantage (Hall, 1993) due to an increase in innovative capabilities (Carneiro, 2000; Dove, 1999; Nonaka and Takeuchi, 1995) and enhanced organizational learning (Buckley and Carter, 2000). Knowledge production, or knowledge creation, has become a significant factor for management today (Fuller, 2012). In this context, knowledge can be defined as "information relevant to a specific context the exercise of judgment based on insight, experience, and/or theory" (Alvesson and Kärreman, 2001).

However, this definition does not account for the different types of knowledge observed in the literature. Nonaka & Takeuchi (1995) introduced the concept

of knowledge that forms the basis of currently practised KM (Kakabadse et al., 2001; Kulkarni et al., 2007). This concept is based on the aforementioned definition of knowledge as “justified true belief” (Nonaka, 1994).

Table 2-1 Knowledge dimensions (Nonaka & Takeuchi, 1995, p. 61)

According to Nonaka & Takeuchi (1995), knowledge can either be *tacit* or *explicit*, with varying manifestations. This notion is based on works from Polanyi (1967) and has been reaffirmed by many other authors (Alvesson and Kärreman, 2001; Schultze and Stabell, 2004; Tsoukas and Vladimirou, 2001). Their general understanding, which will be explained in more detail in the following paragraph, is shown in
Table 2-1.

Tacit knowledge is exclusive knowledge (Tsoukas and Vladimirou, 2001) that can only be conveyed through personal interaction between knowledge holders and not be stored in documents, manuals, or other media in its raw, subjective form. Tacit knowledge is also referred to as “personal knowledge” (Polanyi, 1967), or knowledge that is stored with individuals and which contains the exercise of judgement required to turn explicit knowledge into applicable results (Alvesson and Kärreman, 2001). An example given by Poliyani (1967) is the medical student that is confronted with an x-ray image for the first time. Before the first lecture, the x-ray image will not make sense

to the student, whereas he or she will be able to determine simple structures after gaining more experience. In the end, the explicit knowledge of the human body and the tacit knowledge of x-ray images, what one might call intuition, will work together to create usable information for the student. Since tacit knowledge is neither written down nor explicitly available, it is also referred to by the term “implied knowledge” (Wilson, 2002).

Tacit knowledge can be turned into explicit knowledge through knowledge exchange, documentation, and careful observation (Nonaka and Takeuchi, 1995). Through a combination of multiple demonstrations and repetitions of implied knowledge, the observer can develop “knowing” or “know-how”, which cannot be expressed in written documents (Cook and Brown, 1999). Every repetition, the so-called principle of “dynamic affordance” will force the knowledge recipient to adjust their performance until their knowledge of the process is equal to or even greater than that of the tutor (Cook and Brown, 1999; Sun, 2009).

However, to be transferrable, tacit knowledge needs to be explicable (Brown and Duguid, 2002; Davenport and Prusak, 1998; Dyck et al., 2005; Nonaka and Takeuchi, 1995). This notion is disputed by many authors (Sun, 2009), who believe that tacit knowledge through its very nature is indescribable and that Nonaka’s assertion that tacit knowledge can be turned into explicit knowledge is false (D’eredita and Barreto, 2006; Tsoukas, 2005; Tsoukas and Vladimirou, 2001). As tacit knowledge can only be directly transferred between two individuals, any transcription of tacit knowledge would lead to a loss of fidelity (Bhardwaj and Monin, 2006; Sun et al., 2005). Both opposing opinions can be reconciled if the multi-dimensional nature of knowledge is

considered: a knowledge element might have differing degrees of “tacitness”, as it consists of parts that can be easily explained, while others are too complicated or too deeply embedded in the individual to be transferred to others (Ambrosini and Bowman, 2001; Lam, 1997; Sun, 2009). Knowledge with a high degree of “tacitness” is defined as “implicit knowledge”.

Another description of knowledge was put forward by Kakabadse et al. (2001), who define knowledge as “information put to productive use”. In their view, knowledge means collecting data and putting that data to productive use through action, making knowledge in itself an activity in the process of knowing and acting. Kulkarni et al. (2007) on the other hand come to the conclusion that knowledge is an object that can be stored, manipulated and shared with others, following the distinction between tacit and explicit knowledge (Nonaka and Takeuchi, 1995). In the end, most authors believe that knowledge is a share-able resource (Alavi et al., 2006; Alavi and Leidner, 2001; Gubbins and Dooley, 2014; Kulkarni et al., 2007; Lipshitz et al., 2002), with some even defining it as a commodity (Spender, 1996). Many authors agree that implicit knowledge represents a major competitive advantage to an organization (Ambrosini and Bowman, 2001; Coff et al., 2006; Osterloh and Frey, 2000)—an advantage that needs to be defended against competitors (Coff et al., 2006).

By combining the different descriptions of knowledge from established KM literature, this study defines knowledge as *a multidimensional object that can be stored, manipulated and shared with others with differing degrees of difficulty while representing a strategic organizational resource that provides a substantial economic advantage in a competitive market*

(Ambrosini and Bowman, 2001; D'eredita and Barreto, 2006; Grant, 1996; Hansen et al., 1999; Kulkarni et al., 2007; Nonaka and Takeuchi, 1995; Osterloh and Frey, 2000, 2000; Spender, 1996; Tsoukas and Vladimirou, 2001).

Knowledge, or "understanding gained through experience or study; the sum or range of what has been perceived, discovered, and learned" (Alavi and Leidner, 2001; Smith, McKeen, et al., 2006) is neither data nor information. Following this explanation, data just represents facts without context. Adding context and structure to unstructured data turns it into information. Information is structured through syntax and semantics, like language (Nonaka, 1994; Shannon and Weaver, 1949). Shannon and Weaver (1949), who analyse information from a mathematical perspective, transforming natural language and internalized truth into mathematical equations, underline the importance of syntax for turning information into a universal, machine-readable truth. Nonaka (1994), one of the fathers of modern KM, on the other hand emphasizes the significance of semantics for disseminating information into knowledge, since even syntactically correct information can be useless without context that is semantically appropriate for the recipient.

Adding logical order to information and combining it with the experience and expert insight of individuals through continued use turns it into knowledge (Davenport and Prusak, 1998; Fahey and Prusak, 1998; Gunnlaugsdottir, 2003; Jones and Leonard, 2009). Gunnlaugsdottir (2003) finds that "the truth is that we are drowning in information, but we thirst for knowledge", a statement that is supported by studies that show that unstructured or semi-

structured information represents 80% of the information volume in organizations (Ferrucci and Lally, 2004; Lindvall et al., 2003).

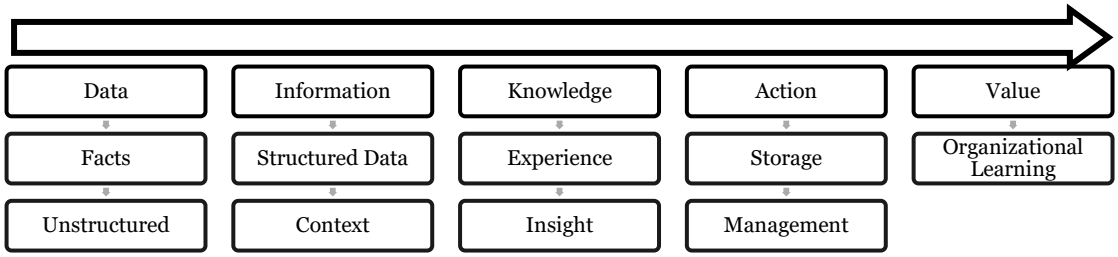


Figure 2-2 Turning data into wisdom by way of KM (Davenport & Prusak, 1998; Gunnlaugsdottir, 2003; K. Jones & Leonard, 2009; Kakabadse et al., 2001)

After knowledge has been created, it is still stored on an individual level, divided into its explicit and implicit form (Nonaka and Takeuchi, 1995). To utilize the available knowledge, it needs to be made actionable (Davenport and Prusak, 1998; Gunnlaugsdottir, 2003; Nonaka and Takeuchi, 1995), before it can be turned into value (Kakabadse et al., 2001)—a process, which is also referred to as "KM", and which will be explored in the next section.

2.2.2. Definition of KM

This section will provide a unified definition of KM, which was required for the discussions that comprise this study. Frequently, KM is defined as the generation, representation, storage, transfer, transformation, application, embedding and protecting of organizational knowledge (Hedlund, 1994). Hansen et al. (1999) postulate that the newfound value in knowledge requires a concerted effort by managers to introduce KM into their firms. KM has to structure unstructured information and make it available to the organization (Schwartz and Tauber, 2009). Since KM is a very young discipline, it is still considered to be in the pre-science stage by some (Hazlett et al., 2005; Sun,

2009). King (2009) defines KM as “the planning, organizing, motivating, and controlling of people, processes and systems in the organization to ensure that its knowledge-related assets are improved and effectively employed”. Therefore, KM is not only of interest to the scientific community, but also managers and practitioners from all fields.

Before identifying the gap in current KM literature, it is necessary to investigate the KM theories that led to the formation of KM as it is practised today. Although it is a young scientific field, KM already underwent a number of mutations, some of which fundamentally changed its underlying approach.

This section shall serve as an introduction to the modern discipline of KM by way of its predecessors, which include—among others—Wernerfelt’s “Resource-based view of the firm” and the go-to book on Japanese innovation culture, “The knowledge-creating company” by Harvard alumni Ikujiro Nonaka and Hirotaka Takeuchi. Knowledge of the permutations of KM is the key to understanding its current iteration, which enhances these ideas. While the following pages might include citations that date back ten or more years, they will always be set into context with recent findings from the field of KM. This shall create a holistic picture of the ideas that survived the test of time and enable the reader to understand how KM came to be the discipline that it is today. However, the exploration of KM requires a unified definition, which—as it turns out—is difficult, since every author follows their own meaning.

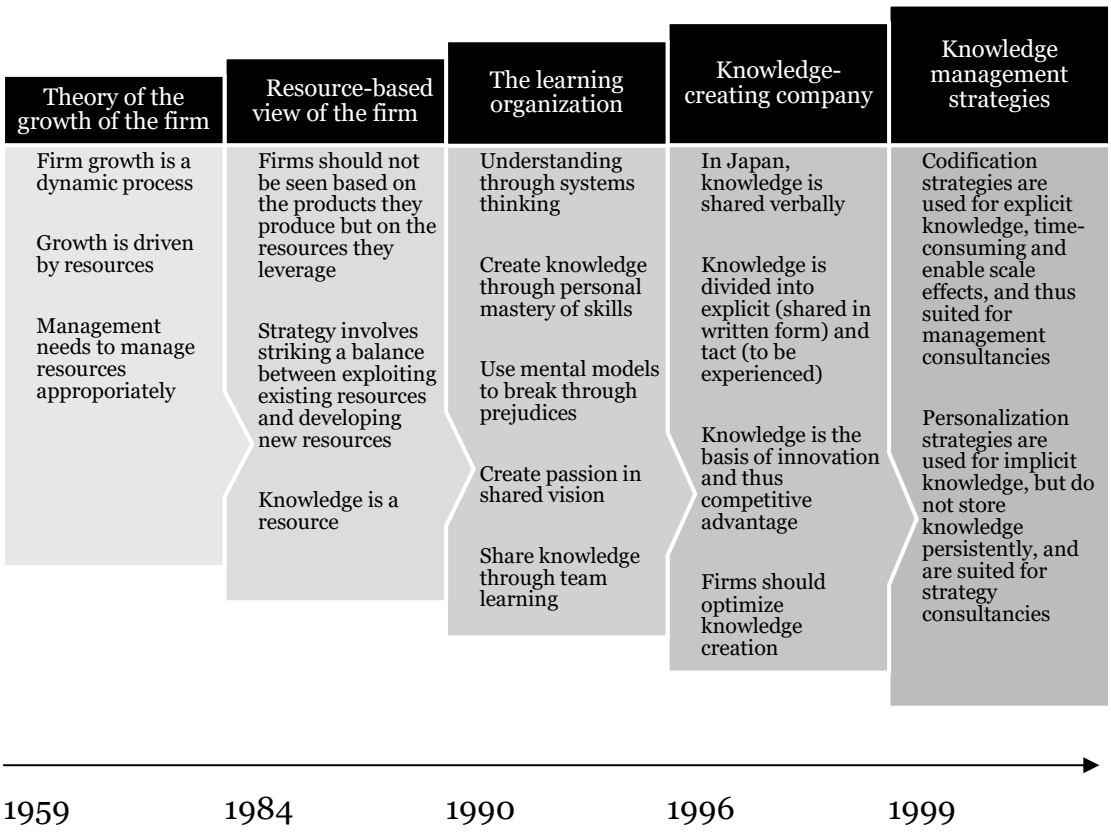


Figure 2-3 From the theory of the growth of the firm to open innovation (Hansen et al., 1999; Nonaka & Takeuchi, 1995; Penrose, 1959; Senge, 2006; Wernerfelt, 1984)

Figure 2-3 above gives an overview over the major ideas that have driven KM over the past 50 years, beginning with Penrose in 1959 and ending with Hansen et al. in 1999. This extensive literature review was not able to return any study after 1999 that added a meaningful extension to the ontology of KM.

KM is commonly traced back to the seminal work of Penrose (1959, p. 5), which describes the growth of a firm as a dynamic process that is driven by capable management, which leverages available resources as best as possible while limiting the rate of growth to ensure continuous survival of the organization. This approach was subsequently refined by focusing on different types of resources (Hall, 1993; Hitt et al., 2001; Kor and Mahoney, 2004). The process of growth is driven by the experience and knowledge of managers that

know which resources to employ in any given situation (Penrose, 1959, p. 85). This was the first occurrence of knowledge in the context of management research. At this point, knowledge itself was not seen as a finite resource, but as a supporting factor that could help with matching resources and capabilities with upcoming opportunities (Kor and Mahoney, 2004). In the end, knowledge in the context of the growth of the firm helps experienced managers to make the right investment decisions. At the same time, Penrose (1959, p. 53) distinguishes between experience and "objective knowledge". Experience, similar to the concept of tacit knowledge frequently mentioned by Nonaka and Takeuchi (1995), cannot be transmitted as it is firmly connected to its owner. It can only be shared in the form of objective knowledge.

One of the foundations of modern economic research is the mechanic behind resource allocation in firms. Penrose (1959) introduced the so-called "resource-based view" of the firm, which notes that not all resources are easily accessible, and that information is limited, forcing managers to make informed decisions with a limited amount of knowledge (Wernerfelt, 1984, 1995). She proposed to not only consider the physical resources of a firm, but also its immaterial assets. Consequently, most approaches to KM rely on the resource-based view (RBV) of the firm, a concept that was developed more than 30 years ago (Wernerfelt, 1984, 1995). The RBV defines knowledge as a resource, which is an important production factor that needs to be managed. Some authors even go as far as to define knowledge as the "primary intangible resource" for value creation (Sveiby, 2001). As immaterial assets like knowledge cannot easily be valued in absolute numbers, economists were reluctant to include them in their models (Wernerfelt, 1984). Within the RBV,

any asset that is connected permanently or semi-permanently to a firm can be classified as a resource (Clarke and Turner, 2004). This definition encompasses a wide variety of assets, from material possessions like real estate or manufacturing supplies, to technical or scientific knowledge, or even brands. According to Wernerfelt (1984), holding one of these assets gives the resource holder a distinct advantage in the market, a so-called “resource barrier”. These barriers can be expensive machinery that requires high investments from new challengers entering the market, or specialized knowledge that is difficult and costly to acquire. A common strategy to enter new markets is thus to first fully develop a resource, e.g., manufacturing knowledge, and then using that resource to open up new business opportunities by either breaching existing resource barriers or building new barriers in underdeveloped areas of the market. Resources considered in the RBV need to be (1) sufficiently scarce, (2) exceptionally valuable and (3) either impossible or very difficult to imitate and replace in order to offer a substantial and sustainable competitive advantage (Combs and Ketchen, 1999; Powell, 1992; Priem and Butler, 2001).

The introduction of the resource-based view of the firm was a significant contribution to the discipline of strategic management research (Priem and Butler, 2001; Wernerfelt, 1995). It also had immediate effect on the discipline of KM, as implicit knowledge had been directly identified as a valuable strategic resource within the context of the RBV that would lead to a competitive advantage (McAuley et al., 1997; Saviotti, 1998).

The resource-based view of the firm complements the established theory of industrial organizations, which focuses on external determinants of firm

performance, by specifically considering internal factors and the abovementioned strategic resources (Kraaijenbrink et al., 2010; Peteraf, 1993). However, there have been two main criticisms that were levered at the RBV: Its limited managerial applicability and its unclear definition of a resource (Kraaijenbrink et al., 2010; Priem and Butler, 2001). At its core, the resource-based view is a simplified description of an organisation. Wernerfelt (1984, 1995) assumes that the mere presence of a rare, valuable and inimitable resource will lead to a substantial advance within the market. This description does not specify the meaning of the term “value” in the context of strategic resources. The value of a resource is determined by the market and is subject to fluctuations, as the acquisition or dejection of a resource by a market player might lead to an arbitrary increase or decrease in its value (Priem and Butler, 2001). Furthermore, the reduction of firms to perfectly functioning mechanisms (Bromiley and Papenhausen, 2003) that operate in a neutral environment disregards the fact that organisations are living organisms with at times unpredictable or erratic behaviour (Kraaijenbrink et al., 2010).

This is especially true in the world of KM: Where knowledge of a specific information technology like corporate telephony might have been highly sought ten years ago, it has since been replaced with new technology like Voice over IP that has completely replaced its predecessor. To give practitioners a distinct advantage in developing their resource portfolio, researchers need to give a clear indication as to how, when, and where resources are valuable (Miller and Shamsie, 1996). This means going beyond the limits of the resource-based view and considering external market

influence alongside the internal perspective of the RBV (Kraaijenbrink et al., 2010).

Empirical research shows that knowledge is a competitive advantage (Galende, 2006; Theriou et al., 2014), as innovation as a core success factor is highly dependent on the knowledge and intellectual capacity available to a company (Subramaniam and Youndt, 2005). Consequently, Grant (1996) developed the so-called knowledge-based theory of the firm, which expands the resource-based view of the firm with a specific focus on knowledge resources and the knowledge economy. The underlying premise is that knowledge as a valuable resource needs to be transformed and integrated into a firm's product offering. If managers are able to increase their knowledge and the knowledge of their workers, their use of other resources is greatly improved (Darroch, 2005). Knowledge, like other strategic resources of the firm considered in the RBV, can only be transferred with differing degrees of transferability. The key question asked by Grant (1996) and the Segway to the next step of KM history is thus: How can we transfer knowledge effectively?

One step beyond knowledge sharing, organizational learning is one of the major sub-disciplines of KM and describes knowledge sharing as not only an activity between individuals, but as an organizational activity (King, 2009). In a non-learning organization, learning is a personal activity that is restricted to the individual level. All acquired knowledge is stored in the heads of individual employees and only shared with the organization irregularly. In a learning organization, it is necessary to introduce a corporate structure that not only encourages learning, but also sharing and distributing knowledge throughout the organization (Davenport and Prusak, 1998; Karkoulian et al.,

2013). In an empirical study, Karkoulian et al. (2013) show that organizational learning instruments are mutually reinforcing disciplines that have a positive influence on knowledge acquisition, knowledge sharing and knowledge utilization if implemented correctly. Their research proves that KM is a prerequisite for organizational learning, whereas organizational learning only has a distinct positive effect on KM.

It is proposed that organizations function similar to the human physiology. The organization itself can be thought of as the “hardware”, the brain, which enables the “neurons”, or the individuals working within the organization, to develop ideas, share knowledge and create innovation (Nonaka, 1994). A commonly drawn distinction is that organizational learning mainly considers knowledge sharing and transformation processes between individuals and other organizational units, while KM focusses on knowledge itself (Easterby-Smith and Lyles, 2011). Robbins et al. (2013, p. 594) define learning organizations by their “continuous capacity to adapt and change”. Successful learning organizations are known for employing so-called “double-loop learning” as opposed “single-loop learning”. Double-loop learning was developed by one of the fathers of organizational learning, Chris Argyris (1977). The premise of his theory is that all learning is triggered by the observation of an error. In double-loop learning, not only the action that lead to the error is corrected, but the entire process, its goals and underlying policies are re-evaluated to improve the system as a whole. When double-loop learning is successfully implemented, organizations can learn from their experiences and correct inefficient and erroneous organizational behaviour (Karkoulian et al., 2013; Labedz et al., 2011). This means that the KM process

is a cycle that repeats itself in self-reinforcing iterations (Garud and Kumaraswamy, 2005).

Figure 2-4 KM Cycle (Alavi & Leidner, 2001)

There are two ways to describe KM processes: In the first way, the process is described based on its outcome: It begins with newly created implicit knowledge. Explicit information is then extracted by codifying implicit knowledge and shared with employees so they can create new organizational knowledge (Jones and Leonard, 2009). Another perspective is to describe the process based on the necessary activities. According to Alavi and Leidner (2001), KM begins with knowledge creation. Newly created knowledge is then codified. Codified knowledge can be shared, and knowledge sharing leads to application of knowledge. The cycle then repeats. Extending on the original concept by Alavi and Leidner, the fourth step has been specified to refer to innovation, instead of general knowledge application (see Figure 2-4). As more recent research shows, innovation is the most value-adding application of knowledge and of integral importance to the survival of an organization (Du Plessis, 2007). According to Nonaka and Toyama (2003), the application of

knowledge into innovation is the final step of the knowledge management process. This definition of the KM process is still well-regarded and frequently cited throughout the literature, and used by many established KM authors as basis for their research (Ferreira et al., 2018; García-Holgado et al., 2015; Gaviria-Marin et al., 2019; Theriou et al., 2014).

By following a KM process, all implicit knowledge is retained in the organization, forming a collection of organizational knowledge that belongs to the organization itself and is especially valuable to large, multinational corporations, which can be classified as "knowledge networks that are engaged in knowledge transfer and construction worldwide" (Li and Scullion, 2006). Acquiring, storing, sharing and retaining knowledge should therefore be a key concern to these corporations (Argote and Miron-Spektor, 2011), as learning not only on an individual level (Nonaka, 1994), but also on different organizational levels is seen as the key to an organization's survival (Casey, 2005). According to Smith (2008), who was one of the editors at the influential journal *The Learning Organization*, the discipline of this so-called "organizational learning" is fractured and comprises many distinct and intersecting research streams. Regardless of their personal preference, all authors unanimously agree on the inherent value of knowledge and its importance to the perseverance of an organization and as a key factor of its economic growth (Drucker, 2013; Hansen and Von Oetinger, 2001). Consequently, knowledge and the associated technological skills underpin all of a firm's product and service offerings, effectively becoming the foundation of its economic success (Teece, 2004, p. 129). Furthermore, the high likelihood of losing employees (Kim, 2005)—and the knowledge they carry—

forces companies to implement knowledge sharing and collaboration to ensure that knowledge is retained by their organization (Jones and Leonard, 2009). The high cost of reacquiring knowledge and the negative effect knowledge losses have on any organization has prompted an exponential increase in KM research with more than 50% additional publications submitted per year (Ragab and Arisha, 2013).

Apart from protecting knowledge, KM needs to ensure that knowledge assets are stored efficiently and shared effectively. This will improve the creation and sharing of new knowledge objects, streamline decision making processes and positively affect organizational performance (King, 2009). To identify knowledge assets and enable their storage, KM turns implicit knowledge into implicit knowledge (Nonaka and Takeuchi, 1995), in a process that requires managers as “catalysts” (Nonaka, 1994). The existence of “catalysts” and the importance of retaining knowledge holders and the significance of inter-personal relations mean that KM processes have to rely more on social and less on technological factors than most managers assume, even though “a modern knowledge-enabled enterprise must support KM with appropriate information and communications technology” (King and Marks Jr, 2008).

In conclusion, KM will be defined as *the discipline of creating, codifying, sharing and leveraging implicit and explicit knowledge within an organization using interpersonal social networks as well as information and communication technology*.

2.3. KM activities

This section will analyse KM activities along the KM process in the context of consulting firms and identify aspects that need to be investigated to create a model of knowledge sharing performance. The structure of this section will be based on the simple KM process described in Figure 2-4. There are alternative process model, such as the more elaborate interpretation in Figure 2-5, which focuses on the eight steps of knowledge acquisition, knowledge creation, knowledge refinement, memory, transfer, sharing, and utilization, which then increases organizational performance (King, 2009).

Figure 2-5 KM process (King, 2009)

Another model extends on Alavi and Leidner (2001) by defining a process of knowledge acquisition, sharing, development, preservation and application (Raudeliuniene et al., 2018). However, these alternative process models have not been empirically tested, whereas the model developed by Alavi & Leidner (2001) has been cited more than 8000 times and is a staple of KM literature. They created a four-step process model that includes the four steps of (1)

knowledge creation, (2) knowledge codification, (3) knowledge sharing and (4) knowledge application / innovation. Due to its simplicity and general applicability, this process model will serve as the basis of this section of the literature review and guide the reader through all aspects of KM that pertain to consulting firms. Some variations of their model exchange the term "innovation" for the more general "knowledge application" (García-Holgado et al., 2015).

2.3.1. Knowledge creation

Knowledge production, or knowledge creation, has become a significant result of business conduct today (Fuller, 2012). These behaviours, which are sometimes also described as knowledge generation, include all activities that create new knowledge, which—depending on the context—is new, either to an individual, a group, an organization, or humanity as a whole (Ruggles, 2012). In most cases, knowledge creation is driven by individuals and not the organization itself. Therefore, organizations need to find ways to increase knowledge creation among their members (von Krogh et al., 2001; Nonaka, 1994).

In the 1990s, Japan was at the forefront of technological progress, with companies such as Sony, Toyota and Fujitsu being the leading innovators in a number of markets. Since knowledge is directly connected to innovation (Cassiman and Veugelers, 2006; Foo et al., 2012; Voon-Hsien Lee et al., 2013), it stands to reason that the Japanese of the 1990s would not only have been innovative, but also knowledge leaders. Consequently, KM research by

leading Japanese researchers Nonaka and Takeuchi warrants a deeper look and critical evaluation.

Conventional KM processes begin with the creation or acquisition of knowledge (Bloodgood, 2009; Foo et al., 2012; King, 2009). The knowledge, which is observed within KM as it is practiced today, is seldom the absolute truth fabled by ancient philosophy, but "justified true belief", which is rooted in the value system of the individual (Nonaka, 1994). First and foremost, individuals create knowledge by themselves (Nonaka, 1994). Organizations support knowledge creation by creating environments that are conducive to knowledge creation (Nonaka and Toyama, 2003). There are four primary modes of knowledge creation that depend on the mode of the original and the resulting knowledge: (1) implicit knowledge to implicit knowledge through socialization, (2) explicit knowledge to explicit knowledge through combination, (3) implicit knowledge to explicit knowledge through externalization, and (4) explicit knowledge to implicit knowledge through internalization (Nonaka, 1994). This study employs the more commonly used term "implicit knowledge" instead of the term "tacit knowledge", which has been favoured by Nonaka. Since the "tacit knowledge" discussed by Polanyi (1967) is defined as inexplicable and not shareable, "implicit knowledge" with a high degree of "tacitness" is a better term to describe the knowledge commonly found in consulting firms. From a practitioner's perspective, there are two examples for this "implicit knowledge" found in consulting. First, there is the knowledge of practicality and effectiveness. Just like in a manual trade, consultants are required to produce output quickly and with a high level of quality. This requires the ability to operate e.g., Microsoft Excel with

shortcuts and keyboard navigation. A skilled consultant will be able to build a financial model in far less time than a junior associate. While they are able to explain each step in the form of explicit knowledge, it will take juniors years to learn and master these skills. The other example is problem solving. Since the challenges that consultants face vary from day to day—from a cost-cutting exercise in industrial goods to a new product introduction in financial services—it is very important to develop a robust approach to problem solving and creating insight. The ability to understand a client's real problem, identify and analyse the root cause and provide a suitable solution requires years of experience, which can be trained, but not made explicit.

The first mode of knowledge creation involves the derivation of new implicit knowledge from implicit knowledge. Since it has been established that implicit knowledge cannot be transferred through a medium, it needs to be conveyed through personal interaction between individuals, as in the relationship between a cobbler and his apprentice. This process has been commonly defined as socialization (Leonardi and Bailey, 2008; Nonaka, 1994; Nonaka and Takeuchi, 1995, p. 70f; Sun, 2009). The second mode of knowledge creation involves the combination of existing explicit knowledge into new explicit knowledge, for example by combining different customer presentations from a document management system into a new presentation (Mitchell and Boyle, 2010; Nonaka, 1994). Due to the explicit nature of the underlying knowledge, no personal interaction is necessary. The third mode of knowledge creation describes the conversion of implicit knowledge into explicit knowledge. Nonaka (1994), Nonaka and Takeuchi (1995) and their scholars like Dyck et al. (Dyck et al., 2005) refer to this process as

"externalization", while other authors call it "codification" (Earl, 2001; Gammelgaard and Ritter, 2005; Hansen et al., 1999; Powell and Ambrosini, 2012). Externalization of codification is governed by way of procedures, policies and rules (Bock et al., 2006; Hall, 2006; Stenmark, 2001). The fourth and final mode of knowledge creation is the internalization of explicit knowledge to create implicit knowledge, by absorbing it in written form and applying it in practice (Nonaka, 1994; Nonaka and Takeuchi, 1995, p. 70f).

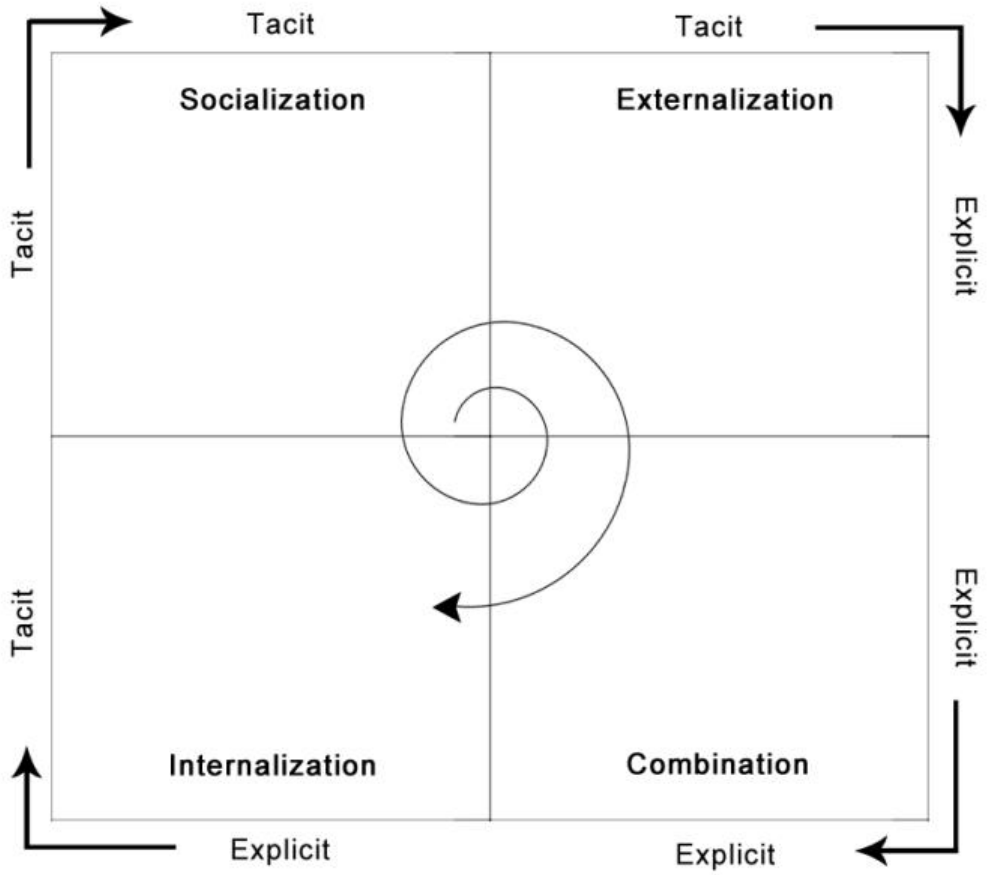


Figure 2-6 Spiral of knowledge creation (Nonaka, 1994; Nonaka & Takeuchi, 1995, p. 73)

All four forms of knowledge creation need to be balanced to enable the growth of organizational knowledge (Nonaka, 1994; Nonaka and Takeuchi, 1995, pp. 71–73). Only an equilibrium between combination, socialization,

externalization and internalization that ensures a balanced distribution of explicit and implicit knowledge within the organization ensures continuing innovation. Neglecting either the explicit or the implicit dimension deprives individuals in the organization of valuable input and reduces the creation of new knowledge, since neither socialization nor combination distribute knowledge equally (Nonaka, 1994; Nonaka and Von Krogh, 2009). Figure 2-6 shows this “spiral” model of knowledge creation, in which explicit knowledge is combined, learned as implicit knowledge, which is then shared between individuals, and finally re-encoded as explicit knowledge. According to Nonaka (1994), organizational knowledge creation begins at the individual level, scales up to the group level, and is consolidated either on an intra-organizational or inter-organizational level. This theory was tested by Dyck et al. (2005) in an empirical setting, who extended the four phase model with a fifth phase for tacit error correction, i.e., identifying and resolving misunderstandings. Even authors who oppose organizational KM like Ehin (2008) agree with its underlying assumptions.

According to Nonaka (1994), there are three prime factors that motivate members of an organization to create more knowledge: (1) intention, (2) autonomy, and (3) fluctuation. The first factor, intention, describes individuals’ relationships to their environment, and the fact that they will always react and respond to external impulses (Nonaka, 1994). Consequently, our surroundings influence how we react to the information we receive and the knowledge that we create. The second factor, autonomy, designates the independence of the individual from the organization. Members of an organization retain differing degrees of individuality, which allow them to

pursue their own dreams and ideas. The knowledge created by an individual from an anti-authoritative, independent environment will be different from the knowledge created within oppressive, restrictive organizations (Nonaka, 1994). Later research affirms the notion that a dynamic, independent team structure leads to entrepreneurship not only on a managerial, but on a team level that encourages individuals to be creative and innovative (Foss et al., 2008). More recent research shows that modern technology such as mobile access to email and instant messaging has led to a decline in autonomy. The free space required to create knowledge has been continually restricted by a constant flow of information from mobile devices (Mazmanian et al., 2013). The implications on workplace creativity and knowledge creation will be a research subject for the coming years. The third and last motivating factor for individual knowledge creation is fluctuation. Fluctuation defines the irregularities and changes we all face within our organizations that force us to constantly adapt and improve our internalized knowledge constructs to accommodate our altered environments (Nonaka, 1994). Successful organizations are characterized by refraining from random, anarchical changes and instead introduce a constant, predictable pattern of changes, defined as “order without recursiveness” by Gleick (1997). Consequently, the quality of the implicit knowledge created by an individual is improved by the variety of the tasks they perform (Nonaka, 1994; Nonaka and Toyama, 2003). Foss et al. (2008) affirm that heterogeneity is a prerequisite to the creative process. However, the authors also add that fluctuation needs to be planned and controlled in order to create complimentary variety within the organization, i.e., skillsets and knowledge bases that support and reinforce each other.

To create the best mixture of intention, autonomy and fluctuation, organizations need to create what Nonaka (1994) refers to as a “self-organizing team”. These self-organizing teams form the social reality of the individuals within the organization and are the creative space that they can use to formulate their ideas. A “self-organizing team” should also implement additional processes that automatically share the synthesized knowledge created within the team with the entire organization (Nonaka, 1994). Knowledge that is created within teams is of higher quality than knowledge created by individuals on their own, since the resources of different team members are combined into making a better, more informed decision (Robbins et al., 2013, p. 290). Unfortunately, since members of a team are usually brought together through arbitrary assignment based on job titles and hierarchy, they are not necessarily suited best for completing certain tasks. Consequently, group decisions usually take considerably longer and lack clearly defined responsibility for the decision (Robbins et al., 2013, p. 291). This led to the evolution of so-called “communities of practice” that facilitate the sharing of knowledge and collaborative problem solving between teams (Brown and Duguid, 1996; Nonaka, 1994). The examination of these concepts from a social network perspective shows that team members form strong ties that lead to an intense and productive exchange of often redundant information, whereas communities of practice usually consist of rarely enacted weak ties that share very valuable information, which has not been available to the respective team before (Brown and Duguid, 1996; Granovetter, 1983, 1973; Nonaka, 1994). Studies show that knowledge sharing behaviour in these groups is positively affected by basic needs like social interaction (Chen, 2007b), as well as self-efficacy, personal outcome

expectations and trust in the social network (Hsu et al., 2007). According to Hsu et al. (2007), group members first need to establish economy-based trust, followed by information-based trust before establishing trust in the social network.

The first of two concepts in the process of organizational knowledge creation is the introduction of “creative chaos”, which satisfies the requirement for fluctuation in routines and tasks, into the daily schedules of workers (Nonaka, 1994). On one hand, chaos is created naturally by challenges faced by the organizations that force individuals to adapt or evolve by developing new skills. On the other hand, it can also be introduced manually by managers, either through setting daunting goals or by restructuring the organization. Regardless of which way is chosen, organizational members need to be presented with a problem that they need to solve, and be given enough time to reflect on their knowledge and actions in order to be able to internalize explicit knowledge and create new concepts from it (Nonaka, 1994). Goncalo and Staw (2006) continue this idea by pointing out the importance of conflict within the creative process. According to their research, collectivistic ideals further cooperation and consequently knowledge sharing, but create a sense of complacency that stifles the creative process.

The second core concept of knowledge creation is redundancy: Unlike with processes and resources, redundancy in knowledge increases efficiency by making knowledge widely available to the organization (Nonaka, 1994; Nonaka and Takeuchi, 1995, p. 14). When individuals socialize and share their knowledge, sharing of mutually known concepts leads to a high-level discussion that focuses on differences and can lead to a combination or an

expansion of the idea at hand (Nonaka, 1994; Nonaka and Takeuchi, 1995, p. 14). Redundancy promotes mutually shared cultural values within the organization and reduces trickery and deceit between members of the organization, since withholding or even falsifying information holds no merit, if everyone is equally informed (Nonaka, 1994). Redundancy can be introduced by assigning different work streams to the same problem, creating friendly competition. While this also constitutes an inherently wasteful activity, it will create two similar but ultimately different solutions that can be merged into a much more powerful concept (Nonaka, 1994). A similar effect can be achieved by rotating individuals between teams, which not only leads to the sharing of knowledge, but also to the creation of a mutually shared perspective (Nonaka, 1994). Three case studies by Gubbins and Dooley (2014) showw that the most effective networks are those that have a cohesive core conducive to knowledge sharing and trust but continuously develop new connections on the periphery to access non-redundant knowledge. To ensure that the newly created information attains “knowledge” status, i.e., is justified true belief, quality standards and review procedures need to be introduced by management (Nonaka, 1994).

Knowledge is inherently valuable in today’s economy, as it gives companies a competitive edge over their contenders (Desouza and Evaristo, 2003; Theriou et al., 2014). This edge is most often associated with the unique property of knowledge of enabling innovation within the organization that holds it (Darroch, 2005; Davenport and Prusak, 1998; Hansen et al., 1999; Hansen and Nohria, 2004; Nonaka and Takeuchi, 1995; Voon-Hsien Lee et al., 2013). Sharing and applying knowledge is the key to generating new ideas and thus

innovation (Lin, 2007; Newell et al., 2009). Knowledge is also not only leveraged to create innovation within a company, but also shared and traded with partners to innovate in alliances (Zhang et al., 2010). Consequently, these processes become much more complex, since knowledge is not only created within the organization, but across organizations along the value chain. Organizational learning is thus an inter-organizational activity (Nonaka, 1994).

2.3.2. Knowledge codification

After knowledge has been created, it needs to be made available to other members of the organization, which can happen in many different shapes or forms. Building on the concepts of Nonaka and Takeuchi (1995), western management researchers began investigating the value of knowledge and developed strategies to share knowledge with others. There are different kinds of knowledge that require different approaches to codification. Repetitive, simple knowledge is codified either through repetition (learning by doing) or teaching of “know-how”. Heterogeneous and complex knowledge is codified through deliberate learning that not only teaches the “know-how”, but also the “know-why”, since knowledge without context may lead to incorrect understanding (Boisot and Li, 2005; Echajari and Thomas, 2015). Since the knowledge in consulting firms is heterogeneous and complex, this study will focus on the transfer of both “know-how” and “know-why”. According to Hansen et al. (1999), there are two fundamental strategies to manage and store knowledge in knowledge-heavy industries like the consulting sector: a *codification strategy* and a *personalization strategy*. While both strategies are distinct in the way they have to be implemented, they both describe

different ways to codify knowledge: codification through writing, or personalization through narration. Consequently, they are not diametrically opposed, but can be combined and mixed (Gammelgaard and Ritter, 2005) This section will discuss these strategies and more recent addendums and criticisms from KM research. Figure 2-7 shows an overview over both strategies.

Figure 2-7 KM strategies according to Hansen et al. (1999)

The starting point for these KM strategies is the fact that knowledge ownerships determines the possibility to leverage knowledge, since organizations can only utilize knowledge they possess directly—if knowledge is

possessed by an individual, it can only be used by the organization if that individual consents (Leiponen, 2006).

The first strategy, the *codification strategy*, is primarily utilized in firms that focus on providing reasonably priced technically-minded solutions to well-established problems like Accenture and the big four of accounting firms (Gammelgaard and Ritter, 2005; Hansen et al., 1999; Kim et al., 2014; Powell and Ambrosini, 2012). Since their projects usually require a formalized approach to problem solving that is delivered by a large team of specialists, they need to be able to disseminate knowledge quickly and efficiently without time-consuming human interaction. By externalizing implicit knowledge acquired during a project into explicit knowledge stored in knowledge objects in a knowledge base, these firms leverage scale effects, as knowledge that was expensively acquired once can be reused inexpensively multiple times and with great speed through the use of technology (Hansen et al., 1999; López et al., 2009). Consequently, these firms need to complete multiple similar projects to receive a return on their initial investment. A codification strategy is "techno-centred", which means that it relies on tools to codify knowledge into documents—a process, which is referred to as "people-to-documents" (Hansen et al., 1999). Employees are trained to use IT tools to store and retrieve knowledge and incentivized to create good quality knowledge assets. A codification strategy leads to high investment in IT and a comparatively low investment in people. Its advantages are its speed, since new employees do not require much training to replace their predecessors, while its disadvantages are a high reliance on IT and on the quality of produced knowledge assets (Gammelgaard and Ritter, 2005; Powell and Ambrosini,

2012). The overarching goal of a codification strategy is to codify as much implicit knowledge as possible (Hansen et al., 1999) and reuse it as often as feasible to leverage scale effects (Kankanhalli et al., 2011). Coff et al. (2006) postulate that there is a significant risk in codifying too much knowledge, as that knowledge might be made available to competitors, but are not able to support their claim with empirical research.

While a codification strategy enables scale effects, employees that try to retrieve knowledge items from a knowledge repository will be presented with longer and longer lists of structured and unstructured items (Ansari et al., 2000) that require sophisticated search strategies to find the desired information (Brajnik et al., 2002). Currently, makers and implementers of KM systems pursue two support approaches for knowledge seekers: algorithm suggestions and user recommendations (Sutanto and Jiang, 2013). Suggestions made by algorithms rely on machines that analyse knowledge in the knowledge repository. These machines struggle with discerning between factual knowledge and opinionated knowledge (Crowder and Carbone, 2011). Opinionated knowledge is not absolute truth, but much rather information without context, e.g., “Twitter is successful”. To judge the content of this information snippet, the context needs to be investigated. If the knowledge holder holds shares of Twitter, the statement could relate to a rising stock price. If, on the other hand, the knowledge holder is a market researcher, he or she could refer to an increase in market share. Instruments from mathematics and computer science like “Precisiated Natural Language (PNL)”, which extrapolate factual knowledge from opinionated knowledge, can help machines understand codified knowledge and match it to natural

language search queries (Zadeh, 2004). So if an end-user asks “Did Twitter increase market share in the past quarter?”, the aforementioned knowledge object will be retrieved because the KM system identified the correct context. To deliver this functionality, the system has to not only store the knowledge itself, but also the context of the knowledge object. There are concepts for such systems that extend stored objects with appropriate metadata (Ejigu et al., 2008).

Because of the high cost and complexity of electronically generated recommendations, many organizations have begun to embrace KM systems based on user data that help knowledge seekers retrieve the right knowledge items, since they found that their employees have been overwhelmed by the amount of knowledge made available (Poston and Speier, 2005). These algorithms, which are also implemented by internet search engines like Google, most frequently employ an approach called “collaborative filtering” (Ansari et al., 2000). This approach tracks user preferences, preferences of similar users, item ratings (if available) and metadata. If the system finds that a user tends to have a preference for specific knowledge items (e.g., training modules for accounting) or is part of a group of users that have shown this preference (e.g., new starters in the accounting department), it will list these results first. Furthermore, many systems give their users a chance to rate the knowledge items they have received, e.g., by employing a five-star rating scale. If these ratings are available, these items will be given preferential treatment in search results (Sutanto and Jiang, 2013). By employing collaborative filtering, search engines are able to retrieve applicable knowledge items without having to analyse the content of each item and performing complex

algorithms to determine the nature of the contained knowledge. However, it is still necessary to collect metadata for the knowledge item (e.g., title, type, department, etc.). Longitudinally analysing the database of an organizational KM system, Sutanto and Jiang (2013) show that a user-rating-based recommendation mechanism was embraced and valued by knowledge seekers. At the same time, this rating mechanism motivated knowledge contributors, since the sooner their knowledge posts gains comments, the more enthusiastic they will be to continue contributing knowledge items to the KM system—which is vital if the system is to grow and become an increasingly comprehensive and useful resource for the firm's knowledge seekers. To summarize: codification strategies are the only sustainable way to permanently store knowledge within the organization, but are very expensive and time-consuming to implement and hard to understand for end users. They are not suitable for organizations that rely on volatile knowledge because it might be outdated by the time it has been codified.

The competing strategy, which is favoured by strategy consulting firms, is the *personalization strategy*. In a personalization strategy, knowledge is—as the name implies—stored in its implicit form on a personalized level (Gammelgaard and Ritter, 2005; Hansen et al., 1999; Kim et al., 2014; Powell and Ambrosini, 2012). Since the challenges faced by strategy consulting firms are related to creative solutions to unique problems, following an analytical approach, their knowledge only has a limited reuse value. Consequently, individuals need to be trained to apply the analytical toolset of their firm to find solutions to unique problems. Training is delivered person-to-person through internal networks and relies heavily on incentives that reward

knowledge sharing on a personal level. According to Hansen et al. (1999), IT is only of moderate importance, as its main goal is to facilitate social networks within the organization. On the other hand, strategy consulting firms need to invest significantly more in their employees, as they rely on individuals that are highly motivated and can apply an analytical approach to problem solving. Case studies with various consultancies conducted by Powell and Ambrosini (2012) show that smaller consultant firms with a more specialized offering leverage formal and informal social networks to share highly personalized knowledge while larger firms with standardized products use a codification approach. Many firms combine these approaches and personalize market knowledge while they codify process knowledge. This way, employees receive process knowledge through codified knowledge items and valuable market knowledge through personalized knowledge sharing in social networks (Kim, 2005). While a personalization strategy is easy to implement and comparatively cost-efficient to maintain, requiring only the time needed for the actual knowledge sharing session, it incurs the significant risk of losing valuable knowledge when employees decide to leave the organization. However, since structured sharing of personalized knowledge leads to a virtuous circle that will eventually propagate a similar level of knowledge throughout the entire organization (Garud and Kumaraswamy, 2005), this risk can be countered with a structured approach to knowledge sharing. A success factor for a personalized knowledge sharing strategy is to allow employees to choose which knowledge they want to obtain (within reasonable limits) and which communities of practice they wish to join (Alavi et al., 2006). Using enterprise social networks such as Microsoft's Yammer can

further increase the positive impact on organizational learning (Qi and Chau, 2018).

Alongside the storage strategies presented by Hansen et al. (1999), which are devoted to the *type* of knowledge being managed within the strategy (either explicit or implicit), there are also strategies that focus on the *origin* of knowledge (either internal or external), as well as all combinations of these four strategies (Kim et al., 2014). The origin of knowledge is intensively researched by Menon and Pfeffer (2003). They discuss the "not-invented-here" syndrome, which automatically devalues knowledge external to the organization, even if the included idea is superior to concepts developed within the organization. At the same time, however, managers tend to reject ideas developed on the lower layers of their organization and value knowledge that they themselves obtained from competitors through weak ties (Burt, 2009, p. 26). Through a series of case studies, Menon and Pfeffer (2003) discover that internal knowledge is generally seen as less valuable than external knowledge due to its wider availability and the pressure of internal competition. On the other hand, its concrete quality is generally higher due to constant exposure to internal judgement. When applied to real-life projects, these ideas lead to two distinct approaches to KM. Practitioners can either integrate knowledge creation and distribution into their organization by building up the required capabilities, or rely entirely on the external knowledge provided by consultants to successfully complete projects with high knowledge prerequisites (Mitchell, 2006).

More recently, authors have proposed a combination of multiple strategies. While Gammelgaard and Ritter (2005) suggest a combination of

personalization and codification, Kim et al. (2014) investigate a combination of both strategy frameworks and introduce the following four dimensions: (1) external codification, (2) internal codification, (3) external personalization and (4) internal personalization. The effectiveness of these four strategies is highly dependent on the maturity of the KM infrastructure of a firm. For Kim et al. (2014), the two main determinants for said maturity are the availability of environmental knowledge and the readiness of organizational information systems—two factors, which are also discussed by Wang and Noe (2010) in their compilation of main concepts from KM and which have thus been validated against KM literature. Codification strategies are scored on both environmental fit and internal fit. Their study results suggest that codification strategies should be chosen and developed according to external and internal contexts of the target organization (Kim et al., 2014). And even though their sample was restricted to South Korea, their resources seem to be applicable to other cultural circles. Also in South Korea, Choi and Lee (2012) compare the four strategies “system-oriented”, “person-oriented”, “internal-oriented” and “external-oriented” to determine which combination has the most substantial increase on firm performance. However, their study did not discover significant advantages or disadvantages of different combinations of these strategies, but identified that a more complete implementation of a strategy is always more successful than a less complete implementation of multiple strategies

2.3.3. Knowledge sharing

According to Alavi and Leidner (2001), knowledge distribution “in organizational settings is the transfer of knowledge to locations where it is

needed and can be used". Knowledge transfer is achieved through a process called knowledge sharing, which describes the exchange of knowledge items between members of the organization (Liao et al., 2007; Nonaka, 1994). Regardless of the chosen strategy, the most important aspect of KM is to enable people to create knowledge, by giving them access to the prerequisite organizational knowledge (Nonaka, 1994; Nonaka and Takeuchi, 1995, p. 14). Many corporations have created a KM infrastructure that is largely based on KM systems and the associated processes that are supposed to leverage knowledge resources. Holsapple and Wu (2008) show in a meta study of KM award winners and publicly available financial data that organizations with a more mature KM implementation and consequently better knowledge sharing processes are consistently more profitable. Knowledge sharing is defined as the distribution of implicit and explicit knowledge with the intent of either helping others or collaborating with them to solve problems or create new ideas (Cummings, 2004; Dorsey, 2003; Wang and Noe, 2010). Wang and Noe (2010) further differentiate between knowledge sharing and the terms "knowledge transfer" and "knowledge exchange". To them, knowledge transfer describes the handover of organizational knowledge between different organizational units, while knowledge exchange, even though it has been used interchangeably with knowledge sharing (e.g., Cabrera et al., 2006), combines the dimension of active knowledge sharing with the dimension of knowledge seeking. Since the purpose of this study is the investigation of various implications on the exchange of knowledge between individuals, the terms "knowledge sharing" and "knowledge exchange" will be used without differentiation.

One of the biggest challenges in transferring implicit knowledge is its transformation into explicit knowledge (Hansen et al., 1999; Nonaka, 1994). There are three concepts for explaining implicit knowledge (1) models, (2) metaphors, and (3) analogies (Nonaka, 1994; Nonaka and Takeuchi, 1995, pp. 64–67). The most basic concept for transferring implicit knowledge is the model. Instead of, for example, explaining the operation of an engine in words, presenting a schematic or a model of the device, or a video demonstration of it in operation, could help others gain better understanding. The next concept, the metaphor, is a vital element of scientific research and has in fact been applied in the previous sentence. By using the-common process of explaining a product as a metaphor for the transfer of abstract knowledge, one can visualize the difficulty of sharing knowledge. The last concept, the analogy, is probably the most practical and easiest method to transfer new knowledge. For example, when describing a new idea for an engine, one can refer to a similar product to explain our new idea. In this example, one can assume that the recipient is familiar with how engines work in general, so explaining the differences between ordinary engines and a new engine might be sufficient to create mutual understanding. However, if the recipient of the knowledge is not familiar with this analogy and has not experienced the described concept, they will not be able to internalize the explicit knowledge or might even misunderstand it.

For consulting firms, both explicit and implicit knowledge are part of their organizational knowledge and should be shared accordingly. In consulting, explicit and implicit knowledge is tightly interwoven: While most personal, implicit knowledge can be documented and written down as organizational,

explicit knowledge, time constraints and reusability restrict documentation (Hansen et al., 1999). This means that traditional implicit knowledge that cannot be codified, such as the knowledge held by a cobbler, is rare in consulting. Implicit knowledge in consulting is mostly classified as personal knowledge that has not been shared due to time constraints. Consequently, this study will not differentiate between the sharing of implicit and explicit knowledge. Rich and Duchessi (2001) suggest measures that increase the ratio of implicit knowledge that is shared back into the organization: (1) increase the time that individuals can dedicate to KM activities, (2) increase the amount of personal knowledge sharing between employees and (3) optimize staffing for knowledge goals by combining experienced experts with new joiners. This conforms to Hinds, Patterson and Pfeffer (2001), who show that new members of an organization are better at transferring implicit knowledge to other new members of an organization, since experts have difficulties with explaining concepts that were already integrated into the body of their implicit knowledge (Nonaka, 1994). Their research is contradicted by Sié and Yakhlef (2009), who insist that experts are more eager to share their knowledge, since they are passionate about their achievements and want other to experience that passion as well. However, while Sié and Yakhlef (2009) based their qualitative research on a single case study, Hinds et al. (2001) conducted a quantitative psychological study that is more representative and supported by additional studies from other researchers.

Since Davenport and Prusak (1998) defined knowledge as a commodity and an invaluable resource in a globalized economy, the discipline of KM has inspired a multitude of management approaches. Hamel and Breen (Hamel

and Breen, 2013, pp. 59–60), however, postulate that KM that is too stringent and negatively impacts knowledge generation, supported by research that shows that knowledge workers rely on informal social networks to share and generate knowledge (Ehin, 2008; Parkhe et al., 2006). Ehin (2008) advocates relinquishing direct control over employees in favour of increased innovative capabilities.

Garavelli et al. (2004) show that knowledge sharing behaves similar to a star, emanating from a knowledge source and spreading through the organization. Depending on the strategy and form of the organization, knowledge spreads differently, as knowledge sharing is affected by different drivers. In highly networked organizations (spider's web organization), knowledge is shared quickly and thoroughly, but only on a superficial, explicit level. In flat, tightly knit organizations, such as a cobbler's workshop, knowledge spreads slowly, but in its most valuable, tacit form. Depending on the form of the organizational structure and the knowledge needs of the organization, management should therefore choose the appropriate proliferation strategy. In consulting, this means either highly personalized for small strategy boutiques, or codified for large implementers (Hansen et al., 1999).

Figure 2-8 Star model for knowledge sharing (Garavelli et al., 2004)

Even though KM programs have been initiated in many companies (Du Plessis, 2005), research shows that still about 50% fail (Malhotra, 2004). The knowledge sharing step can be perceived as the fault line in the KM process. Enabling, encouraging and sometimes even enforcing the transfer of knowledge between individuals in an organization makes or breaks successful KM (Chong, 2006; Jones and Leonard, 2009; Mitchell, 2006; Wong, 2005). This is especially true for relationships between consulting firms and their clients (Ko et al., 2005; Koh et al., 2004). Consequently, recommendations on how to maximize knowledge sharing performance are a key interest of KM research.

2.3.4. Innovation activities

The last step in the KM process is also the most important from an economic point of view. Looking back at knowledge creation, innovation is a form of internalization of explicit knowledge to create implicit knowledge (Nonaka, 1994; Nonaka and Takeuchi, 1995, p. 70f). Before discussing innovation

activities, it is important to understand the difference between knowledge creation and innovation: According to Hauschildt et al. (2016, p. 4), innovation differs from knowledge creation in that it creates new concepts and products that are of value to the organization and its clients, not just the individual that produces them. However, knowledge creation, codification and sharing are prerequisites for innovation activities (Tödtling et al., 2006). Furthermore, knowledge will increase innovation, commitment and entrepreneurship (Ehin, 2008). KM has performance-enhancing benefits on high-tech entrepreneurial ventures and should therefore be included into the entrepreneurial life cycle of discovering, evaluating, developing and commercializing products and technologies (Gaimon and Bailey, 2013).

Galende (2006) identifies and analyses five approaches from business economics and management in the context of their contribution to the understanding of organizational innovation from knowledge: (1) industrial organization, (2) transaction costs economy, (3) positive agency theory, (4) resource-based view and (5) evolutionary theory. His research shows that evolutionary theory is the most comprehensive approach. The definition of the evolutionary theory of innovation shows that innovation is a result of the knowledge and skills of a firm—knowledge and skills that are contained within the individuals that make up an organization (Galende, 2006; Hauschildt et al., 2016, p. 77).

Consequently, many KM researchers investigate the relationship between KM and innovation. There is plenty of empirical evidence that KM practices such as knowledge sharing, knowledge application and knowledge codification are positively and significantly related to technological innovation (Darroch,

2005; Liao et al., 2007; Lin, 2007; Subramaniam and Youndt, 2005; Voon-Hsien Lee et al., 2013). Explicit knowledge sharing has more significant effects on innovation speed and financial performance, while tacit knowledge sharing has more significant effects on innovation quality and operational performance (Wang and Wang, 2012).

So, if companies wish to increase their innovative capabilities they need to integrate KM into innovation strategy (Buenechea-Elberdin et al., 2018). Gulati (2007a) makes four suggestions: (1) Coordination by breaking down knowledge barriers within the organization, (2) cooperation between departments to increase knowledge sharing, (3) capability through employees with multi-domain and boundary-spanning skills and (4) connection by connecting with an external partner to access knowledge outside of the organization. The contribution of innovation to firm success is mediated by the success of KM (Foo et al., 2012; Mitchell, 2006; Voon-Hsien Lee et al., 2013). The KM approaches of organizations are either inconsistent, passive, moderate or proactive, depending on management's understanding of the concept of KM and the implemented tools and support mechanisms (Donate and Canales, 2012). Consequently, organizations should structure their KM systems proactively, with innovation activities in mind, in order to ensure a successful implementation of KM.

2.4. KM success

The end result of an effective and efficient KM process should be successful KM. The long-term benefits of successful KM are well described in the literature: Competitive advantage, increases in market share and sustainable

growth, to name a few (Nonaka, 1994; Wernerfelt, 1995). Measuring these long-term benefits and putting them in relation to the day to day operation of the KM system is very difficult. Instead, researchers and managers require alternative indicators of KM success (Kulkarni et al., 2007).

Researchers pursue two approaches to measuring KM success: process-focus and outcome-focus. Success is measured based on either actor judgement or substantive evidence. For knowledge processes, substantive evidence can be new ideas, design options, future scenarios and problem solutions, or even more tangible, patent applications, journal articles and new products (Bergman et al., 2004; Bryant, 2006; Mitchell and Boyle, 2010). For consulting firms, where knowledge is often short-lived and either process or solution oriented (Hansen and Von Oetinger, 2001), this substantive evidence will be hard to come by. This means that measurement of KM success in consulting firms must focus on actor judgements such as user perception (Kulkarni et al., 2007)

Some studies introduce numerical measures for actor judgement that assign numerical values to the quality of knowledge produced. However, studies such as Harlow (2008) only look at limited aspects of the KM process. Furthermore, many (Choi and Lee, 2003; Harold Harlow, 2008; Leiponen, 2006; Leonardi and Bailey, 2008) are based on survey data from managers that were asked to rate tacit knowledge in their employees, which—by definition—cannot be understood from the perspective of a third party (Alvesson and Kärreman, 2001; Nonaka, 1994; Schultze and Stabell, 2004; Tsoukas and Vladimirou, 2001). A study by Kulkarni et al. (2007) measured the subjective quality of knowledge received and the subjective benefit of

reusing knowledge during knowledge creation. This study was conducted with 150 managers from various organizations enrolled in MBA programs at a university in the United States and very well received in the KM research community, gathering more than 600 citations.

Common success criteria for actor-judged, subjective success criteria are the involvement in the knowledge creation process (likelihood to create knowledge) (Kulkarni et al., 2007, 2008), the willingness to reuse knowledge produced by others (Kankanhalli et al., 2011; Kulkarni et al., 2008; Watson and Hewett, 2006) and an estimation of the knowledge produced (Kankanhalli et al., 2005b; Leonardi and Bailey, 2008; Wang and Wang, 2012). However, there is no unifying set of criteria for a successful end-to-end KM process as all of these aspects are the result of studies that look at one step of the KM process (e.g., knowledge sharing) in a specific industry or setting.

To summarize: *KM success is difficult to define, as there are very few sources of substantive evidence of success in the KM process (e.g., patent applications). For consulting firms, KM success is best measured using actor judgement (e.g., satisfaction of knowledge workers). However, it is important to only question actors about their own behaviour and their own knowledge, because due to the personal nature of implicit knowledge, it is very difficult to judge the success of KM for others. There is no study that has produced a model of KM success that factors in all steps of the KM process.*

2.5. Drivers for motivation to participate in KM

In a literature review of KM literature focussed on knowledge sharing performance, Wang and Noe (2010) created a framework of five groups of factors that have been shown to motivate individuals to participate in KM the knowledge sharing process: (1) organizational context, (2) interpersonal and team characteristics, (3) cultural characteristics, (4) motivational factors, and (5) individual characteristics. Their framework is shown in Figure 2-9.

Figure 2-9 A framework of knowledge sharing research (Wang & Noe, 2010)

While these five groups are accurate and validated by past and current research, they omit an important factor: the implementation of a KM system, which has been shown to substantially increase motivation to participate in KM (Alegre et al., 2013; Bock et al., 2006; Kankanhalli et al., 2011; Sutanto and Jiang, 2013; Wang et al., 2013).

Special attention was paid to considering research findings from different cultures and industries. The analysed drivers for motivation to participate in KM were identified from research into French biotechnology (Alegre et al., 2013), Asian middle and senior management (Bock et al., 2006; Kankanhalli et al., 2011), global online knowledge networks (Sutanto and Jiang, 2013), global strategy consulting firms (Ambos and Schlegelmilch, 2009; Wang et al., 2013). The following drivers will be discussed:

a) Recognition from others
b) Monetary incentives
c) Social capital
d) Leadership support
e) Use of technology
f) Shared cultural background
g) Fear of losing power or status
h) Creator name attached

2.5.1. Recognition from others

One of the cornerstones of KM research is the learning organization. Organizational learning means that the knowledge and concepts that have been created within a team need to be converted into the “keystones of a successful organization” (Karkoulian et al., 2013)—products or system with real-world applications. According to Nonaka (1994), this process is based on internalization, or the conversion of newly created explicit knowledge into implicit knowledge. In an internalisation process, explicit market and location-specific knowledge increases in importance, while explicit

professional knowledge becomes less important. Individuals play a critical role in the organization's learning progress. Therefore, knowledge leverage mechanisms need to be introduced to explicate newly acquired tacit knowledge into organizational knowledge (Scott-Kennel and von Batenburg, 2012).

To encourage members of the organization to participate in these sharing and conversion processes, it is very important to implement the right incentives (Cooper and Lichtenstein, 2010; Siemsen et al., 2007; Sytch et al., 2011). There are two types of incentives: Extrinsic incentives such as monetary rewards, and intrinsic incentives such as recognition of others. However, authors from the field of KM rarely differentiate between monetary incentives and intrinsic rewards that are achieved through management support, praise and recognition.

Figure 2-10 Motivators and effects in KM (Nelson et al., 2006)

To address this issue, Nelson et al. (2006) created a detailed framework for motivators and effects in KM incentives schemes. According to this framework, incentives for knowledge sharing can be divided into two groups: Intrinsic incentives and extrinsic incentives. Extrinsic incentives will be discussed in section 2.5.2.

Unlike extrinsic incentives, intrinsic incentives are not directly dispensed to employees by the organization. Sun (2009) identifies three types of intrinsic incentives: strong personal connections, commitment to the organization and

individual characteristics. Building strong relationships that are formed by trust is the first major extrinsic incentive (Choi et al., 2008; Levin and Cross, 2004; Reagans and McEvily, 2003). If individuals want to strengthen their relationship with another person, they are more willing to share knowledge. Furthermore, individuals that are regarded as trusted experts within their team are not only more likely to share their extensive knowledge, but also to encourage knowledge sharing in others (Thomas-Hunt et al., 2003). Research by Wasko and Faraj (2005) did not find a statistically relevant connection between expert status and an increased willingness to share. However, later research did find a clear correlation between the value of the knowledge held by an expert and their willingness to share said knowledge (Cabrera et al., 2006; Lin, 2007), while Bordia et al. (2006) discovered that the fear of receiving negative feedback for the quality of shared knowledge stops individuals from sharing knowledge. Overall, intrinsically motivated employees are more likely to share their knowledge with the organization (Hwang et al., 2018). Consequently, *validation as a knowledge holder through recognition by the organization should be seen as a driver to motivate individuals to participate in knowledge creation, codification, sharing and innovation in consulting firms.*

2.5.2. Monetary incentives

The idea that incentives actively encourage knowledge sharing in organizations is straightforward and has consequently suggested by many researchers (Hansen et al., 1999; Nelson et al., 2006). Without suitable motivation, be it through monetary incentives or other means, it is difficult to convince individuals to contribute to knowledge sharing efforts (Ardichvili et

al., 2003; Desouza and Evaristo, 2003). This applies to interpersonal knowledge exchange, as well as digital knowledge sharing solutions. On the other hand, incentives might fill KM systems with superfluous, redundant or bloated knowledge, which can in turn lead to “errors and false truths” (Jones and Leonard, 2009). Jones and Leonard (2009) consequently suggest to implement incentive programs that are based on “quality, rather than quantity”. Other authors question the effectiveness of incentives altogether. According to a case study with a multinational service provider conducted by Cooper and Lichtenstein (2010), incentives hinder knowledge sharing performance altogether. Other authors were not able to identify positive effects of incentives on KM (Lin, 2007).

Kankanhalli et al. (2005b) have shown that extrinsic rewards such as a promotion or a monetary reward in the form of either a higher salary or a one-time payment are positively related to an individual’s willingness to share knowledge with—in this case—an electronic repository. This is in line with the idea of Hansen et al. (1999) that describes the need for hard rewards to ensure the success of knowledge sharing initiatives in two types of knowledge-intensive consulting companies. Interestingly, research has shown that extrinsic incentives not only increase individuals’ willingness to share knowledge (Gagné, 2009; Nelson et al., 2006), but also heighten the perceived usefulness of shared knowledge from electronic KM systems (Cabrera et al., 2006; Kulkarni et al., 2007). However, these notions are refuted by other studies, which indicate that extrinsic rewards for knowledge sharing trigger either indifference (Kwok and Gao, 2005; Lin, 2007) or even hostility towards the KM system (Bock et al., 2005). According to Wang and Noe (2010), these

conflicting findings might be the result of difficulties commonly faced in the design of KM research studies: a questionnaire that investigates motivators to KM cannot always account for other organizational factors and the personal inclination of the survey participant towards knowledge sharing.

While extrinsic incentives can increase knowledge sharing within an organization, managers need to beware of two risk factors that might not only nullify the effect of the incentive, but even lead to adverse effects (Osterloh and Frey, 2000). The first risk factor is the perceived value of knowledge to the source. If someone does not perceive their knowledge as valuable, but is offered a high price for it, then their suspicion might make them less likely to share knowledge. The other factor are the existing social contracts along the norm of reciprocity within the organization. If individuals have already formed social configurations with each other that compel them to either share or hide knowledge because of a social contract (e.g., being told a secret, being asked not to share information), then extrinsic rewards might interrupt these configurations and create a lasting disturbance within the organization (Rousseau and Parks, 1992; Sun, 2009).

While there is no clear consensus as to the general effectiveness of rewards on knowledge sharing, there is evidence that suggests that collective rewards trump competitive rewards when it comes to collaborating in an organization. Individuals are more likely to share information or knowledge when they are rewarded for the result of their group compared to when they are rewarded for their own personal achievement (Ferrin and Dirks, 2003). However, individuals are even more likely to share if they are incentivized through a mixture of both personal and group rewards, which not only recognize the

achievement of their group, but also their individual contribution (Siemsen et al., 2007). It should be noted that most studies investigating group dynamics are not conducted in real-world, but much rather in laboratory settings with relatively homogenous groups of research subjects. Even though there are only two studies that propose this idea, it seems sound.

To summarize: even though some authors doubt the effectiveness of extrinsic incentives, KM research has overwhelmingly shown that *extrinsic or monetary incentives are a driver to motivate individuals to participate in knowledge creation, codification, sharing and innovation in consulting firms.*

2.5.3. Social capital

Before it is possible to explore the impact social capital has on the KM process, the concept of social networks has to be defined.

The definition of social networks underlying this study is based on ideas of Granovetter (1983, 1973) and his article “The strength of weak ties”, in which he postulates that strong ties encourage individuals to collaborate and cooperate. Many authors have investigated the connection between strong ties, weak ties, and the sharing of knowledge. Strong ties are most likely to offer access to useful knowledge (Granovetter, 1973), even though they not necessarily imply a high level of trust between individuals as they might simply be a result of frequent interaction (Levin and Cross, 2004). Individuals that have a high number of connections (strong ties) and actively participate in virtual communities were found to be more likely to create and share helpful knowledge (Chen, 2007b; Chiu et al., 2006; Wasko and Faraj, 2005).

According to Hansen (1999), the quality of knowledge shared through strong ties is superior to the quality of knowledge shared through weak ties, while the reach is limited. This might have a variety of reasons: Close-knit teams of strong ties are more likely to share the same values and the same underlying knowledge base, which means that the cost of sharing knowledge within the team is reduced and the transfer itself facilitated (Levin and Cross, 2004; Nonaka, 1994; Reagans and McEvily, 2003). Research has shown that trust is imparted either through a proof of competence or benevolence by the individual (Tsai and Ghoshal, 1998), and can thus also exist between individuals connected through a weak tie. At the same time, the level of trust along a strong tie is higher than the level of trust in a weak tie, making knowledge sharing more likely (Lin, 2007; Schepers and Berg, 2006). Wang and Noe (2010) also point out that existing literature only investigates the impact of ties on a horizontal level, i.e., between equals, and not along a vertical, hierarchical level.

On the other hand, networks of strong ties usually lead to a monolithic construct of shared values, culture and knowledge that is unfavourable to knowledge creation (Nonaka, 1994). Weak ties, or connections to individuals that are not a part of the network of strong ties, can open up entirely new networks of strong ties with fresh ideas and different knowledge, which facilitates knowledge creation. To support this idea, Cross and Cummings (2004) conducted a study across industries that showed that strong and weak ties alike improve knowledge sharing and knowledge creation throughout the organization. These knowledge networks are required to efficiently distribute

knowledge throughout the organization and give individuals ample opportunities to share (McGurk and Baron, 2012).

The majority of studies in the field of KM have indirectly stipulated a knowledge symmetry between the source of the knowledge and the recipient (Sun, 2009). In these symmetric relationships, knowledge transfer is governed by the strength of the "tie" between the source and the recipient (Hansen, 1999; Ko et al., 2005; Levin and Cross, 2004). The concept of the "tie" describes the depth and intensity of the relationship between two entities and exemplifies the level of trust in a social connection. Levin and Cross (2004) and Lin (2007) have both shown that a higher level of trust in either one another's competency or one another's benevolence will make the successful transfer of knowledge more likely. Other authors have recognized that asymmetries within the knowledge transfer process exist and that the complexity (either implicit or explicit) and quality of the knowledge desired by the recipient influences the likeliness and success of the knowledge transfer beyond the strength of the underlying tie (Sun, 2009). This is especially true with the transfer of implicit knowledge, which is difficult to share and very valuable to the source. Since implicit knowledge is wholly owned by an individual, it is very challenging or even impossible to introduce organizational measures to enforce its dissemination (Osterloh and Frey, 2000). Even though the transfer of implicit knowledge cannot be enforced, there are a number of ways to motivate individuals to transfer their knowledge willingly.

The actions of an individual can be influenced by the position in their respective social networks. Every individual owns so-called "social capital",

which determines their worth to other actors in the network (Burt, 2005; Lin, 2002). Social capital is postulated to be as important as financial capital to knowledge-heavy organisations (Ehin, 2008), even though empirical research to validate this claim is missing. According to Adler and Seok-Woo (2002), social capital represents the trust and solidarity that other individuals within the network feel for an actor. Social capital is one of the most popular research subject in recent KM research (Martin, 2008). However, studies on the impact of social capital on knowledge sharing show conflicting results. Positive studies found a clear indication that the element of reciprocity in a social configuration will increase individual willingness to share if the knowledge exchange is perceived as fair by both parties (Cabrera et al., 2006; Chiu et al., 2006; Ehin, 2008; Rottman, 2008; Subramaniam and Youndt, 2005; Willem and Scarbrough, 2006). A smaller group of studies did not find any positive causation between social capital and the sharing of knowledge (Smith, Bakker, et al., 2006; Wasko and Faraj, 2005). According to Wang and Noe (2010), this might be attributed to the underlying social norms: If a culture teaches strong pro-sharing norms, it is more likely for individuals to share and spread their knowledge (Kankanhalli et al., 2005b). However, due to the overwhelming support for the positive influence of social capital on knowledge, high social capital of the knowledge seeker was listed as a determining factor for knowledge sharing. In the end, *social capital of the knowledge seeker is a driver that motivates individuals to participate in knowledge sharing in consulting firms*.

Trust, or “the willingness of a party to be vulnerable” (Mayer et al., 1995), is another driver for KM (Cooper and Lichtenstein, 2010; Gubbins and Dooley,

2014; Hsu et al., 2007; Mäkelä and Brewster, 2009). Even though technology is without a doubt a significant factor in effective KM, organizational knowledge sharing culture is even more important (David and Fahey, 2000; Nonaka, 1994), as innovative organizations tend to have similar cultures (Robbins et al., 2013, p. 593). According to Jones and Leonard (2009), innovative organizations with a collaborative culture positively affect the implementation of KM. To enable the time-intensive sharing of implicit knowledge, mutual trust is required (Nonaka, 1994). Without trust, members of an organization are reluctant to share knowledge, since they fear that they may either be relinquishing their competitive knowledge advantage (Ambrosini and Bowman, 2001; Coff et al., 2006; Osterloh and Frey, 2000) or that they might not receive a suitable return on their knowledge sharing investment (Kankanhalli et al., 2005b). However, mutual trust cannot be created on demand, since it is only formed through creating and sharing experiences with others over a prolonged period of time. After mutual trust has been established, it is important to introduce a regular dialogue between team members that encourages them to share their implicit and explicit knowledge through externalization (Nonaka, 1994). This will initiate the formation of new concepts within the team that will then be further refined in subsequent knowledge sharing sessions. Without cohesive teams that share a strong bond, collaborative knowledge sharing will be less efficient (Chiu et al., 2006; Collins and Smith, 2006; Wang and Noe, 2010; Willem and Scarbrough, 2006). In a study, Reagans and McEvily (2003) investigated the impact of social cohesion and strong support networks on individual knowledge sharing. Their research within knowledge-reliant organizations shows a clear correlation between the strength of the surrounding network

and the willingness of individuals to share valuable knowledge. Research has shown that individuals in a team with a long history and corresponding high levels of trust are more likely to share knowledge among each other (Smith, Bakker, et al., 2006). High levels of team cohesion, open communication and pleasant behaviour between team members also positively affects knowledge sharing and supports KM endeavours (Vries et al., 2006). Parise and Prusak (2006) see trust, transparency and mutual objectives as important goals in knowledge creation in alliances. Furthermore, trust and tie strength is an important predictor of innovation (Zheng, 2010).

This leads to the conclusion that trust and team membership increase knowledge creation, sharing and also innovation performance. Consequently, *trust is a driver for motivating individuals to participate in knowledge creation, sharing and innovation in consulting firms.*

2.5.4. Leadership support

The dimension of management support can be divided into two aspects: Top management support and support from supervisors and other immediate superiors. Wang and Noe (2010) identify many studies that support the notion that top management backing of KM efforts positively affects KM in an organization by increasing both the quantity and quality of shared knowledge through improved employee commitment (Connelly and Kelloway, 2003; Lee and Kim, 2006; Lin, 2007). Supervisors that actively encourage knowledge sharing and lead by example also increase knowledge sharing activity in their teams and further the organizational learning effort (Cabrera et al., 2006; Kulkarni et al., 2007). The first step in archiving an organizational culture that

is conducive to successful KM is having KM leaders that can explain the benefits and prerequisites to top management, and top management that understands and supports the KM initiative completely (Holsapple and Jones, 2007; Jones and Leonard, 2009; Lin and Lee, 2006).

To this end, Nonaka (1994) proposes a new management style called “middle-up-down management” that combines elements of top-down management with the underlying philosophy of bottom-up management and relies on middle managers to facilitate knowledge creation. While top-down management primarily leads to explicit knowledge, bottom-up organizations mainly create implicit knowledge that is stored in the heads of individuals. In middle-up-down management, middle managers act as catalysts that mediate the knowledge creation spiral by encouraging team members to either socialize, internalize, externalize, or combine knowledge (Nonaka, 1994). Consequent application of this management style would lead to a so-called “hypertext organization”, which combines distinct “contexts” that support the different steps of the knowledge creation process (Nonaka, 1994; Nonaka et al., 1992). This organization would allow knowledge workers (e.g., engineers) to work in dynamic, non-hierarchical teams that are focussed on creating and validating knowledge, while the implementers of knowledge would work in hierarchical teams that ensure an efficient division of labour. It separates the organization into individual layers that either create or disseminate knowledge.

KM is heavily influenced by the organizational context of participating firms (Kim et al., 2014). Individuals will adapt their information process capabilities and knowledge sharing styles to their organization (Turner and Makhija,

2012). This is especially true for consulting firms, who have to choose their KM strategies accordingly (Hansen et al., 1999; Scott-Kennel and von Batenburg, 2012). To this end, Argote and Miron-Spektor (2011) distinguish between the environmental, the latent organizational and the active context.

Figure 2-11 The context of organizational learning according to (Argote and Miron-Spektor, 2011)

The environmental context lies outside the organization itself and includes factors such as competitors, partners and market movements that affect the knowledge created and shared within the organization. The latent organizational content is the part of the organization that affects how members share knowledge. This latent content includes strategic aspects such as the implementation of a KM strategy, the implementation of organizational learning, KM culture and leadership styles. The active context finally is the direct interaction between members, which will be investigated in the next

section, social and team characteristics. The environmental and the latent context of organizations, will be explored in this section.

The environment of an organization has a distinct impact on its innovative performance. Organizations that focus on and collaborate with their customers or cooperate with a partner can expect higher innovation performance (Gulati, 2007a). However, successful knowledge creation in partnerships is not a given. Organizations need to establish trust with their partners, be transparent about their actions, formulate clear alliance learning objectives and manage their relationship (Parise and Prusak, 2006). Research by Sytch, Tatarynowicz and Gulati (2011), as well as Gubbins and Dooley (2014) shows that a successful implementation of partnerships will lead to so-called bridging ties that connect close-knit networks containing homogeneous, redundant knowledge with loose, open networks that enrich them with new ideas. This combination of homogenous knowledge with heterogeneous knowledge will induce innovation. For industry organizations, a similar effect can be achieved by hiring external consultants that infuse internal networks with valuable external knowledge (Nevo et al., 2007).

Research into this area for consulting firms is limited. While Hansen et al. (1999) investigate the different knowledge strategies employed by consulting firms, they only lightly touch on client relationships. While implementation consulting firms like Ernst & Young prefer to commoditize their knowledge and sell it in standardized, repeatable form, strategy consultancies like Bain & Company adapt their offering to their clients' specific needs—and command a significantly higher price point for it (Hansen et al., 1999). Consequently, their requirements for their KM systems are dictated by their external context and

chosen KM strategy (Gammelgaard and Ritter, 2005; Kim et al., 2014). A survey that is limited to a small number of Spanish managers even postulates that knowledge strategy is entirely predetermined by an organization's environment (Revilla et al., 2010).

Taking the previous points into account, namely that frequent collaboration with partners, diverse network structures with a large number of bridging ties and an influx of external knowledge have a positive influence on knowledge sharing performance and knowledge creation, it stands to reason that consulting firms with their frequent client interactions and diverse project portfolio should experience greater knowledge sharing performance.

Additionally, knowledge sharing seems to behave similar to many of the other routine activities found in today's organizations. Routines, which are commonly defined as repeatable activities that allow members of an organization to repeat tasks in the same or a similar context (Cohen et al., 1996), are themselves the result of shared knowledge that has to be learned in order to become a functioning member of the organization. In general, organic organizations that emphasize flat hierarchies and direct, flexible interaction between individuals are more successful at sharing knowledge and creating innovation (Robbins et al., 2013, p. 592). According to Smith et al. (2006) frequent interaction between individuals in an open organization correlates with knowledge sharing through observing co-workers performing their implicit knowledge (Bloodgood, 2009). Consequently, *leadership that adopts a management style that is conducive to KM acts as a driver that motivates individuals to participate in knowledge creation, codification, sharing and innovation in consulting firms.*

Unlike the environmental context, the latent organizational context is more complex since it includes a more diverse set of aspects. In KM theory, some of the most discussed aspects are the implementation of a KM strategy, the implementation of organizational learning, KM culture and leadership styles. Since the previous section about the environmental context ended with an introduction to KM strategies, these will be discussed first. Success of KM initiatives is determined by clearly formulated management goals, a business need for the KM initiative and an appropriate choice of KM strategy based on the organization's objectives and strategy (Greiner et al., 2007).

While Hansen (1999) clearly differentiates between personalization and codification strategies for consulting firms, more recent research suggests that a combination of styles might be more successful. A study conducted with strategy consultancies from the UK finds that successful firms implement a combination of personalization and codification strategies depending on the knowledge-related objective (Powell and Ambrosini, 2012). The authors consequently propose a pluralistic KM system that varies based on knowledge type and knowledge-related objective. A study from Korea supports their assumptions, proving that organizations must consider external and internal contextual factors in developing their KM strategies to maximize knowledge sharing performance (Kim et al., 2014). Another study conducted in Korea indicates that a dynamic KM style that combines both a system- and a human-oriented strategy effectively enhances performance by striking a balance between implicit and explicit knowledge (Choi and Lee, 2003). Research into the last dimension of KM strategy, namely the trade-off between internal and external knowledge acquisition shows a similar picture. A study from the

Belgian manufacturing sector shows that internal research and development and external knowledge acquisition are complementary to each other in improving innovation performance (Cassiman and Veugelers, 2006). Similar studies from the United States come to the same conclusion and advocate a mixture between internal and external knowledge acquisition (Nevo et al., 2007; Zahra and Nielsen, 2002). A study conducted in the public sector shows that having a knowledge management strategy increases achievement of key performance indicators (Laihonen and Mäntylä, 2018). However, another study undertaken with venture capital firms in the United States indicates that accessing external knowledge is more beneficial than developing internal knowledge for firms in more knowledge-intensive industries, unless the organization requires knowledge that is not available at the market and has to be developed in-house (De Clercq and Dimov, 2008). Since the focus of this thesis lies on consulting firms, which require internal knowledge to deliver proprietary solutions that are not available to their competitors, unlike the venture capital sector, which uses external knowledge to make investment decisions, it will subscribe to the predominant opinion that *leadership that implement a balanced KM strategy acts as a driver for motivating individuals to participate in knowledge creation, codification, sharing and innovation in consulting firms.*

While such a radical concept as “middle-up-down management” might not be feasible for every organization, the implementation of a KM system requires a certain level of support from both top and middle management, as companies whose management team actively leverage the KM system have been shown to have a generally better utilization of KM, even if no pervasive knowledge

sharing culture has been implemented throughout the organization (King and Marks Jr, 2008; Lin and Lee, 2006). In general, healthy organizations with satisfied employees that are motivated and committed to their employer show better knowledge sharing performance (Bock et al., 2005; Lin, 2007; Vries et al., 2006).

Contrary to expectations, management use of KM systems does not have a positive influence on KM system use within a team (Wang et al., 2013). However, since successful managers are commonly associated with competent behaviour, they can foster innovation by participating in the corresponding activities (Robbins et al., 2013, p. 592)

Alongside culture, it is expected that management support has a tangible impact on knowledge sharing. Jones and Leonard (2009) propose that innovative organizations with a collaborative culture that includes formalized KM staff with top management support that is expressed through a good communication strategy will have more success transferring implicit knowledge to organizational knowledge. One of the key success factors in knowledge sharing is employee motivation, which is best achieved through management influence (Gagné, 2009). Surveys conducted with Taiwanese executives and R&D employees prove that the organizational climate has a positive effect on knowledge sharing (Lin and Lee, 2006) and that managers directly influence knowledge sharing through rewards and their own expert knowledge, and indirectly influence knowledge sharing through coercion and policy-making (Liao, 2008). A partial-least square analysis of Korean organizations showed that KM initiatives were more mature if they were supported by top management (Lee and Kim, 2006). In general, knowledge

sharing in Asia seems to be more strongly influenced by management than by technology (Lin and Lee, 2006; Lin, 2007). The underlying reason are the collectivistic cultures that are beneficial to knowledge sharing, as individuals are less reluctant to share knowledge for the greater good and more likely to follow their manager's example (Hwang and Kim, 2007).

Results of studies conducted in Europe show similar results: A survey conducted with a large number of German project managers identified top management commitment as one of the key drivers for successful KM in temporary project organizations (Lindner and Wald, 2011). In the United States, a similar study with a federal agency finds that management control and supervision increased the amount of shared knowledge, while organizational support increased its quality—even though the use of an electronic KM system is more effective than both (King and Marks Jr, 2008).

There are also opponents to the hypothesis that top management support positively influences KM: Wang et al. (2013) analysed a large KM system with more than 80,000 employees of a strategy consulting firm and found that there was heavy bottom-up social influence across hierarchical levels, limited peer-level influence within levels, and no top-down influence. An essay by Ehin (2008) that is not supported by empirical data suggests that knowledge workers should not be managed with traditional management tools because hierarchical organisations are not suitable for innovative self-organizing environments. However, since empirical studies show that top management support influences knowledge sharing and not all organizations in a project context are capable of self-organizing, this section concludes that *leadership*

support is a driver for motivating individuals to participate in knowledge creation, codification, sharing and innovation in consulting firms.

2.5.5. Use of technology

One of the basic ideas of KM is the use of a so-called KM system (KMS). According to Alavi and Leidner (2001), KM systems are the central hub for storing, retrieving and sharing knowledge. Holsapple and Jones (2007) show that an incorrect use of technology leads to failure of the KM implementation (Kankanhalli et al., 2005b). This is closely related to the area of communication, as incomplete training efforts can lead to employees that do not fully understand the KM system. Research shows that communication errors do not only lead to distinct problems, but can create self-enforcing circles that either support or hinder KM initiatives (Garud and Kumaraswamy, 2005). Consequently, the main effort of the implementation of a KM system begins as soon as it is made available to the general public. Encouraging compliance with organizational rules, identification with the system and internalization of its underlying ideas and concepts is a key success factor of KMS implementation (Malhotra, 2004; Wang et al., 2013).

A key success factor for efficient knowledge creation and sharing is direct access to existing knowledge and information. According to Nonaka (1994), members of the organization need to know who owns which information and through whom they can access it. A KM system can help to identify knowledge holders and give others direct access and will therefore improve knowledge sharing within an organization (Chong, 2006; Watson and Hewett, 2006; Wong, 2005). According to a survey of 162 CEOs in Spain (López et al., 2009),

competency in using KM systems has a positive effect on knowledge creation, codification and sharing. Holsapple and Jones (2007) agree and affirm that knowledge creation, codification and sharing should all be supported with information systems. However, a KM system on its own will not be sufficient to drive KM success, as the quality of its content mediates its usage (Kankanhalli et al., 2005a). It is important to consider that technology progresses quicker than scientific research, therefore there will always be new advances that have not been considered in scientific literature so far (Sultan, 2013). Big data for example offers the possibility to access implicit knowledge that is distributed in documents throughout the organization and extract explicit knowledge for management to use (George et al., 2014). Similar to human intuition, machines are able to process large amounts of unstructured data and provide solutions to problems without explicating their knowledge first (Pauleen and Wang, 2017). This means that large amounts of data contain implicit knowledge. In one study, machine learning algorithms replicating human mechanisms for creating knowledge were able to process data and come up with actionable insights (He et al., 2017). These technological advantages show that *KM systems are a driver for motivating individuals to participate in knowledge creation, codification and sharing in consulting firms.*

A model created by Sun (2009) identifies two dimensions that influence tacit knowledge transfer: (1) ease of transfer and (2) motivation to transfer. He defines two mechanisms that increase ease and motivation, respectively the “mechanism of motivation” and the “mechanism of training and experiencing”. These mechanisms mean that a KM system that makes

knowledge transfers difficult for the user will require additional intrinsic or extrinsic motivation to ensure that employees are sufficiently motivated to transfer their knowledge. Figure 2-12 shows these two dimensions.

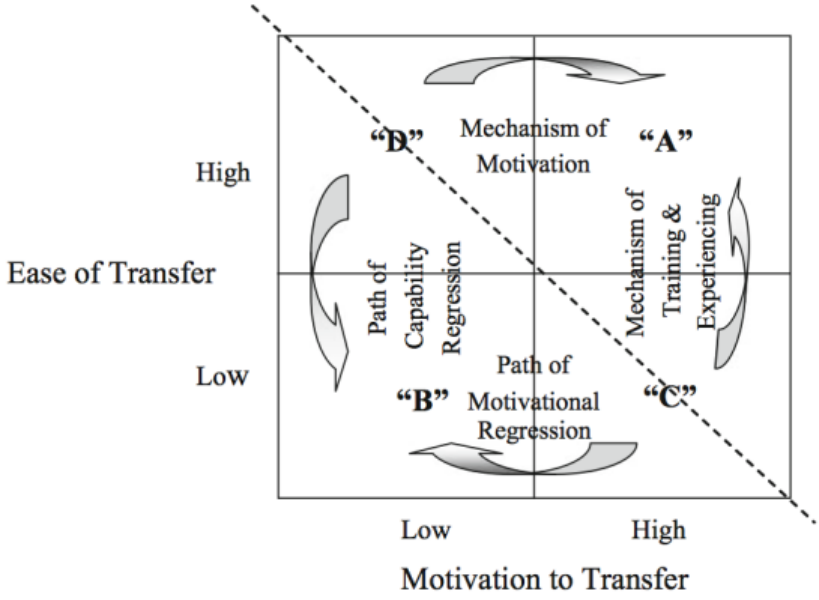


Figure 2-12 Relationship between ease of transfer and motivation to transfer (Sun, 2009)

While this model has not yet been supported through empirical field study, many researchers agree that a KM system that is easy to use has a positive effect on knowledge transfer. For example, through a survey conducted with customer service officers of a multi-national bank, Kankanhalli et al. (2011) show that the capability and accessibility of a KM system, combined with the intrinsic motivation of the individual, positively affect knowledge reuse, which in turn increases KM performance. Ease of use and reliability of the KM system increases both sharing frequency and quality (King and Marks Jr, 2008; Phang et al., 2009), while unwieldy legacy IT has a detrimental effect on knowledge utilization (Karkoulian et al., 2013). Technology-aided KM offers easier recognition of knowledge sharing activity that makes benefits

tangible for sharers. Compared to direct knowledge transfers, individuals were more likely to cite perceived benefits as a reason for sharing knowledge when using computer software (Bordia et al., 2006).

Consequently, *ease of use of KM systems is a driver for motivating individuals to participate in knowledge creation, codification, sharing and innovation activities.*

2.5.6. Shared cultural background and KM culture

Cultural characteristics should be split into two dimensions: The local culture of the individual (e.g., Chinese culture) and the culture of their organization (e.g., Silicon Valley culture). An individual that is a part of Chinese culture might act differently if integrated into a company that lives an open innovation culture. This was shown by Alavi et al. (2006) during their investigation of the impact of organizational culture on KM. Their case study of a large international IT community revealed the importance of KM as a mediator between different organizational cultures and the benefits of employing an organic approach to the growth of KM communities instead of forcing community membership onto individuals. These findings are supported by other studies (Chong, 2006; Jones et al., 2006; Lindner and Wald, 2011; Zheng, 2010). At the same time, the impact of local culture can be mitigated through organizational culture (Gagné, 2009; Mäkelä and Brewster, 2009). Common measures are the definition of common goals, the identification of cultural profiles and the introduction of relationship managers (Javidan et al., 2005). This leads King (2008) to postulate that

hereditary culture should not be considered as a mediator of KM success, as it can be overwritten through organizational culture.

One of the main limitations in knowledge exchange between different cultures is language (Ford and Chan, 2003). Language creates a blockade that effectively halts knowledge sharing. On the other hand, knowledge that is present in a commonly understood language (e.g., in English) tends to be shared more easily, while a local language can be used to protect knowledge from being shared. In an international context, knowledge sharing is not predominantly governed by the nature of the shared knowledge, but by the cultural space of both sender and recipient. Cross-border knowledge transfer is limited by (1) physical, (2) institutional, and (3) cultural distance, especially in China (Li and Scullion, 2006).

Wang and Noe (2010) emphasize the impact of cultural diversity on KM performance. On one hand, research shows that team members that consider themselves to be a minority in a homogenous team, for example because of their gender or because of their belief, were less likely to share their knowledge (Ojha, 2005). However, the study in question was restricted to an Asian setting, so its findings might not be applicable in other cultural or ethnical environments. Phillips et al. (2004) conducted a similar experiment in a laboratory setting, which compared the knowledge sharing performance of homogenous groups to the performance of heterogeneous groups. Their findings indicate that homogeneous groups perform better than heterogeneous groups with minority knowledge holders. Heterogeneous groups that are entirely composed of minorities of equal size seem to perform

just as well as homogenous groups. Consequently, homogeneity through diversity should be desirable in team composition.

Ardichvili et al. (2006) investigate cultural influences on knowledge sharing based on six factors: (1) degree of collectivism, (2) competitiveness, (3) saving face, (4) in-group orientation, (5) respect for hierarchy, (6) communication modes. The result of their qualitative study shows that the observed cultures (China, Russia, Brazil, US) do not necessarily conform to expectations. This might also be due to the sample of only 36 managers from one North American company that were interviewed as part of their case study. Another survey of 134 employees of various firms found that collaborative norms positively impact individuals' knowledge seeking behaviour (Bock et al., 2006).

Robbins et al. (2013, p. 291) use an example from American industrial giant Alcoa to illustrate the difficulty of creating cross-cultural, border-spanning teams. They found that creating shared performance goals and corresponding rewards for everyone and choosing impartial leaders that try to connect to all team members equally significantly increased team performance and team cohesion, which was supported by other studies (Algesheimer et al., 2011; Cordery et al., 2009). To sum up, *hereditary and organizational cultures are a driver for motivating individuals to participate in knowledge creation, knowledge sharing and innovation in consulting firms.*

Individuals have an underlying personality that determines their likelihood to collaborate (Lin, 2007). This personality is determined by relationships, experiences, motivation, expertise, personal and professional background

(Søndergaard et al., 2007). Common individual factors that should be considered are orientation to change, control and coordination, orientation to collaboration, telling the truth, external and internal motivation, and orientation to work. These factors were predetermined by the cultural background of observed individuals (Jones et al., 2006). Individuals that reported themselves to be more open were also found to be more willing to share knowledge with others in their organization (Cabrera et al., 2006). One of the most important individual characteristics is absorptive capacity. Cohen and Levinthal (1990) describe "absorptive capacity" as the ability "to evaluate and utilize outside knowledge", which depends on "prior knowledge" including basic skills, a shared language or more specialized knowledge of scientific or technological developments in a given field. Companies that seek to innovate have to determine, improve and leverage their absorptive capacity to generate the necessary innovation (Quinn et al., 1998). Due to the close relationship between innovation and KM (Cassiman and Veugelers, 2006; Nevo et al., 2007), absorptive capacity is an important concept in KM that is frequently cited as a key success factor for knowledge sharing (Cooper and Lichtenstein, 2010; Kwok and Gao, 2005; Liao et al., 2007).

The result of a survey with 170 Taiwanese firms shows that knowledge sharing is directly related to absorptive capacity and innovation capability (Liao et al., 2007). The researchers found that individuals are more likely to share knowledge than to collect knowledge and that there are more individuals willing to share than able to implement received knowledge and innovate. Increasing absorptive capacity would thus immediately improve knowledge sharing performance in all surveyed firms since the current excess of

knowledge cannot be absorbed by the organization. The results of this study were supported by a case study with a multi-national provider of managed services, which identified absorptive capacity as a barrier for effective knowledge sharing (Cooper and Lichtenstein, 2010).

Walczak (2005) used the term “knowledge culture” to describe the movement of analysing and introducing an organized development of intellectual capital. Successful learning organizations are defined by a knowledge culture that emphasizes learning capabilities and dynamic adaption to their environment through optimal use of knowledge assets (Karkoulian et al., 2013; Pemberton and Stonehouse, 2000). Knowledge culture is a corner stone of KM research. Implementing a knowledge sharing culture has been shown to be a key success factor in increasing knowledge sharing performance (Alavi et al., 2006; Chong, 2006; Gagné, 2009; Jones and Leonard, 2009; Kulkarni et al., 2007; Lee and Kim, 2006; Lindner and Wald, 2011; Taylor and Wright, 2004; Turner and Makhija, 2012; Wong, 2005). Knowledge sharing culture can be shaped through organisational factors, individual factors, and leadership. Knowledge sharing culture in turn determines knowledge sharing behaviours (Søndergaard et al., 2007). Consulting firms can affect and shape these factors when interacting with their clients.

Alavi et al. (2006) investigated the impact of organizational culture on KM. They postulated that organizational values drive knowledge sharing behaviour and thus knowledge outcome. Their study underlined the importance of mediating between different knowledge sharing cultures and the benefits of employing an organic approach to the growth of knowledge sharing communities instead of forcing community membership onto individuals. A

series of case studies from IT implementation projects found orientation to change, control and coordination, telling the truth, orientation to collaboration and orientation to work to be the most influential cultural dimensions. Each dimension can pose a barrier that—if overcome—has a positive influence on knowledge sharing in a project context (Jones et al., 2006). By having people work in teams, companies can increase employees' perceptions of each other, making them more likely to collaborate and consequently share knowledge (Jones and Leonard, 2009).

While most KM research agrees that knowledge sharing culture has a distinct impact on knowledge sharing performance, one author stalwartly disagrees. King (2009) demanded that culture should no longer be considered a key success factor for KM and advocates against further empirical research into the relationship between culture and KM. Since he was not able to support his claims with empirical research, this study followed the leading opinion and accepted knowledge sharing culture as a key success factor for improving knowledge sharing performance (Holsapple and Jones, 2004).

Summarily, most researchers agree that *knowledge culture is a driver for motivating individuals to participate in knowledge creation, sharing and innovation in consulting firms.*

2.5.7. Fear of losing power or status

Fear has a negative effect on KM activities. Two case studies found that fear of losing power was a major barrier to willingness to participate in knowledge codification and knowledge sharing (Cooper and Lichtenstein, 2010; Renzl, 2008). Fear is mostly about losing status and being exploited by others, i.e.,

"making a bad deal" (Ardichvili et al., 2003; Wang and Noe, 2010). Almost all of our economic actions are governed by internalized benefit and cost analyses, where we try to balance the cost of our planned activity against possible gains in respect, reputation or physical rewards (Emerson, 1976). To understand the impact of fear on KM activities, two dimensions need to be considered: Costs and benefits.

In knowledge sharing, different factors determine the cost of sharing. The first factor to consider is time. A chronic lack of time is a constant factor in many industries. Consequently, if the time required to transfer knowledge is low, knowledge sharing between individuals becomes more likely (Levinthal and March, 1993). If knowledge is easier to transfer by reducing either the time or effort required to transfer said knowledge, organizations will be able to observe increased knowledge sharing activity (Reagans and McEvily, 2003). Since transfer time is not objective, but depends on individual perceptions, managers need to make the transfer seems as short and succinct as possible (Kankanhalli et al., 2005b; Sun, 2009).

To reduce the opportunity cost for knowledge sharing, Sun (2009) gives three recommendations. The first recommendation is to break complex knowledge down into smaller pieces. Especially implicit knowledge is often a composite of multiple smaller entities that need to be separated so they can be shared effectively (D'eredita and Barreto, 2006). Unfortunately, even if knowledge has been broken up, most ideas still require a certain level of preliminary knowledge within the recipients so they can comprehend the ideas that are to be conveyed (Polanyi, 1967). Consequently, managers should create a foundation of knowledge within the organization that ensures that individuals

understand the knowledge the receive (Levin and Cross, 2004; Reagans and McEvily, 2003). This recommendation also creates an intrinsic incentive, as knowledge sharers will feel more valuable when their knowledge is received and understood by other members of the organization (Cabrera et al., 2006). The third and final recommendation given by Sun (2009) is to enable the source to transfer effectively. This can either be achieved through appropriate technology in the case of a non-personal transfer of explicit knowledge or by preparing the recipient to receive implicit knowledge in the shortest amount of time possible. This means that recipients are aware of the importance of the knowledge they are about to receive and the value of the time their sender dedicates to training them, consequently reducing the time and effort required for the transfer and motivating the sender to share through recognition and approval (D'eredita and Barreto, 2006; Tsoukas, 2005). If this effort and time investment is not reciprocated, senders are less likely to codify and share knowledge with others (Cooper and Lichtenstein, 2010).

Wang and Noe (2010) identified a research gap in our understanding of the impact of costs and benefits on knowledge sharing. According to them, informal social contracts and their relationship to individuals' willingness to share knowledge are underexplored. Especially the necessity of "social sanctions" that prohibit one-sided exploitation of organizational knowledge and the intricacies of expectancy theory and social cognitive theory in the context of KM should be investigated. In general, knowledge holders are more likely to share if they believe that their knowledge might benefit someone else than if they think of their own gain (Chiu et al., 2006; Siemsen et al., 2007; Wasko and Faraj, 2005). However, a more common response to a knowledge

sharing effort, especially in a project with an external vendor, is the fear of losing individual value by giving away valuable knowledge. If employees trust their managers, they are less afraid and thus less likely to object to the KM effort (Renzl, 2008). This leads to the conclusion that *fear of losing power and status is a driver that reduces the motivation of individuals to participate in KM activities in consulting firms.*

2.5.8. Creator name attached

Contribution to KM systems has a positive impact on career progression in consulting firms (Galunic, Sengupta, & Petriglieri, 2014). A good example for this are rating-based recommendation mechanisms: A detailed analysis of the database of an organizational KM system showed that a rating-based recommendation mechanism greatly motivated contributors (Sutanto and Jiang, 2013). The sooner their knowledge posts gained comments, the more enthusiastic they were to continue contributing knowledge items to the KMS—which is vital if the system is to grow and become an increasingly comprehensive and useful resource for the firm's knowledge seekers. Another study found that KM systems that make knowledge codification and sharing activities transparent to management were more likely to be used (Phang et al., 2009). This study was based on a sample of university students, making it less applicable to the corporate world. An older quantitative study found that individuals contribute their knowledge to improve their social standing by branding it with their name (Wasko and Faraj, 2005).

Since this is a fairly new field of research, which depends on modern technology such as cloud computing (Sultan, 2013), the number of studies

into this field is still limited. A qualitative study of consulting firms was able to show that being able to publish knowledge with their name attached motivated consultants to contribute to knowledge repositories (Ambos and Schlegelmilch, 2009)

This section showed that *codifying and sharing knowledge with their name attached motivates individuals to participate in knowledge codification and knowledge sharing in consulting firms*.

2.6. The importance of KM for consulting firms

This section intends to answer why consulting firms rely on KM more than many other industries and why successful KM is of utmost importance to the success of a consulting firm. Consulting firms are a form of professional service firm that works with clients, primarily on a project base (Hinings et al., 2006). This makes research directed at professional service firms applicable to consulting firms. Other types of professional service firms are e.g., architecture, law or accounting firms. All professional service firms share a strong reliance on specialized knowledge, so-called knowledge intensity (Greenwood et al., 2005; Starbuck, 1992). Consequently, KM is a success factor for professional service firms in project-based temporary organizations (Lindner and Wald, 2011; Mitchell, 2006). Other characteristics of professional service firms are low capital intensity and a highly professionalised workforce (von Nordenflycht, 2010).

When compared to other types of professional service firms, consulting firms rate higher on knowledge intensity. This is due to the fact that these firms often transfer knowledge to their clients, rather than a tangible result, such as

a financial report or an architectural blueprint (Hinings et al., 2006; von Nordenflycht, 2010). This makes KM especially important to consulting firms, whose success often depends on the implementation of an appropriate KM system (Greenwood et al., 2005; Hansen, 1999). The importance of KM also means that consulting firms need to choose an appropriate KM strategy to realize their ambitions (Choi and Lee, 2012).

In the past, it was generally accepted that there are two KM strategies for consulting firms: Personalization and codification strategies (Hansen, 1999). Personalization strategies focus on building a highly skilled workforce of knowledgeable individuals that operate in small teams to deliver customized solutions to clients. These are more common among senior executive and strategy consulting firms such as McKinsey, BCG and Bain. Codification strategies on the other hand create a repository of ready-made solutions that are codified in standardized operating procedures that can be quickly and efficiently applied by a large workforce of semi-skilled employees. These can typically be found within the large management consulting firms such as Accenture, and the large accounting firms.

In recent years, the lines between these types of consulting firms have begun to blur (Poulfelt et al., 2017). While strategy consulting firms continued to expand their portfolio to include implementation and operations consulting, operational management first have begun to acquire and integrate strategy consulting into their portfolio. Two recent examples are the acquisition of Monitor Consulting by Deloitte in 2013, and of Booz & Company by PricewaterhouseCoopers in 2014. Consultants across all types of consulting firms become more and more homogenous in terms of perceiving their role

and the reputation of their firm. Even consultants in very operational parts of their firms' business perceive themselves as part of a high-performance, strategy-minded organization (Harvey et al., 2017).

Løwendahl (2005, p. 132) shows that this also applies to knowledge management strategies. Strategies are not mutually exclusive and can combine multiple strategic foci, e.g., creative problem solving with larger teams controlled by strict operating procedures. However, quantitative research shows that the consistent implementation of a single strategy will be more successful than a combination of multiple strategies (Choi and Lee, 2012).

The research cited in this section has shown that consulting is a knowledge-intensive industry and that consulting firms require institutionalized KM to succeed. This made them the ideal subject for this study. Due to industry consolidation and the changing nature of consulting firms, which move from specialization on one business model towards a combination of business models, this study will not differentiate between different types of consulting firms.

2.7. Research gap

Before discussing the content of the literature, methodological limitations of KM research will be discussed. 42% of analysed articles based their findings on a quantitative survey. 20% of analysed articles based their findings on qualitative research, such as a case study. This means that 38% of articles did not have strong data underpinning their findings. Most quantitative research (40%) was conducted in Asia—almost double the amount of research conducted in Europe and North America. This means that KM research would benefit from a quantitative study based on a strong data set comprised of European or North American firms.

The literature review has shown that there is a clear definition of a KM process. Each of the activities of the KM process is required to implement a successful KM system. The motivation to participate in each KM activity is in turn influenced by certain drivers from different categories. There has been an extensive amount of research into knowledge creation, knowledge codification, knowledge transfer, and knowledge application—separately. There was no comprehensive study that investigated all activities of the KM process and their relationship to KM success. Furthermore, there was no study that investigated the drivers that affect these KM activities in the context of the organizations that are entirely dependent on successful KM—consulting firms. To simplify the presentation of results, KM drivers were grouped into four groups: Recognition from others, social capital and fear of losing power or status were grouped under *social drivers*. Monetary incentives and leadership support were grouped under *management drivers*.

Use of technology and having my named attached were grouped under *technology drivers*. Culture finally was retained as *cultural drivers*.

Table 2-2 Studies grouped by investigated activities and investigated drivers

		Number of investigated KM activities				
		0	1	2	3	4
Number of investigated drivers	0	12	19	4	1	9
	1	5	72	13	3	2
	2	1	22	4	0	0
	3	1	7	1	0	0
	4	0	3	0	0	0

Table 2-2 shows the distribution of investigated activities and investigated drivers in the studies that formed the main body of this literature review (179 studies). No study investigated all four activities of the KM process as well as all four groups of success drivers. The most common combination was the relationship between one activity and one driver group, e.g., the relationship between knowledge sharing and social drivers. This meant that these studies only produced a partial recommendation for attaining KM success, since drivers that positively affected one activity within the KM process might have been detrimental to another activity.

Table 2-3 Studies grouped by investigated combinations of activities and drivers

		KM activities			
		Creation	Codification	Sharing	Innovation
KM driver groups	Culture	2	1	20	4
	Management	13	10	36	6
	Social	4	6	57	10
	Technology	3	4	25	4

Table 2-3 lists the most common combinations of activities and drivers from a content perspective. This table shows only combinations. If a study investigated an activity and no associated drivers, it was not listed. The total number of combinations was higher than the number of studies in the literature review because some studies contained more than one combination. The analysis showed that contemporary KM literature predominantly focussed on sharing and social factors and neglected other aspects of KM. This meant that there was an urgent need for a comprehensive study that not only focussed on a particular problem, but took a holistic perspective of all KM activities. This study therefore intended to fill the following gaps:

- Comprehensively analyse the activities in the KM process and determine their relationship to KM success
- Test the drivers identified across various industries and determine which impact motivation to participate in KM activities, and to what extent
- Perform this investigation in the context of firms that are dependent on KM—consulting firms

The variety of models in the literature and the distinct lack of empirical research into the relationship between all KM activities and KM success made these gaps viable, of interest to the KM research community, to practitioners in the field, and a valuable addition to the existing body of knowledge.

To bridge the gaps between KM activities, KM success and effectiveness drivers, this study answered two research questions:

(1) Which KM activities contribute to the overall success of KM in consulting firms?

(2) Which factors motivate consultants to participate in KM activities?

To answer these questions, this study created two models. The first model described the relationship between KM process activities and overall KM success. The second model described the relationship between the drivers motivating individuals to participate in KM activities and overall motivation to participate in KM. The next section will discuss both models in detail.

2.8. Research models

This section will describe the research models for KM activities in consulting firms while considering the KM drivers discussed in the literature review. Two models closed the gaps between the KM process and KM success, as well as between KM participation drivers and overall motivation to participate in KM. These models should be seen as abstract representations of reality, not reality itself. They will not behave exactly like reality, but will provide a reliable and valid estimation of it.

2.8.1. Research model for influence of KM activities on KM success (Research question 1)

In KM literature, the generic KM process was broken down into four distinct process steps (Alavi and Leidner, 2001; Bartol and Srivastava, 2002; Ko et al., 2005; Nonaka and Von Krogh, 2009; Riege, 2005; Wong, 2005). Explaining each step will give a holistic understanding of the process:

Knowledge creation: The addition of new components to an organization's tacit and explicit knowledge (Nonaka, 1994)

Knowledge codification: The codification of knowledge into a format that can be understood by other members of the organization, the inclusion of knowledge in the organization's permanent memory and the facilitation of the retrieval of specific knowledge from this memory (Argote and Miron-Spektor, 2011)

Knowledge transfer: The formal or informal transfer of knowledge between the organization and its members or directly between members of the organization, also called knowledge sharing (Wang and Noe, 2010)

Innovation activities: Creating competitive advantage through the application of knowledge (Huggins and Johnston, 2010; Lin, 2007).

KM success: KM success will be defined as actor judgement of successful KM based on measures used in other studies (Choi and Lee, 2003; Harold Harlow, 2008; Leiponen, 2006; Leonardi and Bailey, 2008).

To maximize economic success, consulting firms must optimize their KM processes. Good KM processes are measured by the amount of new knowledge created, the willingness to reuse knowledge produced by others and the quality of the knowledge available to the organisation (Kankanhalli et al., 2005b; Kulkarni et al., 2007, 2008; Leonardi and Bailey, 2008; Wang and Wang, 2012). However, KM functions in consulting firms require guidance to determine which KM activities they should focus on. Consequently, the

relationship between KM activities and KM success needs to be investigated to answer research question 1.

According to the literature, there are various variables that can influence respondents' perception of both KM activities and KM success. This study therefore had to control for these variables.

Firm size: Larger firms should be more likely to invest in codification (Hansen, 1999), and perform better at innovation activities (Zheng et al., 2010), whereas smaller firms would be more likely to invest in sharing (Hansen, 1999; Huggins and Johnston, 2010).

International orientation: International firms should choose a different approach to KM strategies that involves more codification elements than interpersonal knowledge transfer (Gammelgaard and Ritter, 2005; Mäkelä and Brewster, 2009; Zhang et al., 2010).

Experience of the respondent: Senior managers have different expectations towards KM systems and interact with them in a different way (Galunic et al., 2014; Liao, 2008)

Knowledge creation is the first process step in the KM process (Alavi and Leidner, 2001). According to Mitchell and Boyle (2010), knowledge creation is measured as (1) activities that generate new ideas, (2) new ideas that enrich existing knowledge, or (3) existing knowledge that is transformed into new products, services and systems. Optimizing knowledge creation is a very important step in ensuring KM success. While it is possible to obtain knowledge on the free market, e.g., by acquiring competitors, hiring new

employees or bringing in an external service providers (Cassiman and Veugelers, 2006; De Clercq and Dimov, 2008; Nevo et al., 2007; Zahra and Nielsen, 2002), internal knowledge creation is still one of the most important success factors for innovation (Alegre et al., 2013; Harold Harlow, 2008; Li et al., 2010, 2010). In their book "The knowledge-creating company", one of the most frequently cited sources in KM research, Nonaka and Takeuchi (1995) analysed the way Japanese companies succeed at KM. They find that knowledge creation is an iterative process that begins with a small spark of tacit knowledge that is then reiterated until a shippable idea is formed (Nonaka and Takeuchi, 1995, p. 73). This process has been tested and confirmed in empirical studies (Dyck et al., 2005; Zhang et al., 2010). Therefore, this study assumes the hypothesis:

H1: Successful knowledge creation has a positive influence on overall KM success in consulting firms

After its creation, knowledge exists in an intangible, tacit form. This so-called implicit knowledge needs to be encoded in its explicit form and stored either physically in data bases or documents, or transferred orally to make it available to knowledge seekers (Alavi and Leidner, 2001; King, 2009; Oshri et al., 2008). Since knowledge creation depends on receiving and then recombining existing knowledge, knowledge codification is a significant factor for KM success as well as positively and significantly related to technological innovation (Gaimon and Bailey, 2013; Voon-Hsien Lee et al., 2013). This leads to the following hypothesis:

H2: Successful knowledge codification has a positive influence on overall KM success in consulting firms

Similar to semi-finished products along the supply chain, knowledge that has been created and stored is not useful to the organization without proper utilization. To utilize knowledge, organizations need to share and transfer it among their members. Many studies showed that knowledge sharing—or knowledge transfer—is directly related to the innovation capability of a firm (Harold Harlow, 2008; King, 2009; Liao et al., 2007; Nonaka and Takeuchi, 1995, pp. 70–72; Voon-Hsien Lee et al., 2013). Other studies showed that knowledge sharing positively affects financial performance (Zack et al., 2009) and individual career success, especially in consulting firms (Galunic et al., 2014). These findings supported the following hypothesis:

H3: Successful knowledge transfer has a positive influence on overall KM success in consulting firms

The last factor influencing KM success is innovation. Innovation makes the effects of KM tangible by turning knowledge into a product that has a direct effect on an organization. Innovation is directly related to KM success and firm performance (Darroch, 2005; Harold Harlow, 2008; Wang and Wang, 2012), e.g., by stimulating firm growth (Tödtling et al., 2006) or by being a source of competitive advantage (Clarke and Turner, 2004). Consequently, successfully conducted innovation activities are a direct prerequisite of measurable KM success.

H4: Successful innovation activities have a positive influence on overall KM success in consulting firms

Combining these hypotheses created a research model. It consists of the four main hypotheses that describe the relationship between KM activities as independent variables and KM success as a dependent variable. Furthermore, it also shows the controlling variables of firm size, international orientation and respondent years of experience.

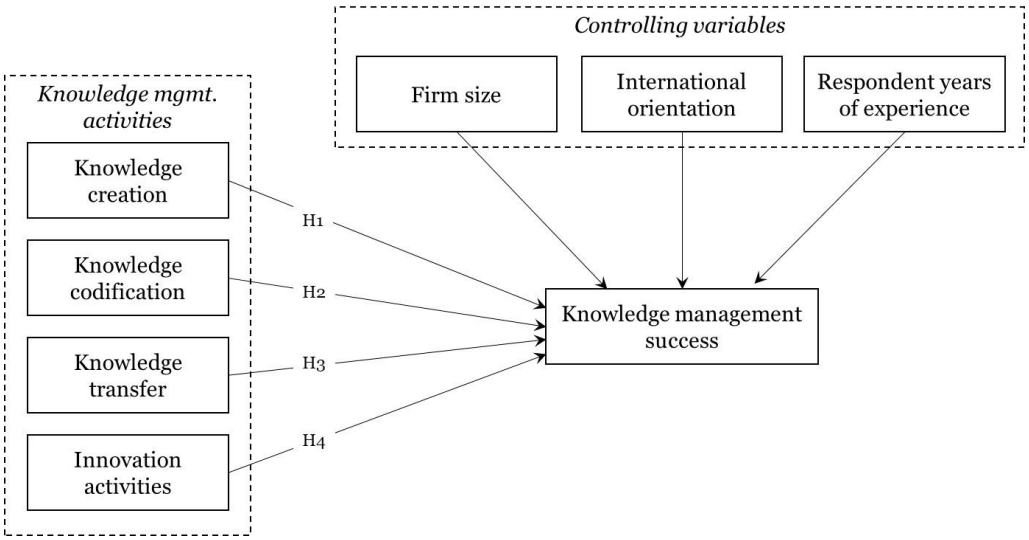


Figure 2-13 Research question 1: KM success research model

Figure 2-13 shows a graphical representation of this research model. Table 2-4 below shows a tabular overview of the corresponding research hypotheses and their corresponding literature.

Table 2-4 Research question 1: Hypotheses and support literature

No.	Hypothesis	Supporting literature
H01	Successful knowledge creation has a positive influence on overall KM success in consulting firms	Nonaka & Takeuchi, 1995, p. 73; Zhang et al., 2010
H02	Successful knowledge codification has a positive influence on overall KM success in consulting firms	Gaimon and Bailey, 2013; Voon-Hsien Lee et al., 2013
H03	Successful knowledge transfer has a positive influence on overall KM success in consulting firms	Liao et al., 2007; Harlow, 2008; King, 2009; Lee et al., 2013

H04	Successful innovation activities have a positive influence on overall KM success in consulting firms	Darroch, 2005; Harlow, 2008; Z. Wang and Wang, 2012

This concludes the definition of hypotheses for research model 1. The next section will discuss hypotheses for research model 2.

2.8.2. Research model for influence of KM drivers on motivation to participate in KM (Research question 2)

Organizations need to implement suitable drivers to motivate their employees to conduct KM activities (Wang and Noe, 2010). These drivers are distributed throughout the literature. Hansen (1999), among the most frequently cited authors in KM research, for example, focuses on organizational measures. Nonaka (1994) discusses social interaction. The literature review collects and discusses all drivers that influence KM and their impact on KM performance. The following sections will discuss the ensuing hypotheses that are derived from the research question.

Social drivers heavily influence KM activities. The first driver that will be analysed is recognition. According to Nonaka and Takeuchi (1995, pp. 70–72), social behaviour is a crucial part of knowledge creation (Dyck et al., 2005; Zhang et al., 2010). Knowing about social networks and leveraging social exchange principles has a positive contribution to knowledge creation (Parise, 2007). When creating or sharing knowledge, individuals commonly expect recognition in return (Hsu et al., 2007; Lin, 2007; Sutanto and Jiang, 2013; Wang, Noe, et al., 2014) in return. Recognition can either occur in the form of

appreciation by peers or managers (Bordia et al., 2006; Schepers and Berg, 2006; Wang et al., 2013), or by receiving knowledge in return (Bock and Kim, 2001; Gordon and Grant, 2013; Hsu et al., 2007; Kankanhalli et al., 2005b; Wasko and Faraj, 2005). Consequently, the following hypothesis is formed:

H5: Recognition of others has a positive influence on the motivation of consultants to participate in KM activities

Next, incentives are considered. Two qualitative studies with consulting firms and other knowledge-intensive organizations in New Zealand showed that management needs to introduce specific mechanisms such as incentives to motivate individuals to participate in KM activities (Bhardwaj and Monin, 2006; Scott-Kennel and von Batenburg, 2012).

These incentives are a major measure available to managers that wish to improve knowledge transfers in their organization. By rewarding their employees for sharing knowledge with their peers, managers can motivate their teams to increase the amount and quality of knowledge transfer. According to strong empirical research, this is true for intrinsic incentives, such as peer recognition and expert status (Ehin, 2008; Gagné, 2009; Gunjal, 2019; Kankanhalli et al., 2011; Kulkarni et al., 2007; Liao, 2008; Phang et al., 2009; Sié and Yakhlef, 2009; Siemsen et al., 2007; Sutanto and Jiang, 2013). Extrinsic incentives require a differentiated approach. While some studies showed that hard incentives such as monetary rewards effectively increase knowledge transfers (Gagné, 2009; Kulkarni et al., 2007; Liao, 2008; Siemsen et al., 2007), others found that they decrease the quality of shared knowledge (Bock and Kim, 2001; Cooper and Lichtenstein, 2010; Ehin, 2008). A more

recent large-scale study conducted in a non-business environment found a significant impact of incentive pay on motivation to share knowledge (Berg et al., 2017). This formed the following hypothesis:

H6: Monetary incentives have a positive influence on the motivation of consultants to participate in KM activities

The next paragraphs will show how social capital has a positive influence on individual motivation to share knowledge. Social capital is defined as the worth of an actor in the social network (Burt, 2005; Lin, 2002). Social capital and strong relationships are a major factor for successfully collaborating to create (Adler and Kwon, 2002; Ehin, 2008; Levin and Cross, 2004), especially when trying to access valuable implicit knowledge (Osterloh and Frey, 2000; Sun, 2009). If knowledge seekers have high social capital (i.e., knowledge holders "own them one"), knowledge holders are more motivated to share valuable knowledge (Bartsch et al., 2013; Cabrera and Cabrera, 2005; Chiu et al., 2006; Ehin, 2008; Mäkelä and Brewster, 2009; Smith, Bakker, et al., 2006; Subramaniam and Youndt, 2005; Willem and Scarbrough, 2006; Zheng, 2010). Furthermore, individuals are more motivated to share knowledge if they trust the recipient (Cooper and Lichtenstein, 2010; Gubbins and Dooley, 2014; Hsu et al., 2007; Lindner and Wald, 2011; Mäkelä and Brewster, 2009; Renzl, 2008). Individuals in strong relationships are more motivated to share significant knowledge (Gubbins and Dooley, 2014; Huggins and Johnston, 2010; Li and Scullion, 2010; Minbaeva, 2007).

Social capital also supports codification: From a theoretical perspective, both Hansen et al. (1999) and Gammelgaard and Ritter (2005) confirmed that

personalization strategies require social interaction and strong relationships to enable effective codification of knowledge. From an empirical perspective, an investigation among university students revealed that social interaction and sociability were important predictors for motivation to codify knowledge in KM systems (Phang et al., 2009). Another case study with a consulting firm revealed that knowledge contribution to the organization's KM system depended on the standing of contributors in the firm (Watson and Hewett, 2006).

Lastly, social capital also motivates individuals to be innovative. Through a survey among knowledge firms in the UK, Huggins and Johnston (2010) found that dynamic social networks are an important source of innovation. Many other researchers independently confirmed this link between social networking, innovation and KM success (Gubbins and Dooley, 2014; Huggins and Johnston, 2010; Subramaniam and Youndt, 2005; Wang and Wang, 2012; Wasko and Faraj, 2005; Zheng, 2010). According to a literature analysis performed by Zheng (2010), social networks had a significant impact on innovation. Human capital and social capital directly influenced innovation (Subramaniam and Youndt, 2005). This strong research base lead to the following hypothesis:

H7: Social capital of others has a positive influence on the motivation of consultants to participate in KM activities

The next major driver from the literature was leadership. Many studies found that managers that explicitly support KM initiatives increase the motivation to participate in KM activities in the organization (Gagné, 2009; Jones and

Leonard, 2009; Kulkarni et al., 2007; Liao, 2008; Lin, 2007; Lindner and Wald, 2011; Renzl, 2008; Wang, Noe, et al., 2014; Donate and de Pablo, 2015; Gunjal, 2019). An aspect of leadership support is the introduction of a dedicated KM organization (or learning organization), which motivates individuals to create and share more knowledge (Argote and Miron-Spektor, 2011; Bloodgood, 2009; Jones and Leonard, 2009; Leonardi and Bailey, 2008; Minati, 2012; Scott-Kennel and von Batenburg, 2012; Smith, 2008). Ehin (2008) postulated that KM organizations reduce knowledge sharing in organizations, but is not able to provide empirical support for this hypothesis. Karkoulian et al. (2013) conducted a study in Lebanon that showed a neutral relation between KM activities and KM organizations. In light of the strong empirical evidence for the motivational benefit of a formalized organization, this study followed the majority of researchers on this subject.

Furthermore, the use of KM strategies that enhance internal and external knowledge acquisition also increases motivation to participate in KM activities (Cassiman and Veugelers, 2006; De Clercq and Dimov, 2008; Kim et al., 2014; Laihonen and Mäntylä, 2018; Nevo et al., 2007; Zahra and Nielsen, 2002). Hansen et al. (1999) delivered the theoretical underpinning by pointing out the incentive models and management involvement required to implement a KM strategy in consulting firms. Other theoretical articles investigated the prerequisites required for tacit knowledge conversion, which are both a strategy for knowledge conversion (Jones and Miller, 2009) and a dedicated KM organization with top management support (Jones and Leonard, 2009). This lead to the following hypothesis:

H8: Leadership support has a positive influence on the motivation of consultants to participate in KM activities

Next, technology drivers were analysed. Since KM activities are often based on the recombination of existing knowledge, KM systems help innovators to retrieve applicable knowledge items that can then be recombined into new knowledge (Bock et al., 2006; Delen and Al-Hawamdeh, 2009; Kankanhalli et al., 2011; Sultan, 2013). This means that making technology available to individuals will motivate them to create more and better quality knowledge (López et al., 2009). Knowledge codification is the area that profits most from using technology: Providing technology to store, share and retrieve knowledge, and implementing tools that reduce the effort of codification motivates individuals to codify knowledge. Research showed that knowledge codification profits from KM systems that are easy to use (Chen, 2007b; Hall, 2006; Phang et al., 2009; Sultan, 2013) and motivate their users through a reward system (Bock et al., 2006; Cooper and Lichtenstein, 2010; Kim et al., 2010; Sutanto and Jiang, 2013). The positive effect of using technology on KM was confirmed in a large number of empirical studies (Holsapple and Jones, 2007; Kankanhalli et al., 2005b, 2011; Karkoulian et al., 2013; Kim et al., 2011; King and Marks Jr, 2008; Lee and Kim, 2006; Li and Scullion, 2010; Lindner and Wald, 2011; López et al., 2009). It should not be omitted that a few authors have conducted studies that did not show any advantage to implementing technology (Coff et al., 2006; David and Fahey, 2000; Lin and Lee, 2006). However, since these studies were conducted at a time when KM systems were difficult to implement and cumbersome to use, more credence should be given to recent research that shows an overwhelmingly positive

picture. Implementing KM systems motivates members of an organization to codify more knowledge (King and Marks Jr, 2008; Phang et al., 2009; Sun, 2009). Use of technology also drives knowledge transfer. Through a field study, Kankanhalli et al. (2005b) showed that the capability of electronic knowledge repositories increases motivation to transfer knowledge, which in turn increases KM success. López et al. (2009) empirically verified that IT competency has a positive effect on the frequency of knowledge transfer in a survey with 162 CEOs from Spanish firms. Furthermore, many studies that investigated knowledge sharing found that technology was a major driver (Holsapple and Jones, 2007; Karkoulian et al., 2013; Kim et al., 2011; King and Marks Jr, 2008; Lee and Kim, 2006; Li and Scullion, 2010; Lindner and Wald, 2011). One study did not find a correlation between successful knowledge sharing and use of technology (Lin and Lee, 2006). One essay argued against using technology to share knowledge and highlights the importance of inter-personal knowledge transfers (Coff et al., 2006), but was not supported by empirical evidence.

In light of the overwhelming strong empirical evidence that links use of technology to increased motivating to create, codify and share knowledge, the following hypothesis was formed.

H9: Technology has a positive influence on the motivation of consultants to participate in KM activities

Wang and Noe (2013) identify cultural drivers that motivate members of an organization to share knowledge. Research by Li and Scullion (2010) shows that local knowledge is highly tacit and volatile, and consequently differs

significantly from knowledge transferred from corporate headquarters. Therefore, local cultural competences need to be considered to ensure that locally created knowledge is captured and processed correctly (Alavi et al., 2006; Ardichvili et al., 2006). This means that cultural drivers support knowledge creation.

Like every organizational process, knowledge sharing is heavily influenced by a healthy, collaborative organizational culture (Jones and Leonard, 2009; Zheng, 2010). There has been a lot of research that shows that individuals are more likely to share knowledge if their organization has implemented a knowledge sharing culture (Collins and Smith, 2006; David and Fahey, 2000; Kulkarni et al., 2007; Lee and Kim, 2006; Lindner and Wald, 2011; Søndergaard et al., 2007; Taylor and Wright, 2004; Turner and Makhija, 2012; Wang et al., 2013). King (2008) opposes this notion in an essay, which has not been empirically tested. It was therefore disregarded in favour of overwhelming empirical evidence. Laboratory studies that were conducted independent of a specific cultural environment showed that culturally homogenous groups always outperformed heterogeneous groups in creating and sharing knowledge. However, as soon as a level of heterogeneity was reached that made it no longer possible to split the group into majorities and minorities, knowledge sharing performance reached levels of culturally homogenous groups (Phillips et al., 2004).

Last but not least, individualistic cultures are more innovative than collectivistic cultures. Even when given the instruction to be creative, individualistic groups outperform collectivistic groups, who before were thought to be better at implementing clear instructions (Goncalo and Staw,

2006). On the other hand, collectivistic cultures are better at sharing knowledge that can then be recombined into innovative ideas (Bock et al., 2006; Hwang and Kim, 2007; Leiponen, 2006). This means that culture is an important driver for innovative behaviour. This is doubly important for so-called knowledge-sharing cultures within organizations. If an organization has an organizational culture that emphasizes sharing of knowledge, it is more innovative (Collins and Smith, 2006; Kulkarni et al., 2007; Lee and Kim, 2006; Lin, 2007; Nonaka, 1994; Schepers and Berg, 2006; Wang et al., 2013). This evidence for a link between cultural drivers in the form of a shared hereditary and organizational culture and the likelihood to perform KM activities lead to the following hypothesis:

H10: A shared culture has a positive influence on the motivation of consultants to participate in KM activities

The next hypothesis concerned a negative factor. Fear has a negative effect on individuals willingness to participate in KM activities, namely codification and knowledge transfer (Cooper and Lichtenstein, 2010; Renzl, 2008). Fear is mostly about losing status and being exploited by others (Ardichvili et al., 2003; Wang and Noe, 2010). It can be mitigated by implementing appropriate reward systems and instilling confidence through management support (Bartol and Srivastava, 2002; Lee et al., 2010). This lead to the next hypothesis:

H11: Fear has a negative influence on the motivation of consultants to participate in KM activities

The last hypothesis is closely related with recognition and can be seen as a prerequisite. Research found that contribution to KM systems had a positive impact on career progression in consulting firms (Galunic, Sengupta, & Petriglieri, 2014). Submitting explicit knowledge to electronic knowledge repositories that connect valuable knowledge to the individuals that contributed it has motivational effects both on knowledge codification and knowledge sharing (Phang et al., 2009; Sutanto and Jiang, 2013). One study even found that the act of submitting knowledge with their name was enough for individuals to participate in KM, even without expecting explicit rewards in return (Wasko and Faraj, 2005). This lead to the last hypothesis:

H12: Attaching the name of the creator has a positive influence on the motivation of consultants to participate in KM activities

This concludes the identification of hypotheses required to answer the second research question “Which factors motivate consultants to participate in KM activities?”. Figure 2-14 below shows the research model for investigating KM drivers and their influence on motivation to participate in KM. The model identifies "recognition from others", "monetary incentives", "social capital of others", "leadership support", "technology", "shared culture", "fear" and "creator name attached" as independent variables, which relate to "motivation to participate in KM" as dependent variable.

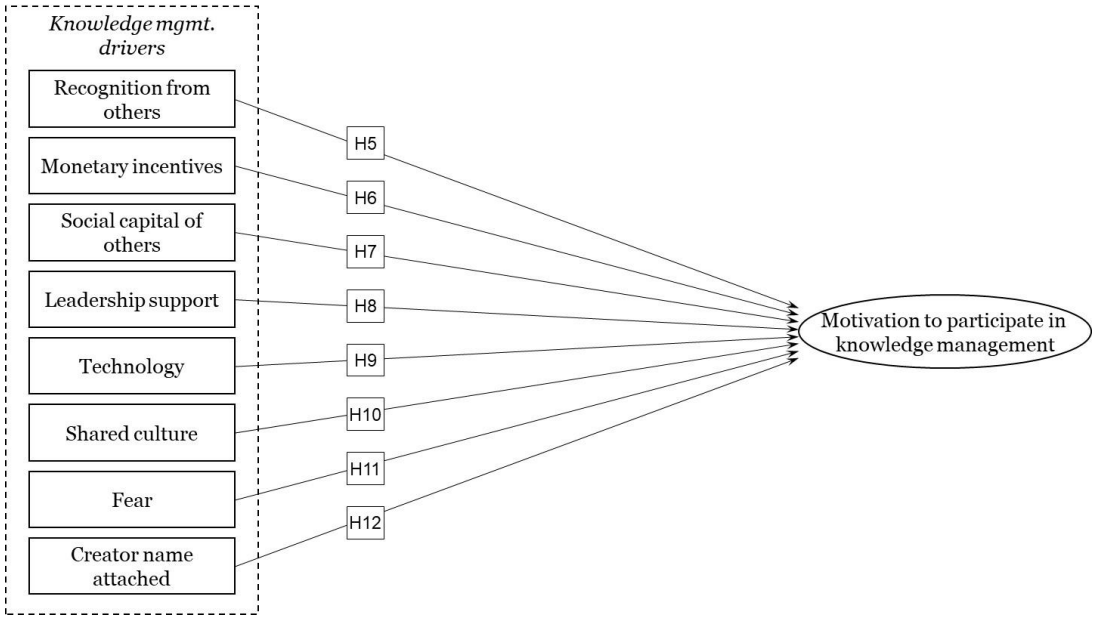


Figure 2-14 Research question 2: KM drivers research model

The table below shows the hypotheses resulting from this model including main supporting literature.

Table 2-5 Research question 2: Hypotheses and supporting literature

No	Hypothesis	Supporting literature
H05	Recognition from others has a positive influence on motivation of consultants to participate in KM activities	Bock & Kim, 2001; Gordon & Grant, 2013; Sutanto & Jiang, 2013; S. Wang et al., 2014; Gunjal, 2019
H06	Monetary incentives have a positive influence on motivation of consultants to participate in KM activities	Berg et al., 2017; Gagné, 2009; Kulkarni et al., 2007; Liao, 2008; Siemsen et al., 2007; Wang et al., 2014
H07	Social capital of others has a positive influence on motivation of consultants to participate in KM activities	Gammelgaard & Ritter, 2005; Gubbins & Dooley, 2014; Huggins & Johnston, 2010; S. Li & Scullion, 2010; Z. Wang & Wang, 2012
H08	Leadership support has a positive influence on the motivation of consultants to participate in KM activities	Gagné, 2009; Jones and Leonard, 2009; Kulkarni et al., 2007; Liao, 2008; Lin, 2007; Lindner and Wald, 2011; Renzl, 2008; Wang et al., 2014; Donate and de Pablo, 2015
H09	Technology has a positive influence on the motivation of consultants to participate in KM activities	Holsapple and Jones, 2007; Kankanhalli et al., 2011, 2005; Karkoulian et al., 2013; Kim et al., 2011; King and Marks Jr, 2008; Lee and Kim, 2006; Li and

No	Hypothesis	Supporting literature
		Scullion, 2010; Lindner and Wald, 2011; López et al., 2009
H10	A shared culture has a positive influence on the motivation of consultants to participate in KM activities	Kulkarni et al., 2007; Lindner and Wald, 2011; Søndergaard et al., 2007; Turner and Makhija, 2012; Wang et al., 2013
H11	Fear has a negative impact on the motivation of consultants to participate in KM activities	Ardichvili et al., 2003; Wang and Noe, 2010; Cooper and Lichtenstein, 2010; Renzl, 2008
H12	Attaching the name of the creator to knowledge has a positive influence on the motivation of consultants to participate in KM activities	Galunic et al., 2014; Phang et al., 2009; Sutanto & Jiang, 2013; Wasko & Faraj, 2005

2.9. Summary

This study has conducted a structured literature review of all relevant KM literature, which has revealed a clear definition of a KM process: Knowledge creation, codification, and knowledge transfer and innovation activities. Next, the literature review also discovered eight drivers for successful KM: "recognition from others", "monetary incentives", "social capital of others", "leadership support", "technology", "shared culture", "fear" and "creator name attached". The literature review did not find a comprehensive study that investigated all drivers that motivate individuals to participate in KM activities. Furthermore, these drivers should be analysed in the context of knowledge-intensive organizations such as consulting firms.

The literature review then identified two research questions and created two abstract models, one for each research question. The next chapter will define the methodology for these two research models. After, the models will be validated and hypotheses will be tested.

Chapter 3—Methodology

3.1. Introduction

The literature review developed the theoretical framework for this research. It ended with a list of hypotheses that were tested and either confirmed or refuted using a study in the context of German consultancy firms. However, before the study could be designed and executed, an in-depth discussion of the research paradigm and necessary research methods was required. This chapter will explain common research paradigms of management research and discuss which paradigm was applicable to this study. Based on the chosen paradigm, it will develop a research approach, choose appropriate research methods and identify the target group for the study. It will also look at the sampling process, data collection and analysis. This chapter will justify the validity and objectivity of the chosen research methods were ensured.

This study implemented a quantitative approach that was heavily grounded in postpositivism. It used a survey of experienced managers at strategy and implementation consulting firms in Germany due to the country's unique position as the consulting powerhouse of Europe.

3.2. Paradigm

3.2.1. Overview of common paradigms in management research

The first decision to be made when designing a study is the choice of paradigm. Kuhn (Kuhn, 2012, p. xiii) defines a scientific paradigm as: “universally recognized scientific achievements that for a time provide model

problems and solutions to a community of practitioners". Creswell (2013, p. 6) refers to paradigms as "knowledge claims", which imbue researchers with certain assumptions that guide them in their scientific inquiry.

Following the approach of Gray (2013, p. 19), each paradigm is defined by the theoretical perspective or epistemology. The epistemology is determined by the ontology, or reality of the researcher. Based on the paradigm, research methods are chosen that then analyse and resolve the underlying problem of the study. There are a number of realities or world views that researchers can subscribe to. All of these will be described in this section.

The world view of positivism was first described by French philosopher August Comte in the year 1830, as an attempt to explain the system of sciences and the relationship of sciences. It is based on the philosophical meaning of the word "positif", which means "imposed on the mind by experience" (Crotty, 1998). German philosopher Emmanuel Kant forms an opposing idea: To him, knowledge is constructed in the mind based on observations, but also reason (Dickerson, 2003). This led to the constructivist epistemology, which opposes positivism. Besides positivism and constructivism (Gray, 2013, p. 33), there are also more modern forms such as postpositivism, participation and pragmatism (Creswell, 2013, p. 6), as well as critical theory (Lincoln et al., 2011). Onwuegbuzie et al. (2009) have assembled a comprehensive table that lists both the common world views of management researchers, as well as a common interpretation of each paradigm. This table was amended and extended with the interpretation of positivism given by Lincoln et al. (2011). Each of these world views has its own definition of ontology, epistemology and axiology (Saunders et al., 2016, p.

129). Consequently, any paradigm can be broken up into three elements: ontology, or our definition of knowledge, epistemology, or how we come to experience knowledge and methodology, or how we acquire knowledge (Lincoln et al., 2011, p. 97). Appendix B contains a detailed breakdown of paradigms by world view.

Paradigms in management research are often characterized by the dichotomy of rigour and relevance. Whereas scientific standards demand rigorous research that investigates a broad field in high detail, practitioners require clear solutions to specific problems that are relevant to their specialization (Aram and Salipante, 2003). Academics on one hand rely on standardized data collection and analysis methods to ensure comparability between results and intend to create universally applicable laws and principles that are primarily intended for other researchers to use (Gulati, 2007b). Practitioners on the other hand demand turnkey solutions that improve their day-to-day business conduct (Chi Vo et al., 2012). These differences are not new: a longitudinal analysis of management research from organization studies, which reaches back more than 50 years, showed that researchers always had to decide if they wanted to produce scientifically rigorous or relevant work, as articles that fulfil both criteria are few and far between (Palmer et al., 2009).

To account for this dichotomy, Gibbons et al. (1994, cited by Tranfield and Starkey, 1998), differentiate between two basic research modes: Mode 1 is the traditional research approach that is based on a single discipline and follows established, scientific standards. The other mode, Mode 2, is based on a research problem and leverages multiple disciplines to achieve its goal (Tranfield and Starkey, 1998). KM is by its very definition a discipline that is

suited for Mode 2, since its researchers borrow heavily from the social sciences, information technology and management research (Ragab and Arisha, 2013). This, coupled with the close practical proximity of the researcher, who was associated with one of the world's leading strategy consultancies at the time of writing of this study, meant that this study was predetermined to be conducted through Mode 2 research. With this in mind, all common paradigms were discussed and investigated with regards to their applicability to this study.

Positivism and postpositivism

Adherents to the school of logical positivism, such as Ayer (1966) and Popper (1959), believed that social observations from the social sciences behave similarly to physical observations from the natural sciences (Johnson and Onwuegbuzie, 2004), and that there is a unifying true answer for all questions (Easterby-Smith et al., 2012, p. 39). Logical positivists use quantitative data to support their claims. Consequently, detached positivists insist that researchers should be completely unbiased, independent and remain separate from the subject of their research in order not to disturb their subject and obtain objective results from their studies (Nagel, 1989, p. 9). According to Lincoln and Guba (1985 cited in Tashakkori & Teddlie, 2010, p. 99), detached positivists "believe that there is a single reality, that the knower and the known are independent, that inquiry is value free, that time- and context-free generalizations are possible, and that real causes are temporally precedent or simultaneous with effects". Positivists should be detached from their research subjects, in order not to influence their world and ensure an objective representation of reality. Detached positivists favour reliable experimental

research methods including control groups to ensure an independent, unbiased opinion and accuracy and objectivity (Denscombe, 2009, p. 121). A way for positivists to become involved researchers is to turn to postpositivism. These researchers do not limit themselves to purely quantitative data, but include qualitative data in their research, while still subscribing to objectivity and pursuing a complete elimination of bias (Onwuegbuzie et al., 2009). As this study seeks to determine the relationship between independent and dependent variables, a positivist or postpositivist research approach would be feasible (Gray, 2013, p. 267). Furthermore, since this study intends to deliver a highly reusable, adaptable model for KM implementations, a positivist approach will give it the required repeatability (Gill and Johnson, 2010; cited by Saunders et al., 2016, p. 138).

Constructivism

Constructivist researchers believe that there is no absolute truth and that researchers should report on all different truths and their construction (Easterby-Smith et al., 2012, p. 48). According to Denscombe (2009, pp. 121–124), constructivists that conduct social research subscribe to five major philosophical ideas: That (1) social reality is subjective, (2) humans react to being studied, (3) humans react to the results of the study, (4) objective knowledge is not possible, and that (5) social research cannot produce a universal truth. Since there are many individuals in this world, there are also many realities, as these depend on the “here” and “now” of the observer (Berger and Luckmann, 1991, p. 39). This means that constructivists need to be aware of the different viewpoints of others and consider these in their research. Consequently, social constructivists give more importance to

scientific discourse and competing theories. However, it is very difficult for social constructivists to appreciate the validity, accuracy and usefulness of their research, since they question that there is such a thing as detached, impartial research insight (Denscombe, 2009, pp. 123–124). Golden-Biddle and Locke (1993) demand three criteria from constructivist research to ensure that its research results are a valid addition to scientific discourse: authenticity, plausibility and criticality (cited by Easterby-Smith et al., 2012, p. 52). Researchers need to convince their reader that they have a deep understanding of their research subject, that their research question contributes to their subject and that they are critical of their research results. To this end, constructivists often favour case studies and grounded theory that combine elements from positivist research with a constructivist philosophy. There are two ways to interpret constructivism: as a detached researcher that observes systems from the outside, or as an involved researcher that participates in the system and actively shapes the outcome of their investigation (Easterby-Smith et al., 2012, p. 51). However, constructivist analysis as a management researcher depends on long-term observation and gives deep insight into the behaviour of members of an organization in a specific case context (Saunders et al., 2016, p. 608). Since the research questions for this study intends to build a general model and identify relevant factors instead of investigating their implementation, a constructivist approach is not the appropriate approach.

Critical theory

One research methodology that was omitted by Easterby-Smith et al. (2012) is critical theory. Critical theory refers to the deconstruction of existing scientific

ideas using so-called critical theories (Lincoln et al., 2011; Sim, 2004). Social theories such as Marxism or Feminism, or physical concepts like quantum theory are well-known critical theories. Research that leverages critical theory will look at an idea from a new stand point, e.g., Marx' analysis of Adam Smith' division of labour through Hegel's dialectic, which extended theory without conducting quantitative or qualitative research. By critically applying the worker's view-point to a virtual reality shaped by social and economic factors, Marx discovered the new philosophy of communism (Sim, 2004). As this study into KM did not have a rich theoretical background that it could investigate with a different philosophical standpoint, critical theory was not the right approach.

Pragmatism

As Tashakkori and Teddlie (2010, p. 98) note, research itself is neither quantitative nor qualitative. This distinction only applies to the data that is the basis of the research. Referring to research as quantitative or qualitative is imprecise as the distinct elements of research such as methodology, epistemology and ontology might be a combination of quantitative and qualitative approaches. To this end, critical realism, for example, has expanded positivist philosophy with the doubt and penchant for discourse found in constructivist approaches (Denscombe, 2009, pp. 124–125). This lead to pragmatism, which rejects the idea that social and economic interaction can be predetermined by universal truth and theory (Denscombe, 2009, p. 128; Easterby-Smith et al., 2012, p. 32). Instead, pragmatists reject philosophical debate and focus on the research problem at hand. Appropriate research methods are chosen based on the research problem. Especially in the

social sciences, pragmatist researchers insist that “uncovering the actual integration of qualitative and quantitative approaches in any particular study is a considerably more complex undertaking than simply classifying the study into a particular category on the basis of a few broad dimensions or characteristics” (Maxwell and Loomis, 2003, p. 203 cited by Bryman, 2006). Consequently, pragmatists favour so-called mixed-methods approaches that integrate quantitative and qualitative research (Johnson and Onwuegbuzie, 2004). While pragmatism is good combination with the pragmatic approach of Mode 2 (Syed et al., 2009), too much methodological variety would have negatively impacted the reusability of the model at the heart of this study. Therefore, postpositivism with its methodological rigour and slight flexibility in choice of research instruments was the preferred paradigm.

The next section will move away from the theoretical parameters of common paradigms in management research and begin the concrete definition of the methodology at the heart of this study.

3.2.2. Ontology

The next step in defining a methodology is the choice of ontology, which refers to the underlying understanding of reality, or *what is* (Creswell, 2013, p. 6; Gray, 2013, p. 19). According to Gruber (1993), an ontology is “a formal specification of a shared conceptualisation”. This means that if individuals share a common ontology, they will have the same perception of reality. In management research, ontology specifies the researcher’s perception of objects, such as organizations, management, individual employees, events and artefacts (Saunders et al., 2016, p. 127).

There are two dominant schools of ontology in Western philosophy: the ideas of ancient Greek philosopher Parmenides, who described the world through what he saw and felt, as opposed to his compatriot Heraclitus, who also considered what, in theory, could be (Gray, 2013, p. 19). Modern followers of Parmenides' theory are found in the materialists, such as Russel, who said that "the physical world is only known as regards certain abstract features of its space-time structure—features that, because of their abstractness, do not suffice to show whether the physical world is, or is not, different in intrinsic character from the world of mind" (quoted in Hameroff et al., 1999, p. 24). In this worldview, all experiences and occurrences can be explained through mathematics and physics, even deeply human reactions such as consciousness. Most researchers from the natural sciences adhere to Parmenides' philosophy, which is also referred to as representationalism, even though the competing approach of anti-representationalism has seen growing popularity over the past decades (Haselager et al., 2003).

Anti-representationalists insist that a subject's interpretation of what is a representation of the real world is invariably shaped by dynamic cognitive processes that need to be considered in scientific research through recognizing not only the representation, but also the neurological process that lead to its formation (Cliff and Jason, 1997). This means that the researcher should on one hand investigate *what* they see, and on the other hand question *how* they see it and how their surroundings, upbringing and mental construct influence their perception of reality.

Combining both schools, idealists like Kant ground their ontology in the representationalist world-view of Parmenides and extend it with an

epistemological filter between the mind or consciousness of the individual that connects the representation to its counterpart in the real world (Dickerson, 2003, pp. 18–20; Jansen, 2014). By decoupling their research from the strict empirical boundaries of a representationalist world view, they are able to observe and predict human behaviour, which cannot be predetermined by mathematical observations (Kant, 2004, p. 388). The most important element of the research at hand is to make sense of the underlying mechanisms of knowledge creation, sharing and storage. To ensure the validity and general applicability of research results, objectivity is important. This means a quantitative approach, e.g., a questionnaire, should be chosen. Furthermore, as investigations of the social sciences such as KM research observe human behaviour, the collected data is subjective, as it is filtered through individual consciousness—especially since knowledge development is a highly social endeavour that is driven by human interaction. This study had a firm base in reality. However, it could not be a direct, unfiltered representation of the real world, since such a representation is not possible through the filters of our consciousness (Tsoukas, 1998). Therefore, social research instruments such as surveys were required, which demanded certain freedoms when interpreting data (e.g., the treatment of Likert scales). Consequently, postpositivism was the most appropriate research philosophy, as it combines objectivity with the possibility of relaxing strict quantitative rules where appropriate (Danermark, 2002).

3.2.3. Epistemology

The choice of epistemology lay right at the heart of this study, since it defines "what constitutes acceptable, valid and legitimate knowledge, and how we can

communication knowledge to others" (Burrell and Morgan, 1979, cited by Saunders et. al, 2016, p. 127). This means that epistemology is used to represent the reality according to the rules laid down in the chosen ontology (Lincoln et al., 2011), the two being inseparably interwoven. The challenge of representing reality in line with ontology leads to two competing approaches in peer-reviewed research that are frequently presented as exclusive antagonists, namely logical positivism and naturalistic inquiry, also referred to as constructionism (DePoy and Gitlin, 2015, p. 45). Based on these approaches, Easterby-Smith et al. (2012, p. 38) then differentiate between either a detached or an involved researcher, creating a matrix of four research styles: (1) detached positivist, (2) detached constructionist, (3) involved constructionist and (4) involved positivist. Figure 3-1 shows a visualisation of these research styles.

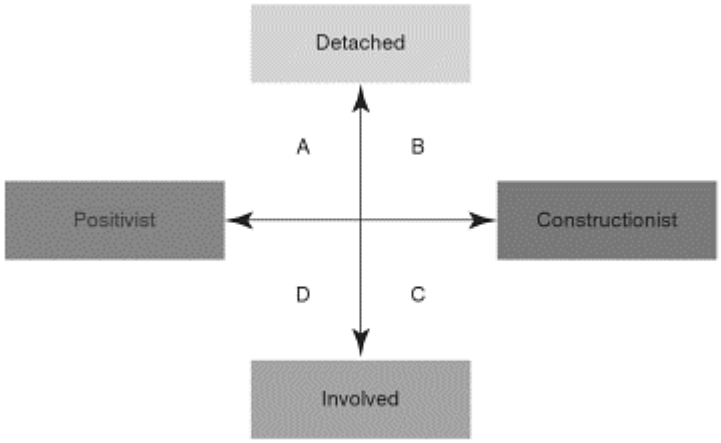


Figure 3-1 Epistemology and research style (Easterby-Smith et al., 2012, p. 39)

In their meta-analysis of existing KM literature, Wang and Noe (2010) criticize the methodologies of the authors they analyse. According to them, most of the quantitative work conducted in the field of KM is severely limited.

Questionnaires, which are the main instrument of quantitative approaches in KM research, only measured willingness and did not verify if responders followed through on their intentions. Only very few studies (e.g., Wasko & Faraj, 2005) measured the act of sharing. These studies are limited by their target audience, which is restricted to students and not practitioners, making the applicability of their work doubtful in a real-world context. Consequently, any study of KM should ensure that the questionnaire is directed at a representative sample of KM practitioners.

To implement this recommendation, this study followed a strong positivist approach. Because research goal (factors that influence KM success) and subject (consulting firms) were interwoven, the research differentiated between researcher and subject. A constructivist epistemology, which allows and encourages interaction between researcher and subject (Goldkuhl, 2012; Orlikowski and Baroudi, 1991) was not feasible. The study aimed to actively eliminate bias as far as possible and remained emotionally detached from the research subject.

3.2.4. Research methods

Creswell (2013, p. 5) defines the term methodology as the “strategy or plan of action that links methods to outcomes”. This section will argue the methods that make up the postpositivist methodology underlying this research. Common strategies are experimental research and survey research. He differentiates from “methods”, which are “techniques and procedures” such as questionnaires, interviews or focus groups. Following a postpositivist philosophy, the methods for this study should yield time- and context-free

generalisations that reliably determine the real-world causes for certain events (Lincoln et al., 2011; Onwuegbuzie et al., 2009). Nowadays, epistemologies are no longer seen as an absolute choice, but as a continuum that allows for a certain combination of methods in order to achieve a research goal (Leech and Onwuegbuzie, 2009; Tashakkori and Teddlie, 2010, p. 219) Consequently, this study relied on chiefly quantitative methods that were enhanced with qualitative methods where appropriate.

When choosing research methods, there are multiple strategies: a mono-method strategy, which restricts itself to using one method and a multi-method strategy, which uses multiple research methods. Mono-method strategies are either quantitative or qualitative. A multi-method strategy can also be both by combining a quantitative and a qualitative method into a so-called mixed methods approach (Saunders et al., 2016, p. 166). Figure 3-2 shows the decision tree for these methodological choices.

Figure 3-2 Methodological choices (Saunders et al., 2016, p. 167)

Use of mixed methods is frequently advocated in recent business and management research, as it leads to higher quality results due to eliminating weaknesses within purely quantitative or purely qualitative methods (Bryman, 2006; Onwuegbuzie et al., 2009). Depending on the research approach, use of quantitative methods alone suffices, for example if one follows a postpositivist research paradigm and captures with an instrument suited for attitude measurement (Creswell, 2013, p. 20). Since KM rarely produces measurable results, research relies on the attitudes of respondents. Consequently, this study adopted mono-method quantitative methods that were heavily grounded in a postpositivist research paradigm. A postpositivist paradigm demands data that is reliable, objective and validated (Lincoln et al., 2011; Onwuegbuzie et al., 2009). Before making a choice for a research method, a few terms need to be understood. According to Tashakkori and Teddlie (2010, p. 27), research methods produce *data*. This data is then analysed during *data analysis*. During data analysis, connections between data produce *inferences*, or relations between data that have a certain meaning. These inferences can either be deductive, inductive or abductive (Saunders et al., 2016, pp. 146–149). Deduction, which is the most common approach in scientific research, uses a structured process to formulate, test and then either prove or disprove a hypothesis to answer a research question. In induction, a small sample of data is collected before the hypothesis is formed based on that data. To summarize: in deduction, theory is moved to data, whereas induction moves data to theory. The last approach, abduction combines both induction and deduction. It suggests using inductive methods to form the research model and then employing deductive methods to investigate and test it. As a positivist, the starting point of a piece of research is usually defined by strong

hypotheses or at least formulated propositions, which are then tested through appropriate data collection (Easterby-Smith et al., 2012, p. 25). This means that positivists usually follow a deductive approach and would therefore choose deductive research methods.

The research method fulfilled the goal of this research, which was to create a model for effectively and efficiently implementing a strategy for knowledge sharing in a consulting firm. The scope of this research was limited to the creation and validation of such a model and did not test its application in a real-world context. After the research methodology has been chosen, the timeframe and data collection method is determined (Gray, 2013, p. 33). Following a postpositivist philosophy, the choice of methods is broad and not restricted by the strict rules of positivism (Lee, 2012). Naturally, positivist researchers implement quantitative research methodologies, including but not limited to experimental, correlational and survey instruments (Denzin and Lincoln, 2011, p. 10).

The purpose of this section is to choose and detail the research methods that answered the research questions and confirmed or refuted the hypotheses. Yin (2009, p. 4) gives the following guidance when choosing research methods: If the research question begins with a “what” or a “which”, e.g., “what candidate are you going to vote for this year?”, a survey is a suitable instrument. If, on the other hand, the research question begins with a “how” or a “why”, e.g., “how are the new candidate’s policies going to change the country?”, a more in-depth, qualitative analysis is required (see also Gray, 2013, p. 267).

This study asked two questions: (1) "Which KM activities contribute to KM success from the view of relevant actors in consulting firms?" And (2) "Which factors motivate consultants to participate in KM activities?" Both questions clearly indicated that a quantitative research approach should be chosen. (Ritchie et al., 2003, pp. 38–40).

The next sections will detail the design approaches used for the literature review and the quantitative data collection.

3.3. Research design

3.3.1. Literature review design

Literature reviews are a core component of management research. They provide researchers with an overview over their research area and an in-depth understanding of their focal area (Easterby-Smith et al., 2012, p. 103). Hart (1998, p. 13) defines a literature review as “the selection of available documents (both published and unpublished) on the topic, […] written from a particular standpoint to fulfil certain aims or express certain views on the nature of the topic and how it is to be investigated”. A special variant of a literature review is the so-called systematic review, which “strives to comprehensively identify, appraise and synthesize all relevant studies on a given topic” (Petticrew and Roberts, 2008, p. 19). KM with its extensive body of literature that follows recurring themes was ideally suited for conducting such a systematic review. At the start of this review, it has to be noted that citations should not be seen as a measure of the strength of a theory or its veracity. They can form the starting point for the formulation of a theory, but should be complemented with further research (Martin, 1996).

Identifying relevant data bases

The focus of the literature review were articles that could be identified through searches on Google Scholar using the keywords “KM”, “knowledge management”, “knowledge sharing” and “knowledge transfer”. The choice of data bases is a significant decision in performing a systematic literature review, as it can affect the scope of the query (Easterby-Smith et al., 2012, p. 105). Traditionally, data bases such as Thomson ISI Web of Knowledge, Web of Science and the Journal Citation Reports (JCR) were used to identify and retrieve applicable articles. However, in recent years Google Scholar has replicated a lot of the content of these data bases and has thus become a viable alternative (Harzing and Van der Wal, 2008). While earlier research diagnosed significant shortcomings such as smaller indexes, less accurate full text search and missing content (Jacsó, 2005), newer research shows that Google Scholar not only caught up to but eventually surpassed other data bases such as Web of Science (De Winter et al., 2014). Consequently, Google Scholar served as the main source for this literature analysis. It was supplemented with sanity checks using other data bases.

Developing the search string

While Google Scholar offers a web interface, navigating the interface and extracting desired information about thousands of articles can be cumbersome. To circumvent this issue, the researcher developed a Python application to automatically access Google Scholar and extract metadata for the desired articles. This application was later replaced with Harzing Publish

or Perish (Harzing, 2007), a more stable software that is frequently used for citation analysis.

Since the goal of this research was a general analysis of KM literature with the intention of deriving actionable input for consulting firms, the search used the following search string:

"KM" OR "knowledge management" OR "knowledge sharing" OR "knowledge transfer" OR "transferring knowledge" OR "transfer knowledge" OR "share knowledge" OR "sharing knowledge" OR "managing knowledge" OR "manage knowledge"

Additional keywords for “professional services” or “consulting” were excluded as a cursory search showed that important works from KM (e.g., Nonaka’s & Takeuchi’s “The Knowledge Creating Company”) did not appear in the search results, even though they were clearly applicable to the subject.

Due to the overwhelming number of results (more than 17.000 articles), many of them with questionable quality as evidenced by zero citations, the search was restricted to the top 6 journals in KM: *Journal of Knowledge Management, Journal of Intellectual Capital, The Learning Organization, Knowledge Management Research & Practice, Knowledge and Process Management* and *International Journal of Knowledge Management*. These journals were identified in a ranking of 25 KM/IC-centric journals by 379 active KM researchers that were queried in a survey (Serenko and Bontis, 2013).

Research areas were identified based on the hypotheses of the article at hand. If the article discussed knowledge creation, codification, sharing or innovation, it was added to the corresponding activity group. Articles that investigated the close relationship between KM and innovation and the various concepts surrounding this idea (e.g., open innovation) also belonged to the innovation activity group. If an article investigated the impact of hereditary or organizational culture on KM, it was added to the cultural drivers group. Some articles were added to multiple groups: e.g., if an article investigated the impact of social drivers on knowledge creation and knowledge sharing, it was added to the social drivers group, to the knowledge creation group and to the knowledge sharing group. Authors that discussed the role of information technology and its application in KM, be it in online communities of practice or KM systems, were added to the "technological drivers" research area. If authors tried to extend the ontology of KM or contribute to the philosophy surrounding the subject, the article was counted within the ontology research area. If an article discussed social implications of KM, social capital or social debt in the context of knowledge sharing, it belonged to the "social drivers" group. Last but not least, all authors that investigated the implications of managerial instruments like incentives with the intention of helping managers improve their knowledge sharing performance or the quality of their KM system, were added to the "management drivers" group.

The decision to add an article to a specific research area was made by the author of this study. While it was based on the objective criteria listed above, most articles fell into two or more different categories. To simplify the

presentation of results, KM drivers were grouped into four groups: Recognition from others, social capital and fear of losing power or status were grouped under *social drivers*. Monetary incentives and leadership support were grouped under *management drivers*. Use of technology and "attaching the name of the creator" were grouped under *technology drivers*. Culture finally was retained as *cultural drivers*. The results of this analysis can be seen in appendix B.

Even though only articles with no other contributions were counted, the most popular KM activity at 96 articles, or ~64% of all analysed articles, was knowledge sharing. This could be explained by considering that sharing is the most "visible" activity of KM, and is therefore easy to analyse. Consequently, most research into knowledge sharing was empirical in nature, with 48 surveys, 17 case studies, six secondary data and two mixed method studies comprising the majority of research. Looking at investigated drivers, it was not surprising that 72 articles discussed social drivers, while 58 looked at management drivers. Both of these driver groups are directly connected to knowledge sharing and show very strong causation (Jones and Leonard, 2009; Kulkarni et al., 2007; Mitchell, 2006; Wang and Wang, 2012). 19 articles discussed both driver groups.

Lastly, when looking at the distribution of KM research across the globe, it was interesting to note that research was equally divided between Asia (32 articles), Europe (27 articles) and North America (36). However, when KM activities were considered, Asia showed a clear focus on sharing (27 articles, or ~84%) that was not evident in the other regions (Europe with 19 articles, or ~70%; North America with 20 articles, or ~56%).

The end result of the literature review was shown in section 2.7, where it clearly identified the gaps in KM literature based on the approach outlined above.

3.3.2. Designing the survey instrument

The most popular instrument for obtaining quantitative data in management research is the survey (Bryman, 2006). Knowledge sharing processes and knowledge motivation factors were transformed into a questionnaire structure that was then shared with experts from the field of KM through an online survey. Oppenheim (1992, p. 9) suggests four steps for the survey: (1) designing the survey instrument, (2) piloting, (3) designing the sample and (4) selecting the recipients. This section will discuss the design of the survey instrument.

First and foremost, the survey was analytical. According to Oppenheim (1992, p. 21), surveys have to account for four types of variables: experimental (or independent) variables, dependent variables, controlled variables and uncontrolled variables. Saunders et al. (2016, p. 179) extended this list with mediating and moderating variables. Mediating variables are variables that are required for the relationship between independent and dependent variables (Baron and Kenny, 1986). For example, knowledge sharing will only lead to KM success if a social connection with another knowledge holder is present. Without social connections, there will be no sharing and consequently no KM success. Moderator variables on the other hand are variables that determine the intensity of the relationship between

independent and dependent variables (Baron and Kenny, 1986). Table 3-1 shows an overview of relevant variables.

Table 3-1 Types of variables (Saunders et al., 2016, p. 179)

This first section of the survey considered KM activities as independent variables (IV): “knowledge creation”, “knowledge codification”, “knowledge sharing” and “innovation”. These independent variables determine the dependent variable (DV): “KM success”. The second section of the survey considered KM motivation drivers as independent variables: “recognition from others”, “monetary incentives”, “social capital”, “leadership support”, “use of technology”, “cultural background”, “fear” and “creator name

attached" each had an impact on motivation to participate in KM activities. Finally, the last section of the questionnaire contained the control variables.

There are many different approaches to survey questionnaires. They can be designed cross-sectional, follow a natural experiment, select a panel, use a factorial design or include multiple regression. To facilitate the choice of survey instrument, Oppenheim (1992, p. 35) created a decision table based on the survey setting.

Table 3-2 Survey designs for analytic studies (Oppenheim, 1992, p. 35)

Since this study investigated a well-researched domain, had no control over events and analysed multiple variables, a multivariate analysis with regression was the most fitting choice of study design.

The questionnaire consisted of two groups of questions: Investigative questions to determine the relationship between the independent and dependent variable and classifying questions that described the professional experience of the sample. Classifying questions were placed at the end of the

questionnaire, since they are often perceived as off-putting by respondents (Oppenheim, 1992, pp. 108–109; Roberson and Sundstrom, 1990).

For investigate questions, Saunders et al. (2016, p. 447) suggest the creation of a data requirements table to ensure that all necessary data is collected within the questionnaire. The data requirements for this study were contained in the hypotheses. Each hypothesis described a relationship between two factors. This meant that each hypothesis had to be covered by at least one question. There are two basic questions types: open and closed questions. While open questions generally produce more detailed data, they are difficult and time-consuming to answer and analyse. Closed questions on the other hand are quicker to answer, easier to analyse, but harder to pose and limited in their data (Gill and Johnson, 2010, pp. 143–144; Oppenheim, 1992, p. 113; Saunders et al., 2016, p. 452). Since the target group of this questionnaire, consultants, generally only has limited time, the survey consisted of closed questions. Oppenheim (1992, p. 128) gives a list of recommendations for formulating the questions. They should be brief. One should avoid “or” questions (e.g., do you share knowledge electronically or in person?). Questions should not contain proverbs and double negatives. Questions should use simple, non-ambiguous language. Last but not least, questions should not lead respondents on (e.g., do you frequently help your colleagues by sharing knowledge with them?).

Closed questions are usually answered in the form of a scale. There are four common types of scales: (1) nominal scales, (2) ordinal scales, (3) interval scales and (4) ratio scales (Gill and Johnson, 2010, p. 142). Nominal scales do not have arithmetic values and give an absolute answer (e.g., “Are you self-

employed? Yes/No", "Which country are you from? United Kingdom"). Ordinal scales are used to grade or rate responses (e.g., "How satisfied are you with your current job? Very satisfied, ambivalent, not satisfied"). Interval scales are directly related to their measurement variable but need to be considered independently from other interval scales (e.g., someone with an IQ of 120 is not twice as intelligent as someone with an IQ of 60). Ratio scales finally are interval scales that share an absolute zero (e.g., how many times a certain behaviour is observed). With ratio scales it is possible to confidently make comparisons between data points. In the case of this questionnaire, all classifying questions were either nominal scales (e.g., "In which countries have you done business?") or ratio scales (e.g., "What is the size of the largest consulting firm you have worked for?"). Questions concerning the hypotheses were posed in the form of ordinal scales. The scale of choice was a standard 5 point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree). Due to its ease of use for both the respondent and the researcher, it is the most popular scale in use today (Oppenheim, 1992, p. 195). A constant reason for discussion is the number of items on the scale. However, extensive research conducted by Matell and Jacoby (1971) did not find any indication that a higher number of items improved the statistical validity of responses.

3.3.3. Pilot study

Oppenheim (1992, p. 52) suggests to conduct multiple pilots of the questionnaire to improve the phraseology of the questionnaire (i.e., the understandability of the questions to respondents). Consequently, five individual and three larger scale pilots of the questionnaire were conducted. Pilots were held with members of the target audience (consultants, senior

consultants and managers at consulting firms) and experienced academics, including PhDs and senior researchers and lecturers. During the individual pilots, the questionnaires were discussed in person. Feedback was collected on paper and implemented into the next version. Each of the five individual pilot phases was done with the same eight participants. Two participants were employed as senior consultants for a global financial advisory firm. One participant was a senior manager for a German accounting firm. Two participants were employed as consultants for a global strategy consulting firm, both of which held doctorates (one engineering, one economics). Two participants were managing directors for the same global strategy consulting firm. The last participant was a senior advisor to multiple consulting firms, and a professor of computer science.

After the individual pilot phase was completed, large scale pilots were started. During the first two large scale pilots, the questionnaire was printed out on paper and distributed to 20 recipients, who then filled in the questionnaire and gave their feedback on another piece of paper. Out of 20 recipients, eight were employed as senior consultants, managers or senior managers for a global IT consulting firm. Ten were employed as consultants, project leaders, principals or partners for a global strategy consulting firm. Two were employed as professors and held senior advisor roles to various consulting firms. Between each version, feedback was integrated and a new version printed. The last pilot phase was finally conducted using the finalized questionnaire in Qualtrics. Pilot participants were not only asked to rate the quality and understandability of questions, but also the usability of the tool.

During the pilot phase, three major ideas were tested: (1) Closed vs. open questions, (2) the number of questions in total and (3) the number of items on the Likert scale. The main finding from the pilots was that all consultants requested a short, simple questionnaire that could be completed on their mobile phone. Open questions were generally rejected, even comment sections were not well received. The main requirement from the consultants was that the questionnaire should not take longer than 10 minutes. This meant that the questionnaire was restricted to closed questions. The length of the questionnaire was kept to just under 10 minutes (pilots showed it took respondents on average between 7 and 9 minutes to complete). Regarding the number of items on the Likert scale, consensus was that seven items were too many. Therefore, a five-point scale was chosen. Appendix B shows the full questionnaire including mapping to hypotheses.

3.3.4. Ethics

Ethical considerations should be at the centre of every research. Easterby-Smith et al. (2012, p. 95) recommend ten rules for ethical researchers:

a) Ensure that no harm comes to participants
b) Respect the dignity of participants
c) Ensure fully informed consent of participants
d) Protect the privacy of participants
e) Ensure the confidentiality of research data
f) Protect the anonymity of individuals and organizations
g) Avoid deception about the nature and aims of the research
h) Declare affiliations, funding sources and conflicts of interest

i) Communicate honestly and transparently about the research

j) Avoid misleading or false reporting of research findings

The same or similar rules are recommended by other leading educators on management research (Punch, 2013, p. 276; Saunders et al., 2016, pp. 243–245). This study respected all of these rules. To protect participants, the study did not ask for any identifying information—neither about the participant, nor about their organization. All survey questionnaires were sent anonymously. There was no "free text" question in the questionnaire that would allow participants to divulge personal data. Furthermore, the study clearly outlined the aims and objectives of the research in simple words. It sought explicit consent from participants that they had read and understood the aims and objectives of the research. Invitations were sent via LinkedIn/Xing direct message. No email addresses or other contact information of participants were stored.

To ensure confidentiality of research data, the research was conducted using Qualtrics, the official tool of Coventry University. Research outcomes were downloaded and only stored on the local, encrypted computer of the researcher. To ensure transparency of the results, all descriptive statistics, reports and outcomes are represented in full in the appendix of this study.

The research was self-funded. The researcher was not affiliated with any organisation apart from his university in the context of this study. His employer did not support the research.

3.3.5. Population and sample

As indicated by the title, the population for this study focussed on consulting firms, who rely more on knowledge than most other firms and therefore require advanced KM techniques (Hansen et al., 1999). The expectation was that experienced consultants and their managers were more likely to have valuable insights into the KM process, especially since research has shown that knowledge sharing benefits career progression in consulting firms (Galunic et al., 2014). The research focussed on the German market. The German market was chosen because it was the largest in Europe (134.000 employees in the consulting industry, compared to 70.000 in the UK) and consistently showed the strongest growth (FEACO, 2016). Germany had about 15.425 consulting firms. However, not all of these firms were relevant to this study: Out of these 15,425 firms, only 375 averaged more than 30 employees. The rest were small-sized firms with less than EUR 5m in yearly revenue. (BDU e.V., 2016). Since small firms with less than 50 employees are less likely to implement sophisticated KM systems with e.g., a document management solution (Evangelista et al., 2010; Wong, 2005), the population was limited to larger firms. Brand Eins (2014) created a list with 150 of these consulting firms, which is shown in appendix A. Since it was not possible to obtain a list of company names for the consulting firms listed by BDU e.V., the list from Brand Eins was used. One hypothesis is that BDU e.V. listed different legal entities of large consulting firms (e.g., Deloitte & Touche, Deloitte Consulting, Deloitte Monitor) separately, which were combined by Brand Eins.

Restricting the research to the German cultural circle was in line with findings from KM research, which showed that local culture has little to no influence

on KM (Ardichvili et al., 2006; King, 2008). Organizational culture, on the other hand, had a strong impact on KM (Chong, 2006; Jones and Leonard, 2009; Lindner and Wald, 2011), across all cultural spheres.

Figure 3-3 Growth in the European consulting market (FEACO, 2016)

Due to the large number of potential targets and the restricted amount of data on the employees of consulting firms, a probability sample was not suitable. While there are ways to leverage e.g., LinkedIn to identify suitable members of the population, they are always restricted to individuals that have signed up for such a service and that have consented to sharing their information. Therefore, this study, as is common in business research, required non-probability sampling.

The core principle of a sample is to achieve maximum heterogeneity within a population. A sample should represent the entirety of its population within a smaller group. Looking at the target population, consulting firms in Germany,

the target group was fairly heterogeneous (BDU e.V., 2016): In 2015, 24.7% of market share went to strategy consulting, 43.6% to general management consulting, 10.2% to HR consulting and 21.5% to IT consulting. Across sectors, 33.8% of consulting revenue was produced in industrial goods, 24.3% in financial services and 9.2% in the public sector. The rest was evenly divided across other sectors. To ensure that the sample represented this population, questions pertaining to experience in these sectors were added to the questionnaire.

For populations that are difficult to access or reach, researchers generally prefer purposive sampling or convenience sampling. Convenience sampling is "a type of nonprobability or non-random sampling where members of the target population that meet certain practical criteria, such as easy accessibility, geographical proximity, availability at a given time, or the willingness to participate are included for the purpose of the study" (Etikan et al., 2016). On the other hand, convenience sampling tends to be biased since it excludes members of the population that are hard to reach. The sample was chosen through purposive sampling, which relies on a sample of the population that best fulfils the research goal (Teddlie and Yu, 2007). Since the goal of this research was to understand how consulting firms in Germany can maximize their KM success, it attempted maximum variation sampling (Etikan et al., 2016). In cases where respondents need to have a certain skillset or require a certain background, a selection of a smaller, non-random group is permissible to increase the quality and validity of responses (Tongco, 2007). Appropriate candidates were selected using international career network LinkedIn and German career network Xing. The goal was to identify

consultants with appropriate professional experience (> 4 years) and tenure at one of the consulting firms listed in appendix A. To ensure a higher response rate and to keep the sample approachable (both Xing and LinkedIn restrict sending of message to a certain number per month, even with premium memberships), the selection was restricted to results with either a direct connection to the researcher, or a shared contact with the researcher. This search returned 340 profiles that had experience with at least one of the 150 firms listed by Brand Eins.

The main advantage of this selection was that the targeted consulting firms represented both high-level strategy consulting and more operative forms of consulting, such as implementation consulting. While strategy consultants generally favour a personalized strategy, other consultants prefer codification to make use of scale effects (Hansen et al., 1999). By focussing on both groups in this purposive sample, all approaches were covered.

To determine the minimum required number of responses, simple statistical sampling was used. This approach employs two variables: alpha level and the acceptable margin of error (Barlett et al., 2001; Cochran, 1977; Krejcie and Morgan, 1970). The first variable, alpha level, describes the likelihood that a Type I error occurs, i.e., that the results of the survey are coincidence. This research used an alpha of 0.05, as is common in academic research. The next variable, confidence interval, describes the margin of error, or the likelihood that any given response will be wrong. For categorical data such as Likert scales, the margin of error is commonly calculated as 0.05 (Barlett et al., 2001). For this survey, due to the limited level of access to the population and the high level of professionality of respondents, the tolerated margin of error

was set to 0.10. The formula for calculating appropriate sample sizes is shown below (Krejcie and Morgan, 1970):

$$s = X^2NP(1-P) \div d^2(N-1) + X^2P(1-P)$$

s is the required sample size. X^2 is the table value of chi-square for 1 degree of freedom (DF) at the desired confidence level. N is the population size. P is the population proportion (assumed to be .50 to provide the maximum sample size). d is the confidence interval expressed as a proportion.

The variables in the case of this study were calculated in Table 3-3.

Table 3-3 Variables for simple sample size estimation

Variable	Description	Value
X^2	Chi-square for one degree of freedom (DF)	3.84 (for $p = 0.05$ and $DF = 1$)
N	Population size	150
P	Population distribution	0.50
d	Margin of error	0.05

Using the simple sample size formula yielded $s = 58.776$. That meant the survey needed to return at least 59 responses.

3.3.6. Data collection method

The participants were purposively sampled from the shortlisted firms. The purposive sampling technique used relied on a sample of the population that best fulfilled the research goal (Teddlie and Yu, 2007). Since the goal of this research was to understand how consulting firms in Germany could maximize

their KM success, the study relied on maximum variation sampling to gather data from as many different types of consulting firms as possible (Etikan et al., 2016).

Data collection was executed through industry-leading survey tool Qualtrics (https://www.qualtrics.com/). The questionnaire described in section 3.3.2 was transferred to Qualtrics. Participants were then contacted with a personalized message that included a link to the questionnaire. The questionnaire was distributed on April 27, 2017. Between April 27 and August 28, 2017, 136 responses were received. Based on IP addresses, 125 responses were received from Germany. 4 responses were received from Switzerland and Italy, respectively. 1 response each was received from Spain, the United Kingdom and Indonesia. This meant that the goal to target consultants from countries within the German cultural circle was achieved.

Out of 136 responses, 102 responses were valid. The other 34 responses were only partially completed.

3.4. Data Analysis

To test the hypotheses proposed in this study, quantitative data analysis was employed. Since the hypotheses generally required the investigation of more than one variable (e.g., Comparing the knowledge sharing potential of an organization with its perceived KM effectiveness), quasi-experimental statistical methods such as an analysis of variance had to be used. Before the analysis of the data could be discussed, two factors needed to be confirmed: Reliability and validity of the study. Reliability is central to determining the quality of quantitative research. It refers to the ability to repeat a research

approach and obtain similar results (Saunders et al., 2016, pp. 202–203). Reliability is commonly threatened by participant error, participant bias, researcher error, or researcher bias. There are various ways to increase reliability, most of which relate to improving the phraseology of the questionnaire, e.g., by conducting pilot rounds (Oppenheim, 1992, p. 52). By carefully selecting the questions in the questionnaire and reusing concepts employed by other studies from KM research, the study aimed to produce reliable results. See section 3.3.3 for a description of the survey pilot.

The next factor that needed to be confirmed was validity. Validity means that the data that was collected allows for meaningful and valid conclusions (Creswell, 2013, p. 8). Validity has two aspects. The first aspect, internal validity, means that it is possible to demonstrate a causal relationship between two or more variables. This is especially important in quantitative research (Saunders et al., 2016, p. 203). A way to measure internal validity is to test for Cronbach's alpha. For this study, Cronbach's alpha was calculated using the "psych" package in R version 3.4.1. The cut-off for Cronbach's alpha is commonly set at $\alpha > 0.7$ (Cohen, Manion, & Morrison, 2013, p. 639). Since this study was split into two sets of hypotheses and two models, Cronbach's alpha was calculated twice. Cronbach's alpha for the first model was identified at $\alpha = 0.79$. Cronbach's alpha for the second model was identified at $\alpha > 0.79$. Both values lay above the cut-off of 0.7. This confirmed internal validity for the data underlying both models. The other aspect of validity is external validity. Easterby-Smith et al. (2012, p. 87) define external validity as the ability to generalize from a study done with a sample onto the larger population. The biggest threat to external validity is choosing a sample that is

either too small or biased. This study avoided sampling bias by carefully sampling a cross-section of the German consulting market (see section 3.3.5 for details).

Any statistical analysis should start with a description of the data, commonly using a combination of tables and bar charts or histograms (Saunders et al., 2016, pp. 512–515). These so-called inferential statistics allow the drawing of conclusions from the collected data, but are not enough to provide correlation or causality (Gray, 2013, p. 458). Bar charts represent the data as they are the most appropriate graphical representation of the ordinal data on a Likert scale (Black, 1993, p. 306).

Before choosing an appropriate statistical instrument, assumptions about the data had to be made. The questionnaire consisted of Likert-type questions with a 5-point scale. The distance between the points on the scale was not absolute, meaning it has returned ordinal data. Furthermore, the data did not return a normal distribution, as respondents tend to avoid a neutral answer (Oppenheim, 1992, p. 200). Due to these limitations, this analysis had to pay special attention to the robustness of its test approach. Parametric approaches such as generalized linear models have been found to be powerful when analysing ordinal data (McCullagh, 1980).

The first model was tested with a generalized linear model using ordinary least squares (OLS) regression. OLS is frequently used in KM research to analyse the relationship between independent and dependent variables, for example by Berg (2017). It is a generalized linear modelling technique that can be used to measure the relationship between independent variables x_n and

dependent variable *y* (Moutinho and Hutcheson, 2011, pp. 224–228). Generalized linear models are applicable to ordinal scales as long as the underlying data is symmetrical (McCullagh, 1980). As recommended by Ananth and Kleinbaum (1997), tests for goodness-of-fit and sensitivity analysis were conducted.

The second model was tested using Exploratory Factor Analysis (EFA) and Second-order Confirmatory Factor Analysis (CFA). These forms of robust analysis have received significant attention in KM research in recent years (Cohen and Olsen, 2015; Dayan et al., 2017; Hwang et al., 2018; Wang, Wang, et al., 2014). Research that addressed a similar research question to this study ("Which KM critical success factors drive organizational performance in industrial firms?") used second-order factor analysis to produce satisfactory results (Valmohammadi and Ahmadi, 2015). Another paper which studied the question "Which factors determine if employees want to get involved in the KM process?" satisfactorily applied a similar second-order confirmatory factor analysis (Karim et al., 2012). Factor analysis is either an exploratory technique that supports scale development (Exploratory Factor Analysis) or a confirmatory technique (Confirmatory Factor Analysis) that lends itself to hypothesis testing in the social sciences by combining Exploratory Factor Analysis (EFA) and Multiple Regression (Ullman and Bentler, 2012). Both EFA and CFA are generally used as large sample techniques suitable for more than 200 responses. They can also be successfully employed for samples smaller than 60 (Bentler and Yuan, 1999).

CFA is a powerful instrument to test construct validity. Unlike other approaches such as Ordinary Least Squares (OLS) analysis, CFA takes

measurement errors into account (Brown, 2015, p. 43). CFA allows to test if a number of statements accurately reflects a construct, i.e., if the statements regarding motivation to participate in KM activities correlate to the construct of cultural, technology, social and managerial drivers.

Before EFA can be undertaken, several pre-analysis questions had to be discussed, namely sample size, the handling of missing data and the software program that was used to perform the analysis (Schreiber et al., 2006). Sample size had already been discussed extensively in section 3.3.5. There are two methods for dealing with missing data in factor analysis: principal component analysis (PCA) and maximum likelihood (ML). Unlike PCA, ML assumes that data is based on a sample and makes corresponding assumptions towards distribution. This allowed the model to provide accurate standard errors, inter-factor correlations and factor loadings, among others (Lei, 2009; Schmitt, 2011). In its "robust" form, which relies on Pearson correlation, ML is also suitable for use with ordinal data (Beauducel and Herzberg, 2006). The data for this study fulfilled the following assumptions: the data was in ordinal format. The data was non-symmetric, as evidenced by the histograms shown in the previous section. This meant that the model was tested using robust ML estimation. The last question, which needed to be discussed as part of pre-analysis, was the definition of the tool. There are various programs capable of conducting factor analysis. This study used R version 3.4.1 with the lavaan package (Rosseel, 2012) to process CFA. The semPlot package (Epskamp, 2014) was used to produce path diagrams.

To conduct exploratory factor analysis, researchers should start with a description of the method used in exploration and the rotation criteria,

followed by a depiction and description of the underlying correlation matrix (Cabrera-Nguyen, 2010). Since this study could not assume a multivariate normal distribution, ordinary least squares factoring was used. Next, rotation criteria were applied to test different combinations of factors to identify the most suitable model. Rotation helped to choose the correct number of factors to retain and interpret the solution. The most frequently used rotation criteria is Varimax, which is an orthogonal approach that postulates that factors are uncorrelated (Schmitt and Sass, 2011). However, since factors in social research are frequently correlated, orthogonal approaches may lead to incorrect interpretations of models (Henson and Roberts, 2006; Schmitt, 2011). Oblique rotation criteria generally produce stronger results when analysing ordinal, correlated data (Costello and Osborne, 2005). Consequently, the EFA performed for this study relied on robust ML and oblique rotation (Oblimin).

3.5. Summary

This study adopted a quantitative approach heavily grounded in postpositivism. Therefore, it used a survey to collect quantitative data. The survey was designed in alignment to the KM process research model and divided into five sections: (1) knowledge creation, (2) knowledge codification, (3) knowledge transfer, (4) innovation, and (5) demographics. The survey consisted of a combination of positive and negative questions answered on a five-point Likert scale.

The study targeted a purposive sample of German consultancy firms, because Germany has the largest consulting industry in Europe and consistently shows

the strongest growth. This search returned 340 profiles. Out of these 340 profiles, 102 valid responses were collected. This section then detailed the data analysis methodologies that were used to analyse the data.

In the following section, these 102 responses will be analysed to test the hypotheses of this study.

Chapter 4—Analysis and Findings

4.1. Introduction

This chapter will analyse the data obtained from German consulting firms and present the findings. Following the research questions, this chapter is split into two sections: Section 4.2 focuses on the first research question, i.e., *"Which KM activities contribute to the overall success of KM in consulting firms?"* Section 4.3 focuses on the second research question, i.e., "*Which factors motivate consultants to participate in KM activities?"* Both sections follow the same structure: They begin with data screening, followed by statistical testing and end with a summary of the findings. Statistical testing for the sections differs according to the research approach laid out in the methodology. For research model 1, it first outlines the test of collinearity, followed by a test of regression using ordinary least squares regression. For research model 2, it uses a test of collinearity, followed by exploratory factor analysis and concluded by a second order confirmatory factor analysis.

4.2. Analysis of relationship between KM process activities and KM success (Research question 1)

4.2.1. Data screening

In this section, the collected data is presented through descriptive statistics. The section will go through the responses to each question. It ends with a description of the demographic data from the end of the questionnaire.

The first question asked respondents to identify the knowledge sharing performance of their organization. The first sub-questions rate the performance of the four KM process steps creation, codification, sharing and innovation. The last sub-question asked respondents to rate the performance of the organization as a whole.

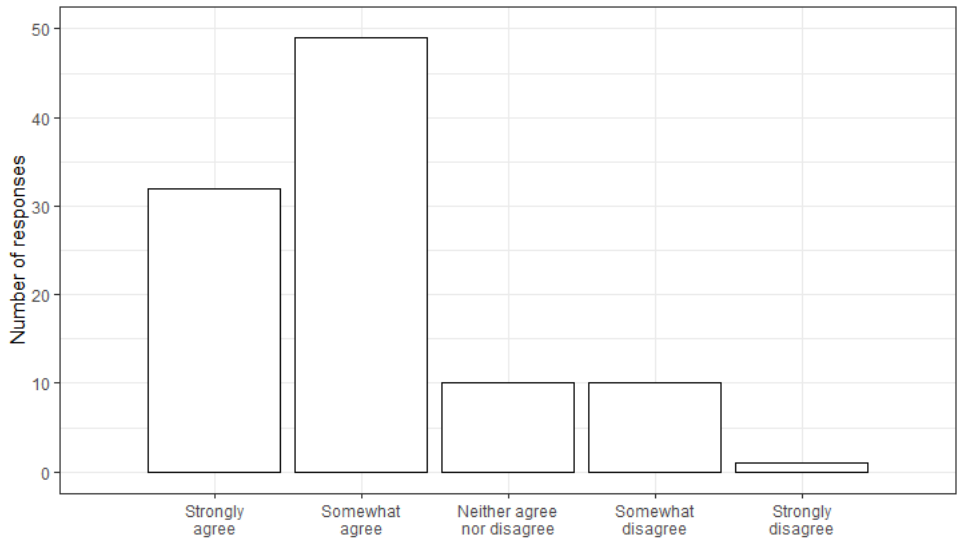


Figure 4-1 Bar chart: My organization creates a lot of new knowledge

Most respondents (79.4%) either strongly agreed or somewhat agreed that their organization created a lot of new knowledge. This is expected of employees at successful consulting firms, as knowledge is a key success factor for offering high quality products and services (Mitchell, 2006; Taminiau et al., 2009). A study conducted in the German context found that knowledge creation was generally perceived as successful by respondents that were affiliated with successful organizations (Zhang et al., 2010). This finding is reflected in these responses as well.

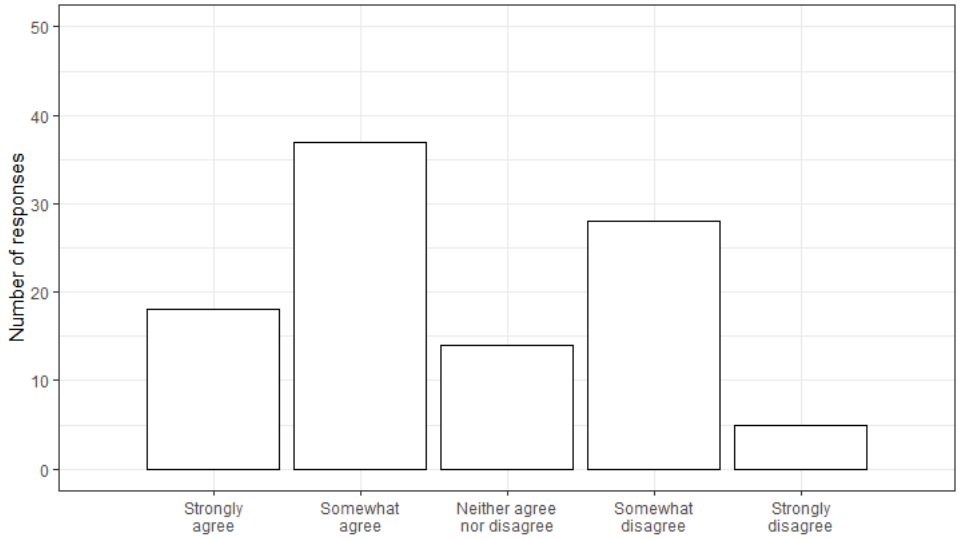


Figure 4-2 Bar chart: My organization gives me access to a lot of new knowledge

The responses on the next sub-question were less uniform: While 53.9% of respondents strongly agreed or somewhat agreed that their organization was successful at codifying, storing and retrieving knowledge, 13.7% were unsure and 32.4% either somewhat disagreed or strongly disagreed. This was expected: while knowledge creation does not require a KM system and occurs naturally to a certain degree, codification is greatly improved through the implementation of a codification strategy (Gammelgaard and Ritter, 2005; Kim et al., 2014). Firms that were unsuccessful in codifying knowledge would not have such a strategy in place. The mixed responses showed that more than one third of consulting firms in Germany struggled with implementing successful codification. This was expected as well, as codification is generally perceived as the most difficult element of KM to implement (Hall, 2006; Powell and Ambrosini, 2012).

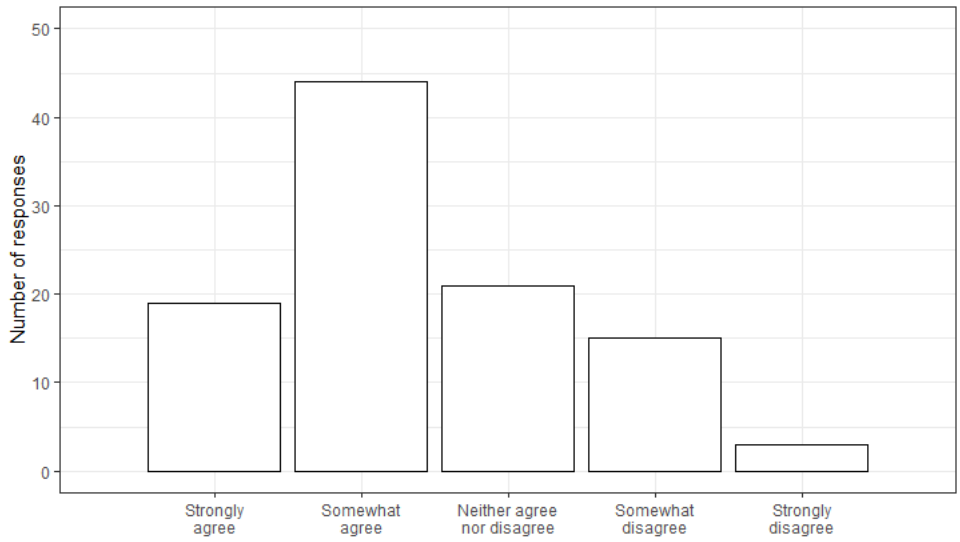


Figure 4-3 Bar chart: My organization enables and encourages knowledge sharing between me and my co-workers

For the third question, responses once again showed a more positive impression of the performance of consulting organizations. 61.8% of respondents indicated that their employer enables and encourages knowledge sharing between themselves and their co-workers. However, researchers agree that implementing processes to direct and govern sharing and transfer of knowledge is highly beneficial to an organization (Cabrera and Cabrera, 2005; Chiu et al., 2006; Gubbins and Dooley, 2014). Implementing processes for interpersonal knowledge sharing is easier than implementing codification processes (Bordia et al., 2006). Therefore, it was expected that respondents would rate the performance of "sharing" higher than the performance of "codification".

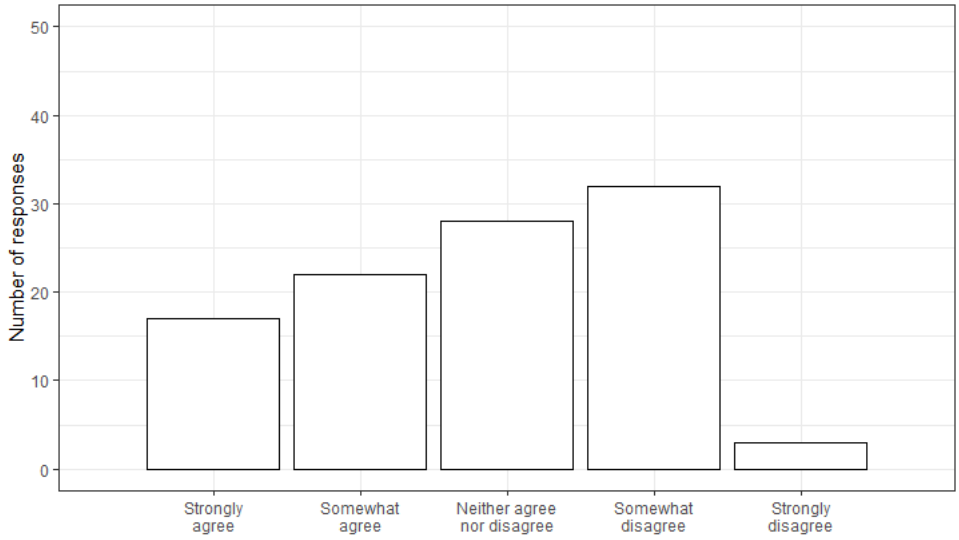


Figure 4-4 Bar chart: My organization frequently produces innovations

In the fourth question, respondents were asked if their organizations were innovative. The formation of new ideas and integration of innovative structures is a core mechanism in consulting firms (Anand et al., 2007). Therefore, a positive response was expected. However, the data showed that only 38.2% of respondents agreed with the statement that their organization frequently produced innovations. 27.5% were unsure and neither agreed nor disagreed. 34.3% of respondents disagreed. This meant that while firms create, codify and share knowledge, they did not seem to be able to successfully apply it in the form of innovation. This was explained by research that found that innovation activities required commitment and a significant investment of resources (Huggins and Johnston, 2010; Liao et al., 2007; Taminiau et al., 2009). Following on the results of this study, many German consulting firms seemed to not have made this investment.

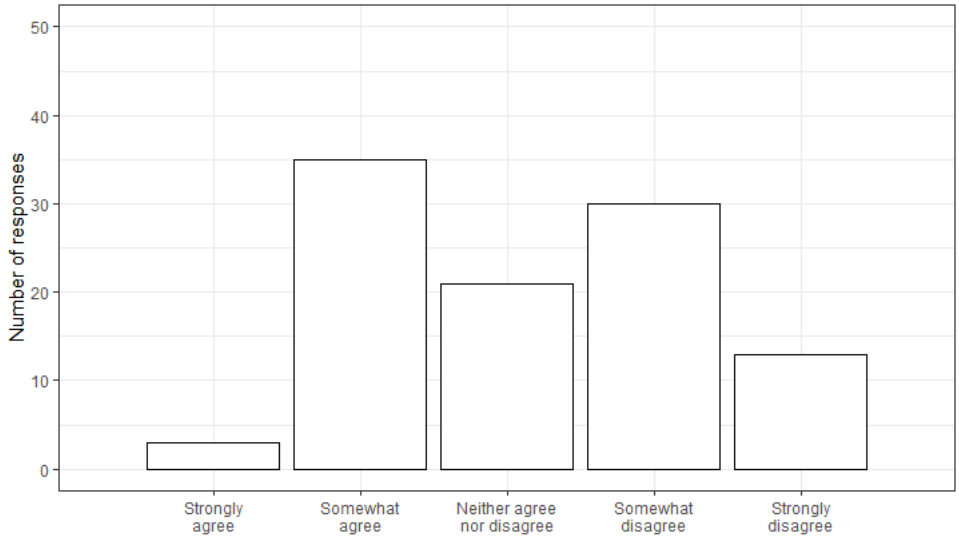


Figure 4-5 Bar chart: I believe that my organization has successful KM-

The final question asked respondents to rate the success of their organization's KM. During regression analysis, this question was connected to the different steps of the KM process. The responses showed that 2.9% of respondents strongly agreed with the performance of their organization's KM system. 37.3% somewhat agreed that their organization had good KM. 20.6% neither agreed nor disagreed, while 42.1% somewhat or strongly disagreed with the statement. There seemed to be a lot of potential to improve KM in the wide sample of organizations analysed, which included some of the most prominent consulting firms in the world. This supported the outcome of the qualitative research conducted by Powell and Ambrosini (2012), which found that none of the surveyed consulting firms had a truly successful approach to KM and recommended a combination of the observed approaches to increase KM success.

Three controlling variables were identified: The number of employees of the observed firm, the internationalization of the observed firm (measured by the

number of regions that they do business in) and the experience of the respondent.

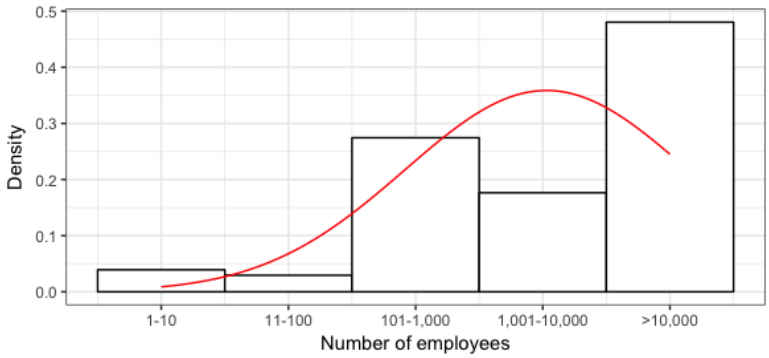


Figure 4-6 Histogram: Number of employees of the firm

The sample showed an equal distribution of firm sizes that was in line with the distribution of firm sizes in the population. The majority of firms were large firms, with more than 101 employees. A significant part of the German consulting market is taken up my large multi-national firms such as Accenture, BCG, Deloitte or EY (BDU e.V., 2016). This was reflected in the sample.

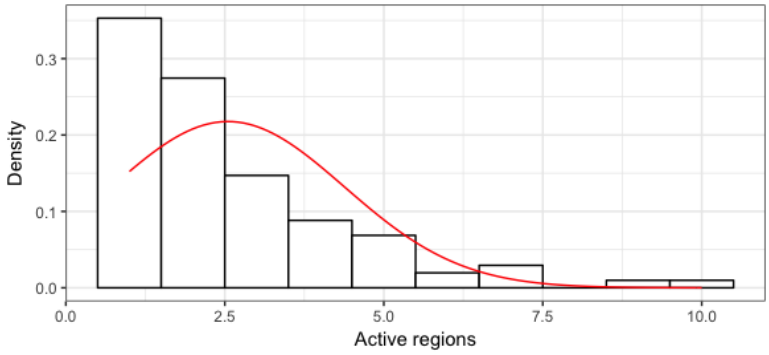


Figure 4-7 Histogram: Active regions (degree of internationalization)

To measure the degree of internationalization, respondents were asked to identify the regions in which they currently did or had done business. The bar chart shows that 35% of respondents had only worked in one region, namely

Germany, Austria and Switzerland. The rest of the respondents had worked in more regions, which included the rest of Europe, the United States and Asia. The sample seemed to combine a good mixture of experience from international firms and firms focusing on the German markets.

Figure 4-8 Histogram: Years of experience

The years of experience of the respondent were the last controlling variable. The sample seemed to reflect the average tenure of consultants well, with 38% of respondents claiming 2-5 years of experience. No respondent gave more than 20 years of experience.

4.2.2. Test of collinearity and OLS test of regression

Before quantitative data analysis could begin, collinearity had to be analysed (Saunders et al., 2016, pp. 548–549). Collinearity means that there is correlation between variables (Dormann et al., 2013), e.g., respondents affix the same rating to different predictor variables because they use the terms "knowledge creation" and "innovation" interchangeably. When a linearized model contains collinear factors, it will produce a higher standard error and be more difficult to interpret. Collinearity can be determined using the Generalized Variance Inflation Factor (GVIF).

Table 4-1 GVIF for KM process activities and KM success

Variable	GVIF
Years of experience	1.239
Size of firm	1.112
International experience	1.158
Knowledge creation	1.256
Knowledge codification	1.794
Knowledge transfer	1.340
Innovation activity	1.947

Generally, a higher GVIF indicates higher collinearity. However, in the case of regression testing, the GVIF should be transformed by raising it to the power of half the number of coefficients in the subset ($GVIF^{\frac{1}{2}*DF}$). This produces a factor that is proportional to the inflation due to collinearity in the confidence interval for the coefficient (Fox and Monette, 1992). For $GVIF^{\frac{1}{2}*DF}$, there is a

rule of thumb that a $GVIF^{\frac{1}{2}*DF} > 10$ indicates collinearity that is too high to be included in a general linear model (Dormann et al., 2013). Since none of the variables in this model produced a factor larger than 10, the assumption of collinearity could be rejected for all independent variables.

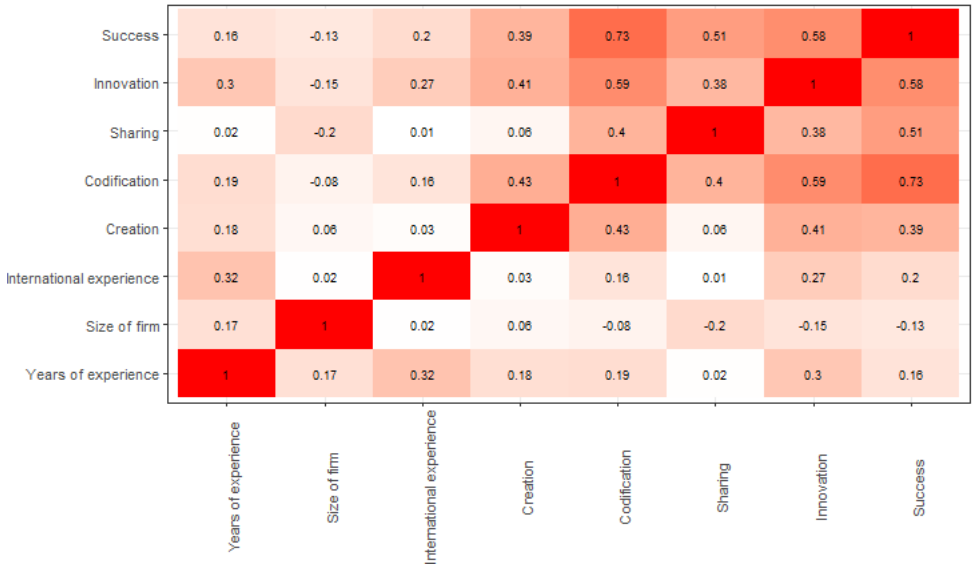


Figure 4-9 Correlation matrix for KM process activities and KM success

Figure 4-9 above depicts the correlation matrix of statements related to KM activities and their correlation with KM success. A look at the correlations revealed that there were correlations > 0.50 for codification, transfer and innovation, which signified moderate correlations that warranted investigation. Correlation also indicates construct validity (Saunders et al., 2016, p. 450; Ullman and Bentler, 2012), which means that a test of regression could be applied. The controlling variables for firm size, years of experience, international experience showed low correlation with KM process activities and success.

Next, a generalized linear model was created to test regression. It consisted of seven independent variables and one dependent variable. Four independent

variables were respondents' assessment of the KM activities "knowledge creation", "knowledge codification", "knowledge transfer" and "innovation activities". The other three independent variables were the controlling variables of "firm size", "international orientation" and "respondent years of experience".

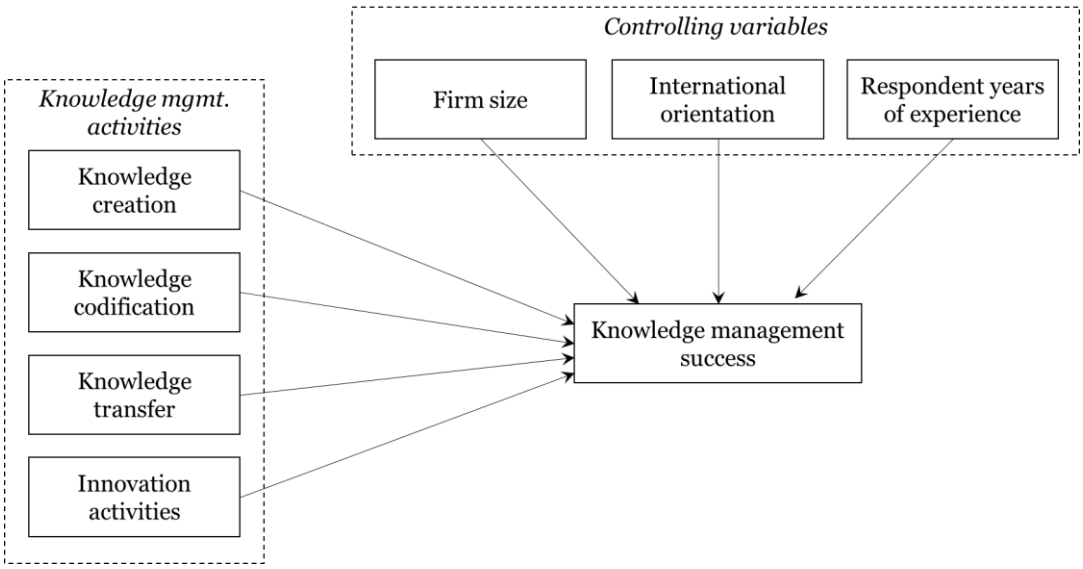


Figure 4-10 KM activity model

The generalized linear model was as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \epsilon$$

The independent variable of “knowledge creation” was X_1. “Knowledge codification” was X_2. “Knowledge transfer” was X_3. “Innovation activities” was X_4. The dependent variable of “KM success” was Y. The control variables of “firm size”, “international orientation” and “experience of the respondent” were included as X_5 through X_7, which minimized the risk of misspecification and allowed effective control for these variables (Lee and Nelder, 2003). The error term ϵ is included as well.

To test if these control variables significantly explained the dependent variable of KM success, stepwise regression was performed using backwards elimination (BE). For this study, the Akaike Information Criterion (AIC) was used to choose the best fitting model, as it is more likely to allow less significant variables than the Bayesian Information Criterion (BIC), which is stricter (Heinze et al., 2018). R^2 was found to not be an acceptable fit indicator, as the underlying model was a generalized linear model. The "step()" function in R was used to compute BE. The outcome is shown in Table 4-2 below.

Table 4-2 Outcome of stepwise regression BE testing

Model	R^2	AIC	Null deviance	Residual deviance	DF
success ~ creation + codification + sharing + innovation + sizeoffirm + international + experience	.75	230.94	126.79	48.17	94
success ~ creation + codification + sharing + innovation + sizeoffirm + international	.75	229.04	126.79	48.22	95
success ~ creation + codification + sharing + innovation + international	.75	227.45	126.79	48.41	96
success ~ creation + codification + sharing + innovation	.75	225.93	126.79	48.64	97

Applying BE showed that model fit remained the same after the removal of moderating variables. Removing all moderating variables slightly increased residual deviance at a gain of three degrees of freedom. AIC was reduced from 230.94 to 225.93. R^2 did not change. This means that the moderating variables will be removed from the model.

The model was then fitted using six diagnostics: residuals vs. fitted, normal Q-Q, scale-location, Cook's distance, residuals vs. leverage, and Cook's distance vs. leverage. Diagnostics are shown in Figure 4-11. The first plot, residuals vs. fitted was used to detect problems of fit. Problems of fit are indicated if the graph shows a curvilinear trend (Faraway, 2016, p. 14). In this case, the graph was straight, indicating a good fit for the model. The next diagnostic, the Q-Q plot, compared residuals to ideal normal observations. A well-fitted model should produce a distribution along a straight line (Faraway, 2016, p. 14), just as it did in Figure 4-11.

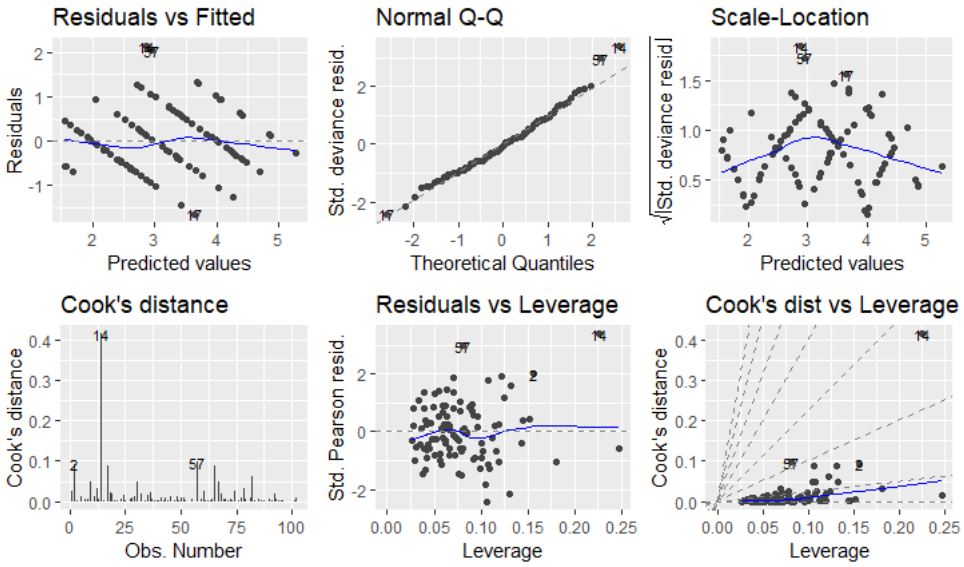


Figure 4-11 Diagnostic plots for linear regression analysis—pre-fitting

The next diagnostic plot was scale-location. The expectation would be a horizontal line with equally distributed points along the axis. Figure 4-11 shows such a plot, which is thinning at the end. The last three plots could be summarized into one indicator: Cook's distance indicates cases that have a very strong influence of the model by combining a large residual with large leverage. This diagnostic identifies three cases as having such a large

influence. Case 14 had a Cook's distance of approximately 0.4. Removing this case increased the linearity of the model and improved its generalizability.

Table 4-3 Outlier cases based on Cook's distance

Case 14	
Variable	Value
Years of experience	11-20 years
Size of firm	1,000 empl.
International experience	German-speaking region
Creation	5
Codification	1
Sharing	2
Innovation	4
Success	5

Table 4-3 shows details for case 14. This case had a high opinion of codification and very low opinion of KM success. This is contrary to the behaviour expected based on the correlation identified in the previous sections. According to Orr, Sackett and Dubois (1991), there are different ways of approaching these outliers. The first approach would be to consider them as a legitimate response and specifically investigate why they act contrary to the overall trend. The other approach would be to assume that they responded in error and exclude them from the result set to improve the generalizability of the model. Observation 14 has a far distance between codification and sharing and overall KM success. Therefore, observation 14 was excluded from the sample, leading to $N = 101$.

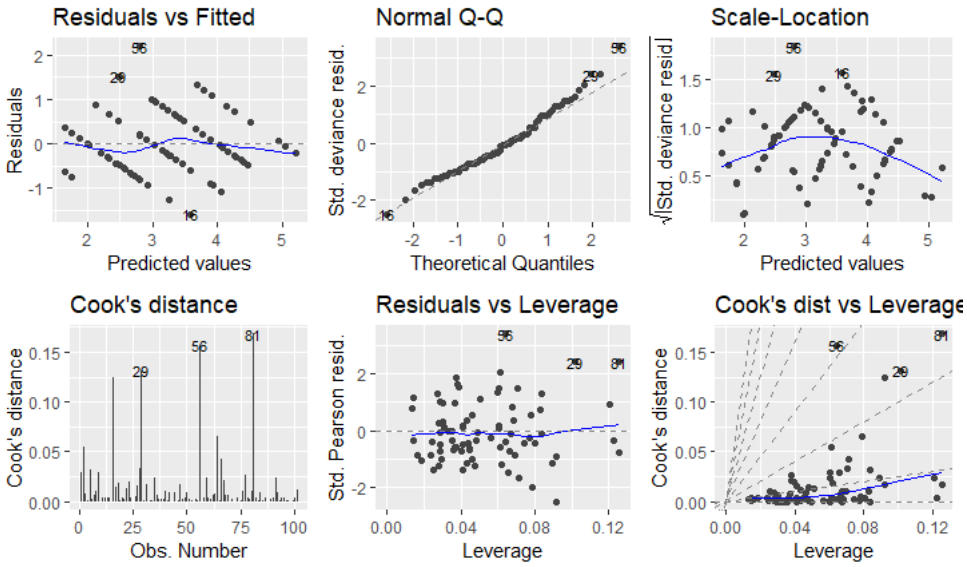


Figure 4-12 Diagnostic plots for linear regression analysis—post-fitting

Figure 4-12 shows the diagnostic plots for the fitted model after removal of observation 14. The fit has improved. The largest Cook's distance has been halved.

Table 4-4 Ordinary least squares analysis for KM model

Variable	*B*	*SE B*	*β*	*t*	*p*
Constant	.712	.229		3.110	.002**
Knowledge creation	.017	.083	.014	.201	.841
Knowledge codification	.556	.079	.597	7.082	.000***
Knowledge transfer	.243	.073	.229	3.337	.001**
Innovation activities	.111	.077	.114	1.444	.152
AIC	211.89				
DF	96				
Residual deviance	42.792				

*p<0.1; ** p<0.05; *** p<0.01

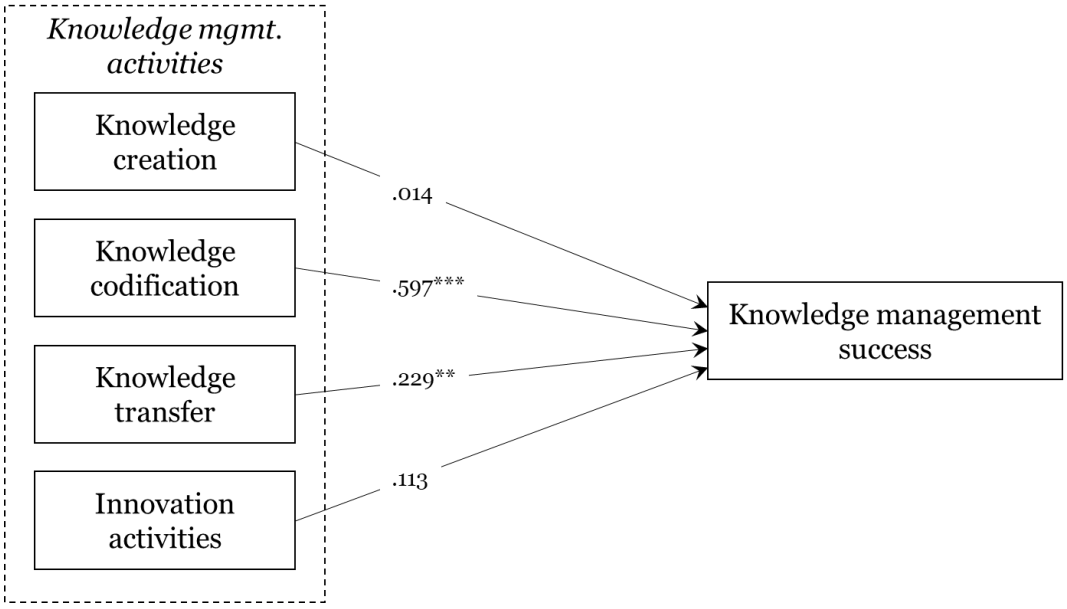
Based on the fitted generalized model, an ordinary least squares analysis was performed. The results of the ordinary least squares analysis showed that the relationship between codification, transfer and KM success were statistically significant with $p < 0.01$. The relationship between knowledge creation and KM success and innovative behaviour and KM success were not statistically significant. For creation, the non-standardized coefficient was 0.017. This was in line with the finding that there is very little correlation between creation and KM success, see section 4.2.2. For codification, the model returned a non-standardized regression coefficient of 0.556. For transfer, the model returned a non-standardized regression coefficient of 0.243. For innovation, the model returned a regression coefficient of 0.111. This means that for e.g., a +1 change in codification, KM success increased by 0.556.

4.2.3. Summary of test results for research question 1

This section analysed the data collected to answer the following research question:

> *Research question 1: Which KM activities contribute to the overall success of KM in consulting firms?*

Figure 4-13 shows the outcome of the ordinary least squares analysis for the generalized linear model.



*p<0.1; **p<0.05; ***p<0.01

Figure 4-13 Research question 1: KM success model with coefficients

The hypotheses that knowledge creation is positively associated with KM success and that innovation activities are positively associated with KM success produced low coefficients with $\beta = 0.014$ and $\beta = 0.114$ respectively. Both were also found to be statistically non-significant. The hypotheses that knowledge codification and knowledge transfer are positively associated with KM success produced higher coefficients with $\beta = 0.597$ and $\beta = 0.229$. Both

were highly statistically significant. Table 4-5 contains a summary of these test results.

Table 4-5 Research question 1: Test result for KM activities

No	Hypothesis	β	p-value
H01	Successful knowledge creation leads to overall knowledge management success in consulting firms	.014	.841
H02	Successful knowledge codification leads to overall knowledge management success in consulting firms	0.597	.000
H03	Successful knowledge transfer leads to overall knowledge management success in consulting firms	0.229	.001
H04	Successful innovation leads to overall knowledge management success in consulting firms	0.114	0.152

The controlling variables of firm size", "international orientation" and “experience of respondent” were found to be non-significant during stepwise regression testing and excluded. The theoretical and managerial implications of this result are discussed in Chapter 5.

4.3. Analysis of relationship between KM drivers and motivation to participate in KM (Research question 2)

4.3.1. Data screening

This section will analyse the data associated with KM drivers and process activities to test the hypotheses associated with this section, which are displayed in Table 4-6 below.

Table 4-6 Hypotheses for KM drivers

Number	Hypothesis
H05	Recognition of peers has a positive influence on motivation of consultants to participate in KM activities
H06	Monetary incentives have a positive influence on motivation of consultants to participate in KM activities
H07	Social capitals have a positive influence on motivation of consultants to participate in KM activities
H08	Leadership support has a positive influence on the motivation of consultants to participate in KM activities
H09	Technology has a positive influence on the motivation of consultants to participate in KM activities
H10	Leadership support has a positive influence on the motivation of consultants to participate in KM activities
H11	Fear has a negative impact on the motivation of consultants to participate in KM activities
H12	Attaching the name of the creator to knowledge has a positive influence on the motivation of consultants to participate in KM activities

First, the collected data was screened through descriptive statistics. The section went through the responses to each question. Afterwards, inferential

statistics were used to draw conclusions from the collected data and test the hypotheses (Gray, 2013, p. 458). Statistical tool "R" was used to perform the analysis. All in all, the questionnaire returned 102 valid responses. The outcome of demographical analysis was discussed in section 4.2.1.

Table 4-7 shows the descriptive statistics for KM drivers to motivate participation in KM activities. This section will screen and discuss the responses to the different driver groups.

Table 4-7 Descriptive statistics for drivers to motivate participation in KM activities

Observed variable	Statement text	n	Min	Max	Mean	Median	Var	St.dev
Q2_1	My cultural background motivates me to create knowledge	102	1	5	2.000	2	0.792	0.890
Q2_2	Recognition of my co-workers motivates me to create knowledge	102	1	5	1.961	2	0.711	0.843
Q2_3	Fear that others will use my newly created knowledge to gain an advantage over me stops me from creating knowledge	102	2	5	4.137	4	0.436	0.661
Q2_4	Access to specific technology (e.g., KM systems, research data bases) makes it easier for me to create knowledge	102	1	4	1.912	2	0.537	0.733
Q2_5	Support and encouragement by my managers motivate me to create knowledge	102	1	4	2.000	2	0.515	0.718
Q2_6	Monetary rewards motivate me to create knowledge	102	1	5	2.059	2	1.086	1.042
Q2_7	Having my name attached to the results motivates me to create knowledge	102	1	4	1.902	2	0.703	0.839
Q3_1	Having access to sophisticated tools makes it more likely for me to codify knowledge (e.g., sanitizing tools, templates, advanced KM systems)	102	1	4	1.902	2	0.624	0.790
Q3_2	Monetary rewards motivate me to codify knowledge	102	1	5	1.912	2	0.814	0.902
Q3_3	Having my name attached to the results motivates me to codify knowledge	102	1	4	1.980	2	0.653	0.808
Q3_4	Being able to reuse my own knowledge at a later point motivates me to codify knowledge	102	1	4	1.676	2	0.439	0.662
Q4_1	A shared cultural background (e.g., speaking the same language, coming from the same region) makes it more likely for me to share knowledge with others	102	1	5	2.559	2.5	0.902	0.950
Q4_2	Receiving valuable knowledge in return motivates me to share knowledge with others	102	1	5	1.804	2	0.813	0.901
Q4_3	Receiving recognition motivates me to share knowledge with others	102	1	5	1.941	2	0.769	0.877
Q4_4	Monetary rewards motivate me to share knowledge	102	1	5	2.059	2	0.828	0.910
Q4_5	Fearing that others might receive an advantage if I share knowledge with them stops me from sharing knowledge with them	102	2	5	4.059	4	0.492	0.701
Q4_6	Having a good relationship with someone motivates me to share knowledge with them	102	1	5	1.686	1	0.772	0.879
Q4_7	If someone is well-respected in the company I am more likely to share knowledge with them	102	1	5	2.167	2	0.715	0.845
Q4_8	If someone is not very respected in the company, I am reluctant to share knowledge with them	102	1	5	2.843	3	0.807	0.898
Q4_9	Having access to sophisticated technical solutions (e.g., collaboration solutions, document management, communications) makes me more likely to share knowledge with others	102	1	5	1.961	2	0.731	0.855
Q4_10	Managers that lead by example motivate me to share knowledge with others	102	1	4	1.814	2	0.609	0.780
Q4_11	A clearly communicated KM strategy motivates me to share knowledge with others	102	1	5	1.980	2	0.792	0.890
Q4_12	I share knowledge with others regardless of the rules and processes of my organization	102	1	5	2.343	2	1.317	1.147
Q5_1	I am more innovative if I work with others from the same cultural background	102	1	5	2.892	3	0.949	0.974
Q5_2	I am more innovative if I work with others that I have a good relationship with	102	1	4	1.716	2	0.542	0.736
Q5_3	I am more innovative if I receive a monetary reward for my innovations	102	1	5	2.657	3	0.960	0.980
Q5_4	I am more innovative if I receive recognition from my peers for my innovations	102	1	5	1.971	2	0.682	0.826
Q5_5	I am more innovative if the company has a strategy that rewards innovation within the workforce (e.g., 5% of my time can be dedicated to innovation)	102	1	4	1.716	2	0.582	0.763

The questionnaire was grouped by KM activities. It began with the relationship between KM drivers and knowledge creation. Respondents were asked how certain factors affected their knowledge creation behaviour. Respondents indicated that their cultural background, recognition of others, encouragement of managers and monetary rewards motivated them to create knowledge. There was very strong disagreement with the idea that fear might prohibit creation of knowledge with a median of 4.

Next, respondents were asked to rate the factors that motivate them to participate in codification. Respondents agreed with all statements. They confirmed that tool support, monetary rewards, recognition and knowledge reuse are all reasons for codifying knowledge. The strongest reason for codifying knowledge with a median of 2 and a mean of 1.676 was the ability to reuse codified knowledge at a later point in time.

Then the questionnaire focused on knowledge sharing. The best reason for sharing knowledge with someone was a good relationship with a median of 1. Good reasons for sharing knowledge were, with a median of 2: a shared cultural background, managers leading by example, receiving valuable knowledge in return, the use of IT and recognition of others. Respondents agreed that they shared knowledge regardless of the rules and processes of their employer. The status of the recipient (median of 2 for the positive, of 3 for the negative statement) and fear of being taken advantage of (median of 4) were not good drivers for knowledge sharing. Overall, the advantages of sharing knowledge motivate respondents far more than possible

disadvantages. It is interesting to note that “soft” rewards, such as recognition and more knowledge outrank the “hard” reward of monetary compensation.

Finally, respondents were asked to respond to the last question “Please rate the following statements to show what motivates you to be innovative”. Drivers that encourage innovative behaviours were a company strategy that rewards innovation, a harmonious team and recognition of their peers (median of 2). Monetary rewards did not clearly encourage innovation (median of 3). The cultural background of co-workers also only mattered for a minority with a median of 3.

From observing the descriptive statistics, questions belonging to the same construct (e.g., Q3_2 and Q4_4 for monetary incentives) were found to produce very similar results and would thus confirm the hypotheses. To obtain final confirmation, both correlations and scale validity were tested.

4.3.2. Test of correlation and EFA

Next, EFA was used to validate the construct for each hypothesis. Section 3.4 provided a detailed description of the approach. First, the correlations were tested. The correlation matrix in appendix E showed multiple strong correlations between factors. Consequently, the data should be suitable for exploratory factor analysis. To determine the approximate number of items for exploratory factor analysis, a scree test should be performed (Brown, 2015, p. 24; Costello and Osborne, 2005; Schmitt, 2011). During a scree test, a graph of eigenvalues of the available data is created. The slope of the graph will change at some point. This point is the cut-off for the number of factors that should be considered in EFA.

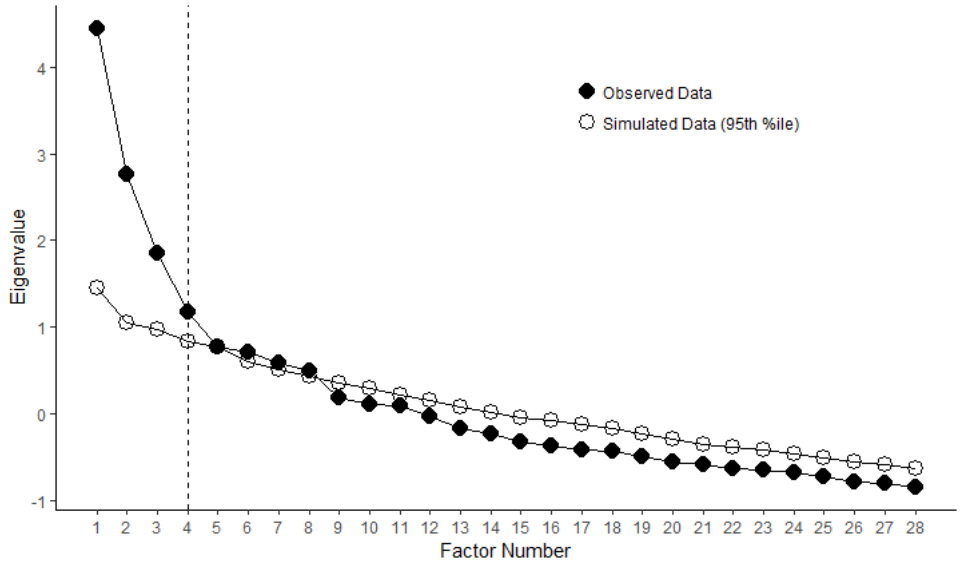


Figure 4-14 Scree test

The scree plot indicated that six factors should be suitable to explain the data. Running exploratory factor analysis with six factors in R version 3.4.1 using the "Parallel" package returned double loadings at a cut-off of 0.4 (Tabachnick and Fidell, 2001). Increasing the number of factors to 8 (same as the number of hypotheses) revealed 8 strong factors with $\lambda > 1$ and without double loadings, which signifies a satisfactory result. (Costello and Osborne, 2005).

Table 4-8 Output of EFA with 8 factors (cut-off .4)

Observed variable	Observed variable statement text	MR2	MR4	MR3	MR7	MR1	MR8	MR5	MR6
Q2_1	My cultural background motivates me to create knowledge								
Q2_2	Recognition of my co-workers motivates me to create knowledge						0.43		
Q2_3	Fear that others will use my newly created knowledge to gain an advantage over me stops me from creating knowledge							0.74	
Q2_4	Access to specific technology (e.g., knowledge management systems, research data bases) makes it easier for me to create knowledge				0.86				
Q2_5	Support and encouragement by my managers motivate me to create knowledge		0.88						
Q2_6	Monetary rewards motivate me to create knowledge			0.63					
Q2_7	Having my name attached to the results motivates me to create knowledge					0.91			
Q3_1	Having access to sophisticated tools makes it more likely for me to codify knowledge (e.g., sanitizing tools, templates, advanced knowledge management systems)				0.82				
Q3_2	Monetary rewards motivate me to codify knowledge			0.76					
Q3_3	Having my name attached to the results motivates me to codify knowledge					0.88			

Observed variable	Observed variable statement text	MR2	MR4	MR3	MR7	MR1	MR8	MR5	MR6
Q3_4	Being able to reuse my own knowledge at a later point motivates me to codify knowledge				0.42				
Q4_1	A shared cultural background (e.g., speaking the same language, coming from the same region) makes it more likely for me to share knowledge with others								0.99
Q4_2	Receiving valuable knowledge in return motivates me to share knowledge with others						0.40		
Q4_3	Receiving recognition motivates me to share knowledge with others						0.80		
Q4_4	Monetary rewards motivate me to share knowledge			0.79					
Q4_5	Fearing that others might receive an advantage if I share knowledge with them stops me from sharing knowledge with them							0.94	
Q4_6	Having a good relationship with someone motivates me to share knowledge with them	0.94							
Q4_7	If someone is well-respected in the company I am more likely to share knowledge with them	0.79							
Q4_8	If someone is not very respected in the company, I am reluctant to share knowledge with them	0.47							
Q4_9	Having access to sophisticated technical solutions (e.g., collaboration solutions, document management, communications)				0.59				

Observed variable	Observed variable statement text	MR2	MR4	MR3	MR7	MR1	MR8	MR5	MR6
	makes me more likely to share knowledge with others								
Q4_10	Managers that lead by example motivate me to share knowledge with others		0.66						
Q4_11	A clearly communicated knowledge management strategy motivates me to share knowledge with others		0.98						
Q4_12	I share knowledge with others regardless of the rules and processes of my organization								
Q5_1	I am more innovative if I work with others from the same cultural background								0.67
Q5_2	I am more innovative if I work with others that I have a good relationship with	0.88							
Q5_3	I am more innovative if I receive a monetary reward for my innovations			0.65					
Q5_4	I am more innovative if I receive recognition from my peers for my innovations						0.76		
Q5_5	I am more innovative if the company has a strategy that rewards innovation within the workforce (e.g., 5% of my time can be dedicated to innovation)								
	Eigenvalue	**2.72**	**2.5**	**2.28**	**2.32**	**2.05**	**1.98**	**1.64**	**1.51**
	Cumulative variance	**0.094**	**0.18**	**0.26**	**0.338**	**0.405**	**0.468**	**0.526**	**0.578**

No latent variables were the product of only one factor, so no latent variables had to be removed, (Henson and Roberts, 2006). The identified latent variables explained 57.8% of the variance in the data. This was slightly below the suggested cut-off point of 60% by Hair et al (Hair Jr et al., 2014, p. 107) and in line with findings from a meta-study on exploratory factor analysis (Peterson, 2000). Therefore, the eight-factor model was accepted. Three out of 28 observed variables were not reflected in any factor due to loadings below the cut-off of 0.4. The strongest factor that was identified was MR2. All statements related to relationships and social capital were captured by this factor. With $\lambda = 2.72$, this factor accounts for 9.4% of variance. The second factor was MR4 with $\lambda = 2.50$. Most factors related to leadership (e.g., management leading by example, KM strategy in place) were captured. The influence of strategy on innovation activities was not a part of this factor. The third factor was MR3 with $\lambda = 2.28$. All statements related to monetary rewards were captured by this factor. The fourth factor was MR7 with $\lambda = 2.32$. All observed variables for use of technology were captured. The fifth factor was MR1 with $\lambda = 2.05$. All factors related to "attaching the name of the creator" were captured. The sixth factor was MR8 with $\lambda = 1.98$, which covered all statements related to recognition. The seventh factor was MR5 with $\lambda = 1.64$. Both observed variables related to fear produced significant loadings onto this factor. The eighth and final factor was MR6 with $\lambda = 1.51$. Two out of three statements related to culture were captured. The influence of culture on creation did not produce a significant loading. Since no factor has $\lambda < 1$, all factors will be considered (Williams et al., 2010).

The factors were then computed using second-order CFA analysis. Calculation of the model returns a set of fit statistics. Before discussing the fit statistics, it should be noted that there are no universally accepted fit statistics for CFA and that all fit statistics require both careful consideration and analysis (Saris et al., 2009; Schmitt, 2011). However, they can still provide valuable guidance and indicate ill-fitting models that should be revised (Bentler, 2007).

Table 4-9 Fit statistics of hypotheses-based CFA for technology drivers

Statistical indicator	Description	Acceptable value	Source	Calculated value
Root Mean Square Error of Approximation (RMSEA)	Determine power of model	< .1	(MacCallum et al., 1996)	.080
Robust Comparative Fit Index (CFI)	Goodness of fit	> .8	(Greenspoon and Saklofske, 1998; Shevlin and Miles, 1998)	.864
x^2 (Chi square)	Goodness of fit	> .05	(Hu and Bentler, 1999; Schermelleh-Engel et al., 2003)	.000

Table 4-9 shows the fit statistics for the model. Chi square equaled zero, which could indicate that the model was not a good fit (Hu and Bentler, 1999). However, more recent research advocated the use of other goodness of fit indicators such as RMSEA and CFI beyond chi square, as chi square was found to be unreliable at smaller sample sizes, as was the case here (Bentler, 2007). The Root Mean Square Error of Approximation (RMSEA) describes the power of the model by identifying the parameters that do not comply with the distribution of the fitting function (i.e., parameters that cannot be fitted). Models that have more freely estimated parameters will therefore produce a

higher RMSEA, which indicates that the data does not support the research question (Brown, 2015, pp. 83–84). Acceptable values for RMSEA should lie below 0.1 (Hu and Bentler, 1999; MacCallum et al., 1996). In this case, RMSEA equalled 0.80, which indicates a fair model fit. The next fit statistic, the Comparative Fit Index (CFI) compares a model against a more simplified, baseline version. It is very sensitive to model complexity and should be kept above 0.8 to indicate a reasonably well-fitting model (Greenspoon and Saklofske, 1998; Shevlin and Miles, 1998). A higher CFI indicates a stronger construct and therefore a better-fitting model (Chen, 2007a; Jackson et al., 2009; Schmitt, 2011). For this model, the CFI indicated a fair fit with a value of 0.86. Next, the model was computed and factor loadings were identified. Factors were named according to the observed variables that are contained within, e.g., the latent factor MR8, which produced strong loadings for observed variables related to recognition of others, will be labelled as recognition.

The loadings for the model confirm the expectations from the exploratory factor analysis. The model was then plotted using LISREL notation.

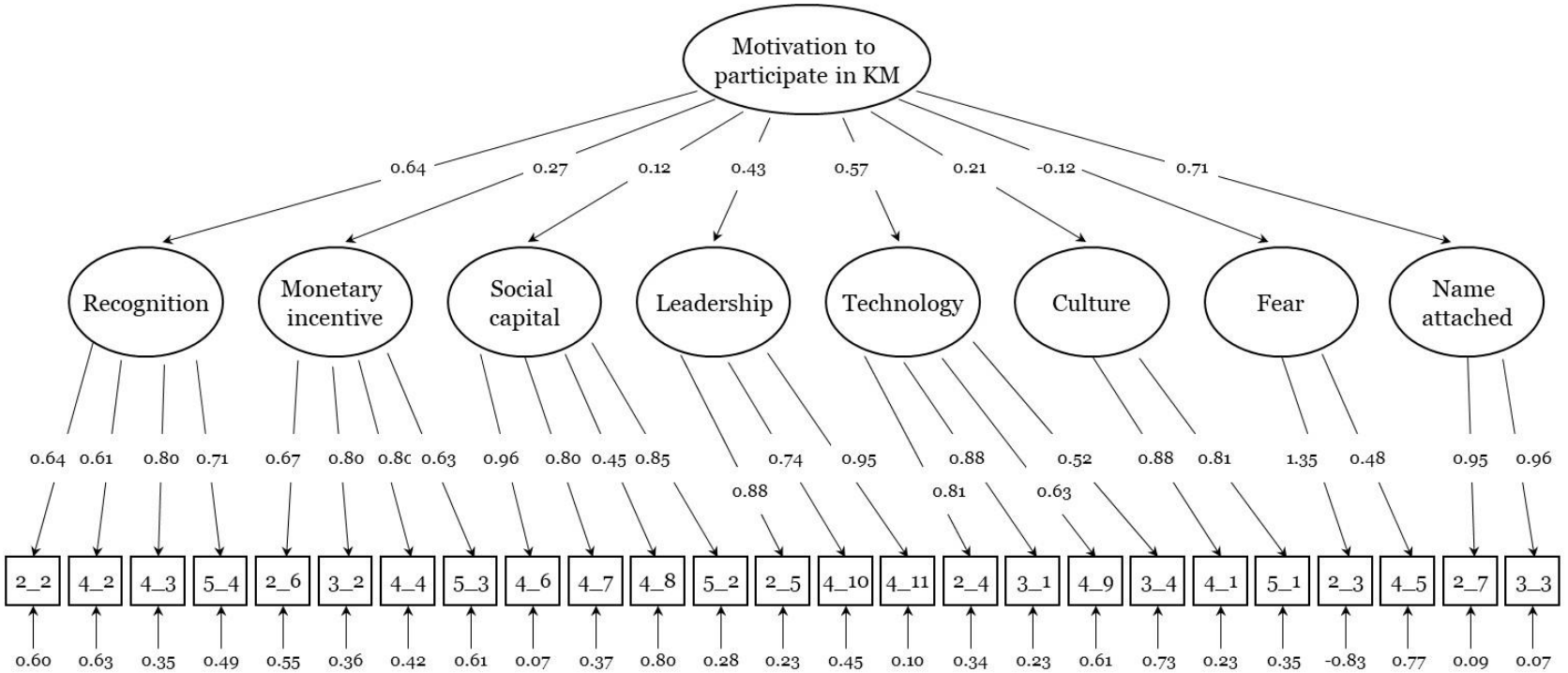


Figure 4-15 LISREL output for second order CFA

Figure 4-15 shows the output of the LISREL plot using R-package "semPaths". Brown (2015, pp. 18–20) explains how to read his output. The bottom-most line (e.g., 0.60 or Q2_2) denotes the variance of the factor, i.e., how far responses deviate from the mean. The next line, e.g., 0.64 for Q2_2 is the loading of the factor onto the latent factor. The loading indicates how strongly the factor associates with the latent factor. P-values are not visualized in the diagram. Table 4-10 on page 186 documents fhe full output of confirmatory factor analysis.

The first latent factor, recognition, has a strong loading of $\beta = 0.64$ onto overall motivation to participate in KM activities. With $p > 0.008$, the scale is statistically significant. The next latent factor, monetary incentives, has a weaker loading onto overall motivation to participate in KM activities with $\beta = 0.27$. The relationship between observed variables and the latent variable is highly significant with $p < 0.001$, so while monetary incentives are recognized, they seem to not be valid for consultants. For social capital, loading onto overall motivation to participate in KM activities is weak with $\beta = 0.12$. The relationship between observed variables and the latent variable is highly significant with $p < 0.001$. The next latent factor, leadership, has a higher impact on overall motivation to participate in KM activities with $\beta = 0.43$. The relationship of observed variables to this latent factor is highly significant with $p < 0.01$. For use of technology, the loading is also strong with $\beta = 0.57$. The construct of the latent factor is also highly statistically significant with $p < 0.001$. The latent factor of culture has a weak loading with $\beta = 0.21$ The construct is not statistically significant with $p > 0.14$. The next latent factor of fear has a weak negative loading on motivation with $\beta =$

-0.12. The construct is weakly statistically significant with $p > 0.065$. The last latent factor is “attaching the creator’s name” with a strong loading of $\beta = 0.71$. The construct is highly statistically significant with $p < 0.001$.

While the statistical significance of the different driver constructs is strong (with the exception of culture and fear), the relationship between the driver constructs and overall motivation to share knowledge is not always statistically significant. The relationship of leadership and technology to motivation is highly statistically significant with $p = 0.004$ and $p = 0.007$ respectvely. Having one's name attached is also statistically significant with $p = 0.011$. The relationship of the other factors to overall motivation to participate in KM activities is not statistically significant. This can have various reasons: One is a sample size that is too small. However, since the p-values of the various constructs are highly significant, this reason can be excluded. The other, more likely reason is that the misidentified constructs of fear and culture distort the second-level construct of overall motivation to participate in KM activities. Table 4-10 shows the full output of CFA including unstandardized estimate B, standardized estimate β, standard error, z-value and p-value.

Table 4-10 Outcome of CFA

Latent variable	Observed variable	Observed variable statement text	B	β	Std. err.	z-value	p-value
Recognition	Q2_2	Recognition of my co-workers motivates me to create knowledge	0.410	0.636	0.110	3.742	<0.001
Recognition	Q4_2	Receiving valuable knowledge in return motivates me to share knowledge with others	0.419	0.608	0.088	4.764	<0.001
Recognition	Q4_3	Receiving recognition motivates me to share knowledge with others	0.539	0.804	0.200	2.687	0.007
Recognition	Q5_4	I am more innovative if I receive recognition from my peers for my innovations	0.450	0.713	0.170	2.649	0.008
Monetary incentive	Q2_6	Monetary rewards motivate me to create knowledge	0.674	0.674	0.113	5.966	<0.001
Monetary incentive	Q3_2	Monetary rewards motivate me to codify knowledge	0.691	0.798	0.114	6.052	<0.001
Monetary incentive	Q4_4	Monetary rewards motivate me to share knowledge	0.664	0.798	0.086	7.695	<0.001
Monetary incentive	Q5_3	I am more innovative if I receive a monetary reward for my innovations	0.588	0.626	0.110	5.346	<0.001
Social capital	Q4_6	Having a good relationship with someone motivates me to share knowledge with them	0.837	0.964	0.097	8.669	<0.001
Social capital	Q4_7	If someone is well-respected in the company I am more likely to share knowledge with them	0.664	0.795	0.087	7.599	<0.001
Social capital	Q4_8	If someone is not very respected in the company, I am reluctant to share knowledge with them	0.401	0.452	0.116	3.441	0.001
Social capital	Q5_2	I am more innovative if I work with others that I have a good relationship with	0.618	0.850	0.074	8.348	<0.001
Leadership	Q2_5	Support and encouragement by my managers motivate me to create knowledge	0.565	0.879	0.053	10.733	<0.001
Leadership	Q4_10	Managers that lead by example motivate me to share knowledge with others	0.521	0.744	0.058	8.912	<0.001
Leadership	Q4_11	A clearly communicated KM strategy motivates me to share knowledge with others	0.758	0.950	0.087	8.744	<0.001

Latent variable	Observed variable	Observed variable statement text	B	β	Std. err.	z-value	p-value
Technology	Q2_4	Access to specific technology (e.g. KM systems, research data bases) makes it easier for me to create knowledge	0.485	0.810	0.089	5.434	<0.001
Technology	Q3_1	Having access to sophisticated tools makes it more likely for me to codify knowledge (e.g. sanitizing tools, templates, advanced KM systems)	0.565	0.876	0.075	7.555	<0.001
Technology	Q4_9	Having access to sophisticated technical solutions (e.g. collaboration solutions, document management, communications) makes me more likely to share knowledge with others	0.438	0.628	0.076	5.785	<0.001
Technology	Q3_4	Being able to reuse my own knowledge at a later point motivates me to codify knowledge	0.279	0.516	0.067	4.142	<0.001
Fear	Q2_3	Fear that others will use my newly created knowledge to gain an advantage over me stops me from creating knowledge	0.573	0.879	0.302	1.900	0.057
Fear	Q4_5	Fearing that others might receive an advantage if I share knowledge with them stops me from sharing knowledge with them	0.559	0.807	0.303	1.844	0.065
Culture	Q4_1	A shared cultural background (e.g. speaking the same language, coming from the same region) makes it more likely for me to share knowledge with others	1.250	1.353	0.847	1.475	0.140
Culture	Q5_1	I am more innovative if I work with others from the same cultural background	0.458	0.484	0.293	1.565	0.117
Name attached	Q2_7	Having my name attached to the results motivates me to create knowledge	0.558	0.951	0.114	4.879	<0.001
Name attached	Q3_3	Having my name attached to the results motivates me to codify knowledge	0.545	0.964	0.107	5.081	<0.001
Motivation	MR8	Recognition	0.834	0.640	0.590	1.413	0.158
Motivation	MR3	Monetary incentive	0.275	0.265	0.266	1.032	0.302
Motivation	MR2	Social capital	0.122	0.121	0.275	0.444	0.657
Motivation	MR4	Leadership	0.482	0.434	0.166	2.905	0.004
Motivation	MR7	Technology	0.696	0.571	0.256	2.716	0.007

Latent variable	Observed variable	Observed variable statement text	B	β	Std. err.	z-value	p-value
Motivation	MR6	Culture	0.218	0.213	0.222	0.983	0.326
Motivation	MR5	Fear	-0.125	-0.124	0.188	-0.665	0.506
Motivation	MR1	Name attached	1.014	0.712	0.397	2.554	0.011

With testing for knowledge activity drivers concluded, the results were aggregated.

4.3.3. Summary of test results for research question 2

This section described an exploratory factor analysis to identify the constructs that have an influence on consultant's motivation to participate in KM activities to answer the following research question:

> *Research question 2: Which factors motivate consultants to participate in KM activities?*

Eight factors were identified that accounted for 58% of the variance in the data. These factors represent 25 out of 28 observed variables with Eigenvalues larger than 1. To further test the validity of these factors, a confirmatory factor analysis was conducted, which found high statistical significance for the relationship between observed variables and latent factors for all factors with the exception of fear and culture. Consequently, the effect of the latent factor on overall motivation to participate in KM activities also showed low statistical significance.

Table 4-11 Research question 2: Test result for KM drivers

No	Hypothesis	β	p-value
H05	Recognition from others has a positive influence on motivation of consultants to participate in KM activities	0.713	0.260

No	Hypothesis	β	p-value
H06	Monetary incentives have a positive influence on motivation of consultants to participate in KM activities	0.215	0.520
H07	Social capital of others has a positive influence on motivation of consultants to participate in KM activities	0.143	0.481
H08	Leadership support has a positive influence on the motivation of consultants to participate in KM activities	0.607	0.034
H09	Technology has a positive influence on the motivation of consultants to participate in KM activities	0.529	0.023
H10	Culture has a positive influence on the motivation of consultants to participate in KM activities	0.206	0.379
H11	Fear has a negative impact on the motivation of consultants to participate in KM activities	0.095	0.624
H12	Attaching the name of the creator to knowledge has a positive influence on the motivation of consultants to participate in KM activities	0.657	0.075

The goal of this section, namely to identify the item scales that have an impact on consultants' motivation to participate in KM activities, has been achieved.

4.4. Summary

This chapter analysed and presented the findings for both research questions using descriptive statistics to screen the data, tests of collinearity and then statistical testing with ordinary least squares regression for the first model and both exploratory and then secondary order confirmatory factor analysis for the second model. Both models produced findings that warrant further discussion.

This concluded the analysis and presentation of findings. The next chapter discusses the findings in the context of the literature.

Chapter 5—Discussion

5.1. Introduction

The previous chapter presented the data obtained during the study and analysed it in two sections, one for each of the models. This chapter will follow the same approach to discuss the data and compare the findings to the outcome expected based on the literature review. Each section will go through the findings along the hypotheses. For each hypothesis, it will recall the summary of the literature review and compare it to the outcome of the survey. The difference will then be interpreted to create insights (Saunders et al., 2016, p. 640). The hypotheses will then be confirmed or the null hypothesis will be accepted.

5.2. Discussion of findings for KM process activities and KM success (research question 1)

The first model intended to answer the following question: *Which KM activities contribute to the overall success of KM in consulting firms?* To answer this question, this study reviewed established KM frameworks and combined them into one process that spans the four process steps "Creation", "Codification", "Transfer" and "Innovation" (Alavi and Leidner, 2001; Foo et al., 2012; King, 2009; von Krogh et al., 2001). The assumption from the literature was that these activities, if executed effectively, would contribute to overall KM success (Choi and Lee, 2012; Gaimon and Bailey, 2013; Lindner and Wald, 2011; Powell and Ambrosini, 2012). To test the framework, it was

applied to a survey among established consultants active in the German market.

Out of the four hypotheses in the model, two hypotheses (H02 and H03) were confirmed. H01 "KM success depends on knowledge creation" and H04 "KM success depends on innovation" could not be confirmed.

Hypothesis H1 postulated a dependent relationship between knowledge creation and KM success. Knowledge creation does not significantly predict KM success, $\beta = .014,\ t(96) = .201, p = .841$. This meant that the null hypothesis was accepted: There was no dependent relationship between knowledge creation and KM success in the case of German consulting firms. This contradicted the findings of Choi and Lee (2003) and Schepers and Berg (2006), who found that knowledge creation was a product of KM. However, findings of De Clercq and Dimov (2008), who conducted a quantitative study of knowledge creation in the venture capital sector in the US, showed that knowledge-intensive industries often prefer external knowledge acquisition to internal knowledge creation. This context can be extended to consulting firms: Knowledge is created externally, by consultants in the field, on-site with clients, without direct involvement of the KM teams. If specific knowledge is required, it is accessed from other consultants or the KM system. However, this access would then be reflected in the knowledge transfer process step. This separation between knowledge creation, codification and sharing explained the rejection of hypothesis H1.

Testing for the next hypothesis, H2, showed a clear and strong dependent relationship between the knowledge codification performance of an

organization and its perceived success of KM, $\beta = .597,\ t(96) = 7.082, p < .000$. The null hypothesis was rejected. In consulting firms, codification affects every member of the organization, since everyone is expected to contribute knowledge (Donate and Canales, 2012; Hansen et al., 1999; Harold Harlow, 2008). Successful knowledge codification requires a unified code. Successfully decoding knowledge requires access to the same code. Knowledge transfer is restricted by each individual's abilities to codify and decode knowledge (Hall, 2006). A KM team is responsible for defining and managing this codification effort through an appropriate KM strategy (Kim et al., 2014; Powell and Ambrosini, 2012). They are also responsible for providing an easy to use IT system to support codification (López et al., 2009). Consequently, consulting firms saw the strongest connection between a KM process step and the success of a KM function in the area of codification.

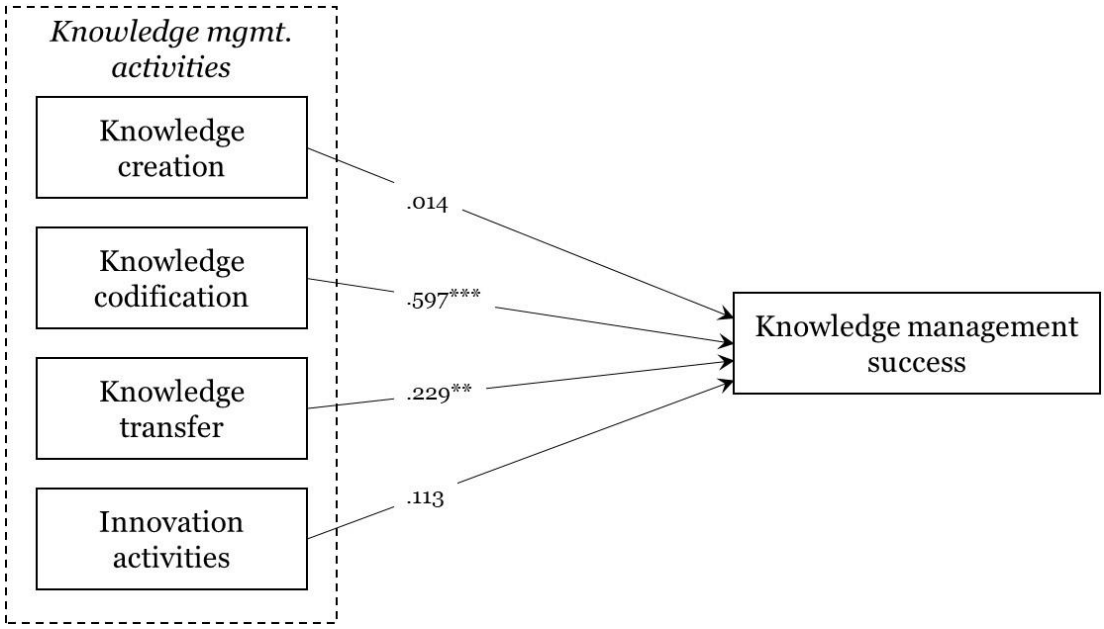
For hypothesis H3, the results of the study showed a medium-strength relationship between knowledge transfer and KM success, $\beta = .229,\ t(96) = 3.337, p = .001$. The null hypothesis that there is no dependent relationship between knowledge transfer and KM success was rejected. This was in line with the literature: The KM team of a consulting firm can increase knowledge sharing through appropriate incentives (Bordia et al., 2006), quality control of shared content (Kankanhalli et al., 2005a), a positive social environment that encourages sharing (Bergman et al., 2004; Bordia et al., 2006) and an easy-to-use KM system (Chen, 2007b). On the other hand, a lot of knowledge transfer happens interpersonally, out of control of the KM team (Chiu et al., 2006; Hsu et al., 2007; Huggins and Johnston, 2010). This explains why respondents saw a clear responsibility with the KM team for knowledge

transfer and perceived successful knowledge transfer as a success of the KM function. On the other hand, the responsibility of the KM team for knowledge transfer was less than the responsibility of the KM team for codification, because a lot of knowledge transfer occurs outside the KM organization.

Hypothesis H4, which postulated that KM success in consulting firms depended on successful innovation, returned a weak relationship, $\beta = .114$, $t(96) = 1.444, p = .152$. Compared to the estimates for codification and transfer respectively, this value was significantly lower. Therefore, the null hypothesis was accepted: The study found no dependent relationship between innovation and KM success for consulting firms. This contradicts the findings of studies from other knowledge-intensive industries such as biotechnology, which identified innovation as a core product of KM (Alegre et al., 2013; Darroch, 2005; Jones and Leonard, 2009; Tödtling et al., 2006). Other studies found direct links between KM and innovation performance (Wang and Wang, 2012). There is some research that can explain the results of this study: According to both Liao et al. (2007) and Subramaniam and Youndt (2005), innovation is first and foremost supported with knowledge acquired through interpersonal relationships and social capital. Therefore, respondents to this study did not recognize innovation as an activity supported by the KM team. To them, KM began with codification and ended with knowledge transfer. All activities that happened after knowledge had been received, were perceived to occur on an individual level.

This answered the first research question: *Which KM activities contribute to the overall success of KM in consulting firms?* In German consulting firms, both knowledge creation and innovation are not activities that are associated

with a successful KM function. Successful KM was mostly associated with effective knowledge codification, and, to a lesser degree, with effective knowledge transfer. Figure 5-1 shows the completed KM activity research model, which visualizes the findings of this study.



*p<0.1; **p<0.05; ***p<0.01

Figure 5-1 Research question 1: KM success model with coefficients

5.3. Discussion of findings for KM drivers and motivation to participate in KM (research question 2)

The second model intended to answer the following research question: *Which factors motivate consultants to participate in KM activities?* Eight drivers were identified in the literature that drove the effectiveness of KM activities, which were transformed into eight hypotheses:

- H05 Recognition from others has a positive influence on motivation of consultants to participate in KM activities
- H06 Monetary incentives have a positive influence on motivation of consultants to participate in KM activities
- H07 Social capital of others has a positive influence on motivation of consultants to participate in KM activities
- H08 Leadership support has a positive influence on the motivation of consultants to participate in KM activities
- H09 Technology has a positive influence on the motivation of consultants to participate in KM activities
- H10 Culture has a positive influence on the motivation of consultants to participate in KM activities
- H11 Fear has a negative impact on the motivation of consultants to participate in KM activities
- H12 Attaching the name of the creator to knowledge has a positive influence on the motivation of consultants to participate in KM activities

These eight hypotheses were tested using second-order Confirmatory Factor Analysis (CFA), since they postulated latent factors such as social capital, which could not be tested using a questionnaire, but had to be inferred from observed factors. The outcome of this test was reported in section 4.3.

The test for the first hypothesis, "H5 Recognition from others has a positive influence on motivation of consultants to participate in KM activities" yielded a negative result: The relationship between observed variables and the latent

variable of "recognition from others" was statistically significant with $p < 0.01$. This meant that the construct of recognition that was identified in the literature was shown to be valid and that the findings that most practitioners were intrinsically motivated by the recognition of others (Kankanhalli et al., 2011; Nelson et al., 2006; Sié and Yakhlef, 2009; Wang, Noe, et al., 2014) could be confirmed. However, the relationship between the latent variable and overall motivation was measured at $\beta = 0.64$ with $p = 0.16$. This is not significant. Consequently, the null hypothesis was accepted: While recognition is a driving force for KM, it was found to not be significant in this study of consultants' motivation to participate in KM activities.

The next hypothesis is closely related to the intrinsic motivation of recognition: H06 states that "Monetary incentives have a positive influence on motivation of consultants to participate in KM activities". During CFA, the observed variables Q2_6, Q3_2, Q4_4 and Q5_3 had a strongly significant relationship onto the latent variable with $p \leq< 0.001$. Loadings onto the latent variable were also found to be strong, with $\beta \geq 0.63$. This confirmed the construct presented and tested by the significant number of studies in KM research that found monetary incentives to be a consistent influence on motivation to participate in KM activities (Gagné, 2009; Kwok and Gao, 2005; Nelson et al., 2006; Wang, Noe, et al., 2014). The relationship between the latent variable for monetary incentives and overall motivation of consultants to participate in KM activities was measured at $\beta = 0.27$ and $p = 0.302$. This meant it was not significant. This was in line with other KM research, which doubts the positive influence of monetary incentives onto motivation to participate in KM activities (Bock and Kim, 2001; Ko et al., 2005).

Consequently, the hypothesis that monetary incentives motivate consultants to participate in knowledge management activities was not accepted.

The next hypothesis, H07, proposes that "Social capital of others has a positive influence on motivation of consultants to participate in KM activities". The outcome of CFA of the relationship between observed variables Q4_6, Q4_7, Q4_8 and Q5_2 and the latent variable for social capital was significant with $p < 0.01$. This confirmed findings from the literature, which showed that social capital of others (e.g., trusting someone, having a good relationship, being recognized in the company), positively affected the motivation to participate in knowledge transfers (Cooper and Lichtenstein, 2010; Mäkelä and Brewster, 2009; Minbaeva, 2007) and innovation activities (Gubbins and Dooley, 2014; Voon-Hsien Lee et al., 2013). CFA for the relationship between the latent variable for social capital and overall motivation of consultants to participate in KM activities returned $\beta = 0.12$ and $p = 0.66$. This was a comparatively weak, non-significant estimate, which was not in line with the findings from the literature. Inspecting the loadings of the relationship between observed variables and latent variable revealed that Q4_7 "If someone is well-respected in the company, I am more likely to share knowledge with them" had a very strong loading of $\beta = 0.80$, while the control question of Q4_8 "If someone is not very respected in the company, I am reluctant to share knowledge with them" produced a lower loading of $\beta = 0.45$. This indicated that social capital was not perceived to work both ways: While it could be a positive influence, a lack of social capital was not as likely to stop consultants from sharing knowledge. The hypothesis H07 was rejected.

Hypothesis H08 proposed that “Leadership support has a positive influence on the motivation of consultants to participate in KM activities”. As expected, leadership impact on sharing shows a stronger loading than leadership impact on creation and innovation. The observed variable of leadership influence on innovation through innovation strategies, which is grounded in the literature (Alegre et al., 2013; Donate and de Pablo, 2015; Jones and Leonard, 2009; Mitchell, 2006), was not identified as part of the latent variable for leadership. This followed the argument proposed by Ehin (2008), who proposed that innovation could be forced through management intervention, but needed to occur naturally. Consequently, this factor was also excluded from the model tested during confirmatory factor analysis, which produced a significant relationship between observed variables Q2_5, Q4_10 and Q4_11 and the latent variable for leadership with $p \leq 0.001$. The loading for the latent variable for leadership onto overall motivation of consultants to participate in KM activities was measured at $\beta = 0.43$ and $p < 0.01$, which was a strong, significant loading. This confirmed hypothesis H08, which stated that leadership support has a positive influence on the motivation of consultants to participate in KM activities.

The next hypothesis, H09, proposed that “technology has a positive influence on the motivation of consultants to participate in KM activities”. CFA produced a statistically significant relationship between observed variables for technology Q2_4, Q3_1, Q4_9 and Q3_4 and their latent factor at $p \leq 0.001$. This validated the construct proposed by the literature (Holsapple and Jones, 2007; Karkoulian et al., 2013; Kim et al., 2011). Of particular note is that statement Q3_4 on the "reuse of knowledge" produced a lower loading of $\beta =$

0.52, compared to $\beta \geq 0.63$ for the other observed variables. This contradicted previous findings that knowledge reuse was one of the main, if not the main, driver behind setting up an electronic KM system (Kankanhalli et al., 2011; Kulkarni et al., 2007; Watson and Hewett, 2006). While consultants agreed that availability of technology motivated them to create, codify and transfer knowledge, they did not immediately connect it to reusing the knowledge they created. The latent variable for technology loaded onto overall motivation to participate in KM activities with $\beta = 0.57$ and $p < 0.01$. This was higher than leadership. This confirmed the hypothesis that use of technology had a positive influence on the motivation of consultants to participate in KM activities.

Hypothesis H10 stated that "culture has a positive influence on the motivation of consultants to participate in KM activities". During EFA, not all observed variables associated with culture were identified: The impact of culture on creation was not associated with any lateral factor. During CFA, the observed variables were not able to produce a statistically significant relationship with the latent factor at $p > 0.05$. The overall implication of this finding was that – within the context of German consulting firms – cultural drivers did not unilaterally contribute to KM activities. This was in line with an essay, which advocated that culture should no longer be considered a key success factor for KM and advised against further empirical research into the relationship between culture and KM (King, 2008). Empirical studies found that culture had a different effect on KM activities depending on the cultural circle (Ardichvili et al., 2006), or were restricted to populations from specific, predominantly Asian cultural circles (Alavi et al., 2006; Chong, 2006; Javidan

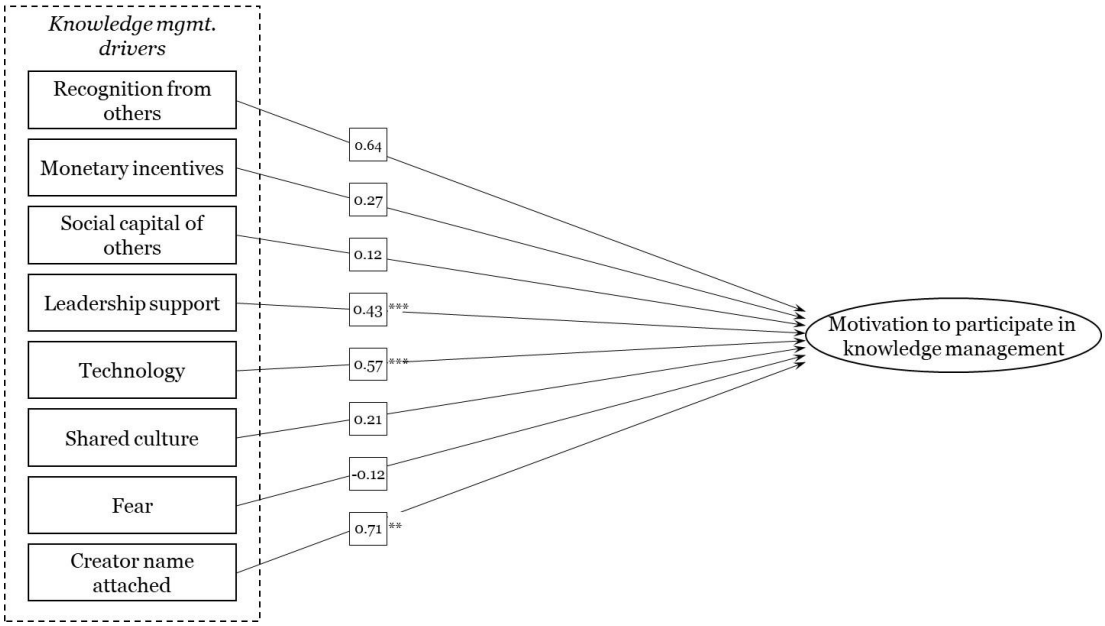
et al., 2005). Consequently, creating a knowledge-sharing cultural and ensuring cultural complementarity should not be expected to increase the effectiveness of KM activities.

The next hypothesis, H11, states that "fear has a negative impact on the motivation of consultants to participate in KM activities". During CFA, the statements Q2_3 "Fear that others will use my newly created knowledge to gain an advantage over me stops me from creating knowledge" and Q4_5 "Fearing that others might receive an advantage if I share knowledge with them stops me from sharing knowledge with them" were not able to create a statistically significant relationship with the latent variable at $p > 0.05$. This meant that the scale proposed in the literature did not apply in the context of German consulting firms. Inspection of the supporting literature showed that the construct of "fear" was analysed in a case study setting with single organizations (Cooper and Lichtenstein, 2010; Lee et al., 2010; Renzl, 2008), which meant that it might not be generalizable to other organizations. This study showed that fear might not have a negative influence on consultants' motivation to participate in KM activities. Hypothesis H11 was rejected.

The last hypothesis, H12, proposed that "attaching the name of the creator to knowledge has a positive influence on the motivation of consultants to participate in KM activities". During CFA, the observed variables Q2_7 and Q3_3 formed a significant relationship at $p \leq 0.00$. The loading of the latent factor onto overall motivation to participate in KM activities was strong at $\beta = 0.71$ and statistically significant at $p = 0.01$. This meant that the hypothesis that "having their name attached" has a positive influence on consultant's motivation to participate in KM activities was accepted.

To summarize, these findings showed that strong leadership ($\beta = 0.43$), use of technology ($\beta = 0.57$), and the option to use shared knowledge for personal branding ($\beta = 0.71$) motivated consultants to participate in KM activities. Recognition, monetary incentives and social capital were found to motivate consultants as well. However, they did not have the same uniform impact on all activities of the KM process. Recognition, for example, drove consultants' motivation to share more than their motivation to create knowledge. Fear of losing power and status, as well as a knowledge sharing culture were found to not influence consultants' motivation to participate in the KM process in a significant way.

This answers the second research question: *Which factors motivate consultants to participate in KM activities?* Consultants are first motivated by "having their name attached" to the knowledge they create and share, then strong leadership and use of technology. Recognition, monetary incentives and social capital motivate them as well, but not in a way that was found to be significant in this study. Their cultural background and fear, finally, do not impact consultants' motivation to participate in KM activities. Figure 5-2 shows the completed KM motivation model, which visualizes the findings of this study.



*p<0.1; **p<0.05; ***p<0.01

Figure 5-2 Research question 2: KM motivation model with coefficients

5.4. Summary

This chapter has discussed the models for both research questions. Both research questions were answered successfully. The first research question was answered: KM practitioners should focus on codification and knowledge transfer to maximize KM success in consulting firms regardless of size and international orientation. The second research question was answered as well: Three drivers showed a positive and statistically significant impact on motivation to participate in KM activities: "Attaching the creator's name" to newly created knowledge, strong leadership and use of technology. Consequently, KM practitioners' should focus on these three drivers to maximize consultants' motivation to participate in KM activities.

All findings were grounded in the literature and either re-affirmed established research or confirm research proposals based on case studies or secondary

data. This concluded the discussion chapter. The next and final chapter will conclude this study and discuss both research and industry implications.

Chapter 6—Conclusion

6.1. Summary of outcomes

This section will review the aims and objectives laid out in section 1.3 and summarize how they were met.

Critically review the relevant literature on knowledge, KM, KM activities and KM success

The study began with a structured literature review that critically reviewed 189 articles from KM literature. These articles were identified based on a search string and meta-studies of KM literature (Serenko and Bontis, 2013; Serenko and Dumay, 2015). The literature review identified and compared definitions for KM, KM activities and KM success. It found that there was a lack of studies that holistically investigated the relationship between all KM activities and KM success. Furthermore, there was no quantitative study that tested the importance of all identified key success factors in the context of a knowledge-intensive industry such as consulting firms.

Examine existing theoretical frameworks for KM and KM success factors in consulting firms and identify a suitable theoretical framework for this study

At the end of the literature review, this study determined an appropriate framework to investigate KM activities and their relationship to KM success. The study combined the frequently cited KM process frameworks (Alavi and Leidner, 2001; Hansen et al., 1999; Nonaka, 1991) into a process with the four activities “knowledge creation”, “knowledge codification”, “knowledge

transfer" and "innovation activities". All of these process activities should directly lead to KM success if executed correctly (Kankanhalli et al., 2011; Kulkarni et al., 2008; Wang and Wang, 2012). Three controlling variables were identified from the literature: firm size, international orientation and respondent years of experience. Figure 6-1 shows the first conceptual model that was created based on the analysed literature.

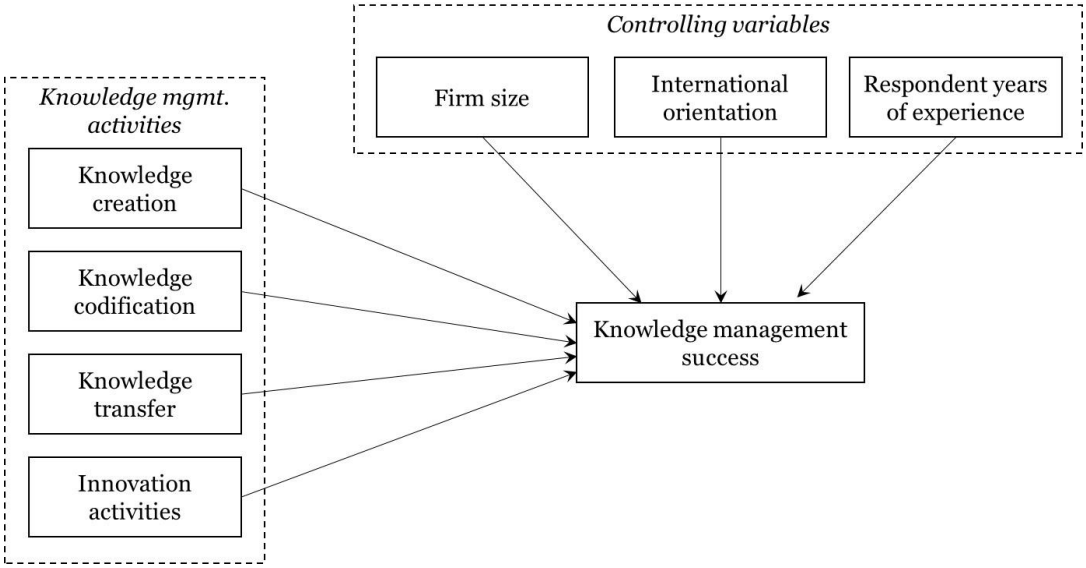


Figure 6-1 Conceptual model for KM success

For KM success factors, various frameworks were combined to identify eight drivers that help KM practitioners increase participation in KM activities (Lindner and Wald, 2011; Parise and Prusak, 2006; Valmohammadi and Ahmadi, 2015; Wang and Noe, 2010). These eight drivers were defined as "recognition", "monetary incentives", "social capital", "leadership support", "use of technology", "shared cultural background", "fear of losing power or status" and "creator name attached". Figure 6-2 shows the second conceptual model that was created based on the analysed literature.

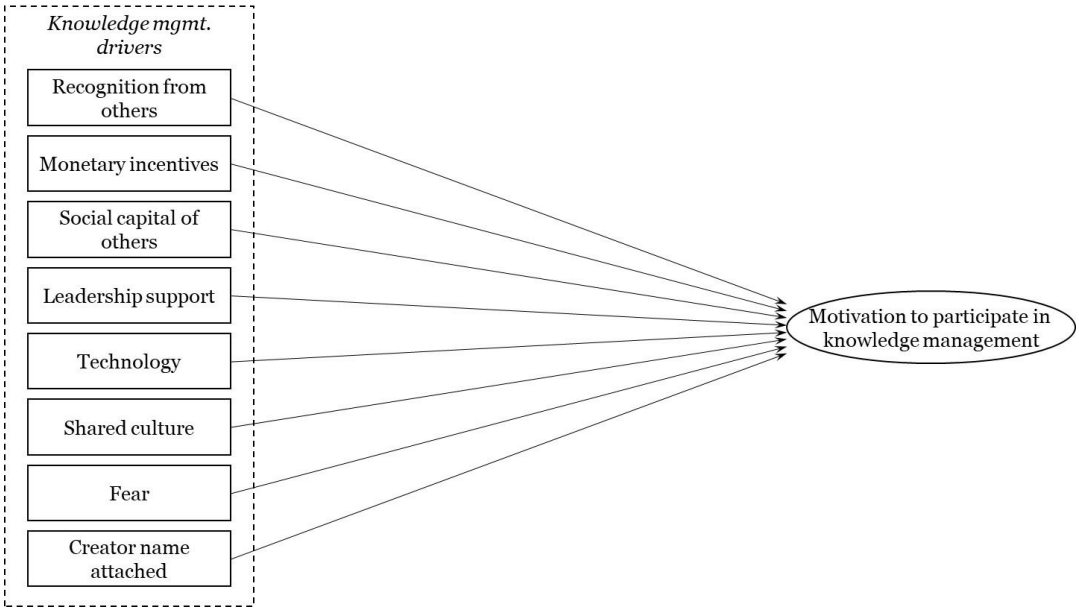


Figure 6-2 Conceptual model for motivation to participate in KM

Both models were analysed and validated using a quantitative research approach.

Create and execute a research approach to test and verify this theoretical framework against a representative sample of consulting firms in the German market

To fulfil its research goals, the study adopted a quantitative research approach heavily grounded in postpositivism. A survey was designed in alignment to the KM process research model and divided into five sections: (1) knowledge creation, (2) knowledge codification, (3) knowledge transfer, (4) innovation, and (5) demographics. The survey consisted of a combination of positive and negative questions answered on a five-point Likert scale. Using multiple pilots, the survey was aligned to the understanding and time constraints of senior consultants and managers in consulting firms.

This research relied on maximum variation sampling to gather data from as many different types of consulting firms as possible (Etikan et al., 2016). Based on studies of the German consulting market (Bartsch, 2014; FEACO, 2016), 150 firms of relevant size and revenue were selected. Candidates with appropriate professional experience at these consulting firms were selected using career networks LinkedIn and Xing. This search returned 340 profiles. Profiles were subsequently contacted directly with the anonymous questionnaire. The study returned 102 valid responses, or a response rate of 30%.

The data collected during the study was analysed in two steps. For the first model, which focused on the relationship between KM activities and KM success, a generalized linear model using ordinary least squares regression was used. The outcome of this test showed that both successful knowledge codification and knowledge sharing predicted KM success in a significant way. Knowledge creation and innovation activities did not have a significant relationship with KM success. The effect of codification on KM success was higher than the effect of sharing.

For the second model, which focused on KM drivers and their impact on the motivation of consultants to participate in KM, the study employed a combination of exploratory and confirmatory factor analysis. During exploratory factor analysis, the majority of observed variables produced significant loadings onto relevant latent variables. Afterwards, the predicted model was tested using confirmatory factor analysis. This test produced satisfactory fit statistics. Out of the tested KM drivers, “leadership”, “use of

technology" and "having my name" attached produced the highest statistically significant loadings onto overall motivation to participate in KM.

Critically discuss scientific and managerial implications of this study

The final aim of this study was to produce a significant contribution to KM research and provide guidance to KM practitioners in knowledge-intensive industries. Scientific implications are discussed in section 6.2. Managerial implication are discussed in section 6.3.

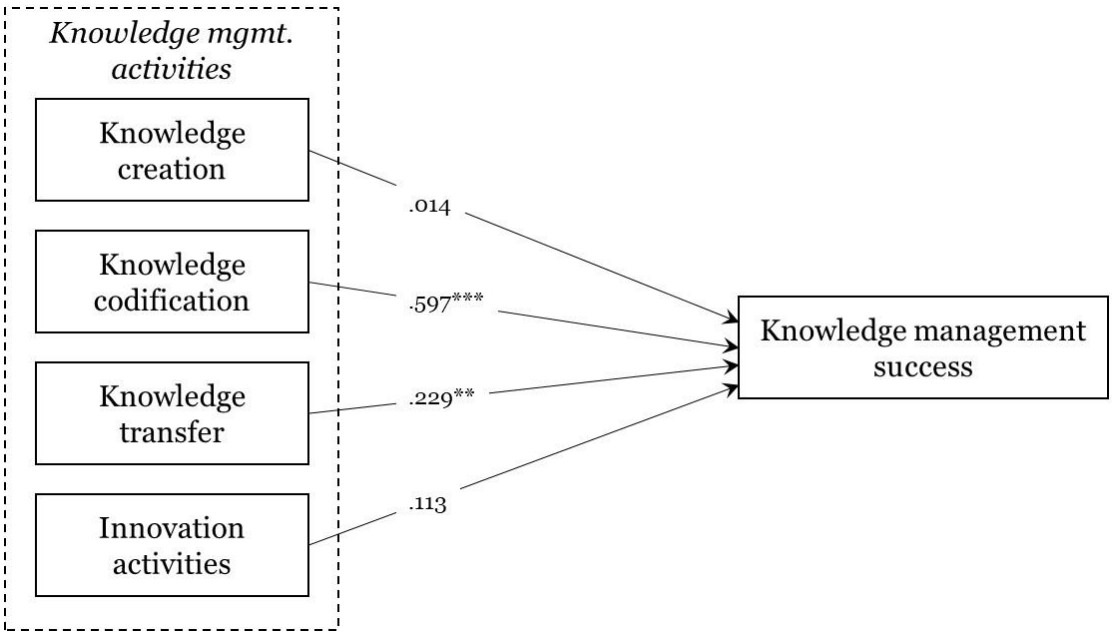
6.2. Contribution to knowledge

The contribution to knowledge of this research is two-fold: It expanded understanding of the established KM process in the context of consulting firms and identified relevant KM drivers that help practitioners motivate consultants to participate in these activities. To do so, it has answered two research questions:

(1) *Which KM activities contribute to KM success from the view of relevant actors in consulting firms?"*
(2) *Which drivers motivate the relevant actors to participate in KM activities?*

To answer the first question, this study has taken the existing KM process model proposed by Alavi and Leidner (2001) and connected it to KM success. This process consists of four activities: (1) knowledge creation, (2) knowledge codification, (3) knowledge transfer and (4) innovation. The study was conducted by surveying managers and senior consultants at medium to large

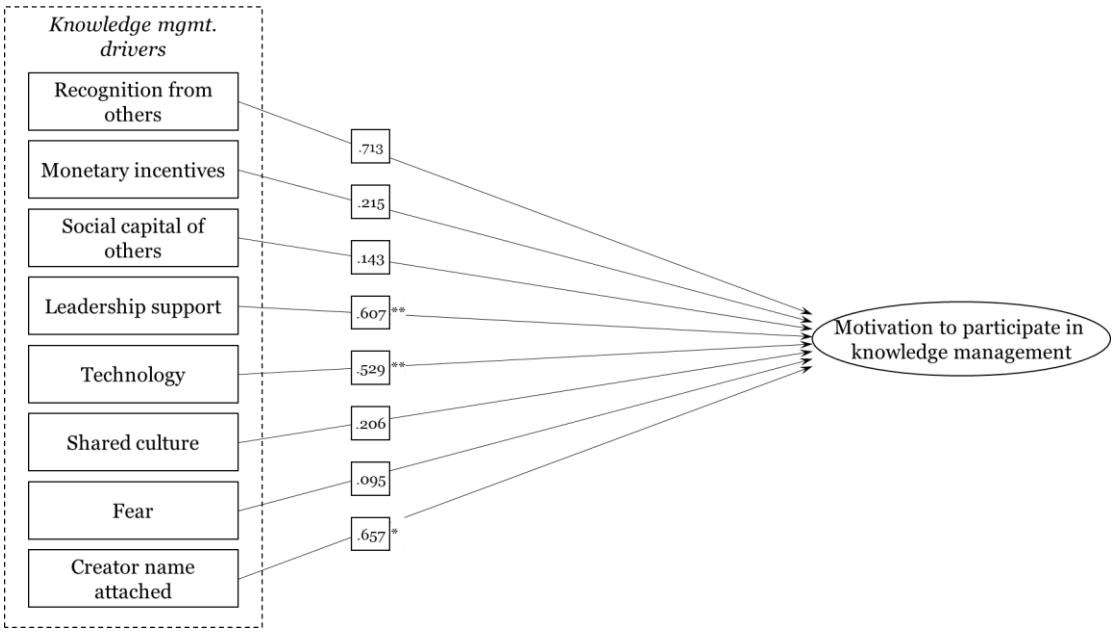
German consulting firms. Respondents were asked to rate their perception of the success of KM activities and their perception of the overall success of KM at their firms. The study returned 102 valid responses. It found that knowledge codification and knowledge transfer were both perceived to have a positive impact on KM success. Knowledge codification was found to be 40% stronger than knowledge transfer. Both knowledge creation and innovation activities were found to not have a significant relationship with KM success. The control variables of "size of firm", "international orientation" and "respondent years of experience" were found not to be statistically significant during step-wise regression. This was a meaningful addition to knowledge, as this process model is frequently used in studies without questioning if these activities are relevant to the organization at hand. Refer to Figure 6-3 for the full model including all coefficients.



*p<0.1; **p<0.05; ***p<0.01

Figure 6-3 Recap: Research question 1: KM success model with coefficients

For the second research question, the literature led to a comprehensive toolset of eight drivers that have an impact on consultants' motivation to participate in KM activities. These eight drivers were (1) recognition from others, (2) monetary incentives, (3) social capital of others, (4) leadership support, (5) technology, (6) shared culture, (7) fear of losing power or status, and (8) having their named attached. These drivers were tested using a set of variables identified from the literature. To test validity of scales, the observed variables were connected to latent variables using exploratory factor analysis. All eight drives were correctly identified as latent variables. The data was then processed using a combination of exploratory factor analysis and confirmatory factor analysis. Figure 6-4 shows the outcome of that test.



*p<0.1; **p<0.05; ***p<0.01

Figure 6-4 Recap: Research question 2: Knowledge driver model with coefficients

The findings showed that all latent factors except for "fear" and "shared culture" produced a significant relationship to their observed variables. This means that "recognition from others", "monetary incentives", "social capital of

others", "leadership support", "technology" and "creator name attached" are all recognized as factors that affect all relevant steps of the KM process. "Fear" and "shared culture" were not meaningful to the relevant steps of the KM process in the case of German consulting firms. Next, the relationship of the latent variables to the second-order latent variable "motivation to participate in KM activities" was tested. During this test, three latent variables produced statistically significant relationships: "leadership support", "use of technology" and "creator name attached". This means that these factors had a significant influence on consultants' motivation to participate in KM activities.

Among the significant factors, "having their name attached" produced the strongest loading onto "motivation to participate in KM activities". The second strongest factor was "leadership support", followed by "use of technology". Consequently, KM practitioners at consulting firms should focus on giving consultants the option to brand knowledge with their name, followed by employing management instruments such as a clearly communicated KM strategy and support and encouragement of managers. Lastly, they should implement appropriate technology to drive the KM process and encourage members of the organization to participate. Latent variables that did not produce a statistically significant loading onto the second order factor should not be discarded: While they might not support all activities of the KM process, they will still affect parts of it in a meaningful way.

These results were obtained from a very reputable group that is intrinsically focused on KM: large and successful consulting firms. This gives them additional validity and weight in the context of KM research.

6.3. Contribution to the industry

6.3.1. Focusing the KM function on codification and sharing

For practitioners in consulting firms, KM is very important: As their main means of production, knowledge and innovation drive the success of these firms (Gaimon and Bailey, 2013; Mors, 2010). Consequently, optimizing knowledge creation, codification, transfer and application is a key requirement and main responsibility of senior managers and partners at consulting firms (Ambos and Schlegelmilch, 2009; Taminiau et al., 2009). This study has produced two very important insights for increasing the success of KM in consulting firms.

The first insight clarifies the required scope of KM functions. While most researchers recommend that the KM function should focus on the full KM process from knowledge creation to innovation (Donate and Canales, 2012; Donate and de Pablo, 2015; Holsapple and Jones, 2007; King, 2009), this study shows that the activities that most influence the perception of KM success in consulting firms are codification and sharing. Neither knowledge creation nor innovation activities contributed to successful KM. This finding can be explained by looking back at the beginnings of KM research: Newly created knowledge is internal, tacit knowledge that has not yet been made available to the organization (Nonaka, 1994; Nonaka and Takeuchi, 1995, pp. 71–73). This tacit knowledge cannot be understood or stored in databases (Tsoukas and Vladimirou, 2001). That means it is not accessible to external parties such as the KM function. The same applies to innovation activities: Innovation requires internalizing existing knowledge and making it

unavailable to the wider organisation (Argote and Miron-Spektor, 2011). After new knowledge has been created and codified, it can be made available again. Both of these processes are therefore internal processes that happen within the individual and outside of the influence of the KM function.

The only activities that can be actively influenced by the KM function and knowledge codification and knowledge transfer. For both of these activities, organizations have a wide array of drivers at their disposal to increase the effectiveness and efficiency. These drivers will be discussed as part of the implications of the second model. Knowledge codification generally profits most from external support, especially since it heavily depends on the use of technology (Phang et al., 2009; Sultan, 2013; Valmohammadi and Ahmadi, 2015). This is confirmed by this study: Knowledge codification received the highest score. The other activity that can be influenced by KM functions is knowledge sharing, which profits from technology and incentive schemes (Chong, 2006; Lin and Lee, 2006; Valmohammadi and Ahmadi, 2015; Wang and Noe, 2010; Wang et al., 2013). However, knowledge sharing is also dependent on factors that cannot be influenced by a third party, such as relationships, personal aptitude and the nature of the knowledge that is being shared (Berg et al., 2017; Cooper and Lichtenstein, 2010; Gubbins and Dooley, 2014; Li, 2012; Mäkelä and Brewster, 2009). For practitioners at consulting firms, this means that they should focus on maximizing the effectiveness and efficiency of knowledge codification and knowledge sharing activities, starting with knowledge codification. If both of these activities are conducted successfully, knowledge creation and innovation activities will increase due to

the increased amount of codified knowledge available to members of the organisation.

6.3.2. Drivers to motivate consultants to participate in KM

The second insight is more straightforward: In the context of German consulting firms, three drivers were found to strongly impact consultants' motivation to participate in KM activities: leadership support, use of technology and the option to attach the creator's name to knowledge. While these three drivers may at first seem unrelated, they build on each other: Putting an electronic KM system in place will enable authors to permanently tag knowledge with their name, which has been shown to act as an incentive and increase willingness to participate in KM activities (Kankanhalli et al., 2011; Wasko and Faraj, 2005). Electronic KM systems commonly offer four capabilities: Storing knowledge content from internal (e.g., employees) and external (e.g., data vendors) sources, retrieving content using search, classification of content using taxonomies, and identifying and connecting to knowledge holders (de Carvalho and Arau, 2011). Few software products provide all of these capabilities in one offering. Commonly, vendors offer multiple products: Microsoft, for example, offers SharePoint for content storage, classification of content and search, and Teams for connecting to knowledge holders and actively sharing knowledge. For content services, Gartner recommends solutions from IBM FileNet, Microsoft SharePoint, Hyland OnBase and OpenText (Hobert et al., 2018). For collaboration, they recommend IBM Connections, Microsoft Yammer and Salesforce.com Chatter (Gotta et al., 2015). From a practitioner's perspective, the Microsoft offering, which is offered as part of Office 365, is a very mature and well-rounded

offering that integrates well with common enterprise software. However, enterprises looking for a leading product should also review Slack, which has become the enterprise standard offering for knowledge-intensive software and consulting companies.

Leadership support will then increase individuals' willingness to submit documents to the KM system (Gagné, 2009; Kulkarni et al., 2007; Liao, 2008). Finally, participation in KM systems coupled with leadership recognition has a positive effect on the career progression of contributors (Galunic et al., 2014), whereas lack of leadership support will limit the amount of knowledge that is contributed by consultants (Taminiau et al., 2009). This means that in order to motivate consultants to participate in KM activities, practitioners should clearly point out the benefits for career progression and put a system in place that will make the contribution of the individual and the impact on their career progression transparent and measurable.

6.4. Limitations and future research

Every study has its limitations and this study was no exception. This section will list the limitations of this study and provide ideas for future research. Consequently, this section identifies three limitations and makes recommendations for further research.

The first limitation of this study was the scope of its literature review. A topic that was frequently researched in the first ten year of KM research (from 1997-2006) was the concept and theory of learning, and how to transfer learning

from individuals to organizations. This topic was discussed less in recent years, as the research area of learning is saturated with a significant amount of studies on learning behaviour and organizational learning (Gaviria-Marin et al., 2018). While the fundamental concepts of learning were discussed in section 2.2.2, the idea of learning and its impact on knowledge created was not further investigated. Following the general trend of KM, this study focused on extending literature pertaining to knowledge creation, knowledge sharing/transfer and innovation. Similarly, some new topics from computer science and information science research such as big data, artificial intelligence and machine learning were not discussed in-depth. This has two reasons: First, while these topics have seen initial real-world applications in the industry (He et al., 2017), research into the subject and its connection to knowledge management is still limited, both in number of articles published and in citations for those articles (Gaviria-Marin et al., 2018). Second, from a practitioner's perspective, the use for knowledge management in consulting firms is limited. Taxonomies and keywords are still required, even when employing AI-based search algorithms (Sharma et al., 2016).

The second limitation of this study was the scope of its sample, a common limitation with quantitative studies. The research was conducted with a focus on German consulting firms. While these firms are internationally oriented, they are limited by their euro-centric viewpoint. However, in KM research it is very common to create a new theory based on a homogeneous cultural sample. Many of the articles that form the cornerstone of KM research today are limited to one cultural settings. Kankanhalli et al., for example, have conducted all of their research in Singapore (Kankanhalli et al., 2005b, 2011).

Further research should apply the models created and validated in this study to other cultural circles and see if the results are generalizable. This would further test the applicability of these models and would show if responses in other countries and in front of other cultural backgrounds would be different.

Furthermore, the study does not differentiate between operational consulting firms such as Deloitte and KPMG, and strategy consulting firms such as BCG and McKinsey. This was done intentionally, as the line between operational consulting and strategy consulting has begun to blur (Poulfelt et al., 2017). Operational consulting firms have expanded into strategy consulting, e.g., with the acquisition of Monitor Consulting by Deloitte in 2013. On the other hand, established strategy consulting firms have broadened their portfolios and now include implementation consulting. McKinsey, for example, has launched a subsidiary named the Business Technology Office to focus on IT advisory and implementation—a business traditionally held by Accenture and IBM. Consequently, asking consultants to self-assess into operational and strategy consulting was deemed not feasible. Follow-on research could explore this further, but a case study setting or similar would be required in order to objectively assess the type of consulting firm that is investigated.

The third limitation of this research was discovered during the discussion of the findings on the first model. Following the theoretical grounding of Alavi and Leidner (2001), the study used an established KM model. However, as the findings show, these KM activities are not independently important—while knowledge codification and knowledge sharing clearly related to overall KM success, there was no such clarity around knowledge creation and innovation activities. Current KM research does not differentiate between knowledge

creation, codification and transfer. Many studies that focus on the impact of various drivers on knowledge creation measure the impact on codification and transfer instead (e.g., Mitchell and Boyle, 2010; Parise, 2007; Parise and Prusak, 2006). To bring clarity and clearly distinguish between direct and indirect effects, subsequent research should investigate the relationship between KM activities and KM success in two steps: It should hypothesize the impact of codification and transfer onto creation and innovation activities, which then impact KM success. This will give practitioners even clearer guidance on which KM activities they should focus on.

The fourth limitation of this study was found in the second model. While this study identified many drivers in the literature, it showed that there is one very significant driver, which has seen limited attention in research: The impact of KM activities on career progression and the corresponding motivational effect on members of the organization. The outcome of this study indicated that consultants are clearly motivated by drivers that also helped them progress their career. A follow-on study should investigate the relationship between contribution to KM systems and career progression in consulting firms. This would be very helpful for KM practitioners to understand how they can shape and foster participation in KM and consequently economic success. This study should leverage the work done by Galunic et al. (2014), who have conducted similar research in consulting firms.

The fifth and final limitation of this study addresses a general concern with surveys in research. Any study that asks individuals to reflect on their willingness to undertake socially desirable behaviour needs to be conscious of the fact that respondents will be more likely to assume that they adopt socially

desirable behaviour (Grimm, 2010). This study has implemented recommendations such as guaranteeing anonymity, not collecting personal information and electronic delivery to ensure social desirability bias is minimized. Still, some of the results (e.g., that fear does not affect consultant's motivation to share knowledge) need to be considered carefully.

For the third and fourth limitation, follow-on research should be conducted. The meanings and value of these findings should be discussed with experts and practitioners. This will help validate the finding and lead to deeper insight, which can then be used to refine and improve the model.

This concludes this thesis, which was submitted in partial fulfilment of the requirements of Coventry University for the award of Doctor of Philosophy.

6.5. Final reflections

As a final note, building on the outcome of this study, the author has implemented an incentive scheme for his own organisation following the recommendations laid out in this study. Both codification and sharing are rewarded by giving out "KM points" to consultants that contribute knowledge to the electronic KM system or that participate in knowledge sharing sessions. These points are then considered during career development and have a measurable impact on progression in the firm. Since this scheme had been implemented, the number of quality-assured documents contributed to the KM system has increased by 20%, and employee satisfaction with the KM system has increased significantly. While this experience might be anecdotal, it points to the merit of research in the field of KM and the real-world industry applications that scientific research can provide.

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Appendix

A. List of relevant consulting firms

List of consulting firms in Germany with more than 30 employees (Bartsch, 2014)		
Name	Offices in Germany	Employees in Germany
4flow	4	95
8.2 Consulting	12	50
ABS Team	1	42
Accenture	7	6000
AlixPartners	2	80
All for One Steeb	12	873
Allgeier	11	5800
Alvarez & Marsal (A&M)	1	55
AON Hewitt	10	1700
Apenberg & Partner	1	240
Arkwright	1	40
Arthur D. Little	2	94
A.T. Kearney	5	390
Atos	13	10000
Atreus	1	55
Bain & Company	3	600
Baker Tilly Roelfs Unternehmensberatung	12	750
Barkawi Management Consultants	1	100
Batten & Company	2	80
BBE Handelsberatung	5	65
BCG - The Boston Consulting Group	7	1060
BearingPoint	8	1400
Becker Büttner Held Consulting	3	50
Booz & Company	5	450
Camelot Management Consultants	3	200

List of consulting firms in Germany with more than 30 employees (Bartsch, 2014)

Name	Offices in Germany	Employees in Germany
Capco	2	300
Capgemini Consulting	6	500
Cassini	6	130
cbs Corporate Business Solutions	5	190
CGI Deutschland	13	2300
change factory	1	35
Computacenter	24	4700
Concentro Management	4	35
ConMoto Consulting Group	2	80
ConVista	3	221
COREtransform	1	33
COR&FJA	9	500
Deloitte Consulting	16	921
Detecon International	4	700
DEWI	1	80
d-fine	2	430
DIDAS Business Services	9	250
diffferent Strategieagentur	2	75
drdp Managementberatung	1	75
Dr. Wieselhuber & Partner	3	80
DST Consulting	7	200
ebp-consulting	2	60
ENERGY4U	4	120
enerson	3	320
Ernst & Young Advisory	24	690
EXXETA	5	200
Faktor Zehn	2	40

List of consulting firms in Germany with more than 30 employees (Bartsch, 2014)

Name	Offices in Germany	Employees in Germany
FINCON Unternehmensberatung	5	160
findic	1	70
Firstwaters	1	40
FRITZ & MACZIOL	15	600
GFT Technologies	8	273
goetzpartners	3	110
Goll Consulting	1	35
GPI Consulting	3	38
Gruppe Nymphenburg	1	35
HANSE Consulting	3	42
Hay Group	2	103
Heidrick & Struggles	4	65
Helbling Business Advisors	3	50
Homburg & Partner	3	120
Horváth & Partners	6	275
HPP Harnischfeger, Pietsch & Partner	1	50
h&z Unternehmensberatung	3	80
IBM Business Consulting	1	22000
Ingenics	4	200
innovas	2	174
innoWake	1	60
INVERTO	2	122
it-economics	3	90
itelligence	12	1200
itemis	9	160
ITinera projects & experts	1	50
it-motive	1	74

List of consulting firms in Germany with more than 30 employees (Bartsch, 2014)

Name	Offices in Germany	Employees in Germany
i-unit—Intelligence Unit Consulting	4	35
Kampmann, Berg & Partner	2	39
Kerkhoff Consulting	1	96
K.GROUP	1	50
Kienbaum Management Consultants	13	300
Korn/Ferry International	4	100
KPMG Advisory	25	2150
KPS Consulting	3	147
L.E.K. Consulting	1	40
Lischke Consulting	2	50
Lodestone Management Consultants	2	300
Loquenz Unternehmensberatung GmbH	1	50
Lynx-Consulting	3	90
m3 management consulting	11	50
Management Partner	1	70
Marsh	7	600
Materna	10	1300
MBtech Consulting	15	128
McKinsey & Company	7	1300
Metaplan	1	45
Miebach Consulting	3	88
Mieschke Hofmann und Partner (MHP)	8	821
msgGillardon	5	400
msg systems	13	530
Mücke, Sturm & Company	3	60
noventum consulting	2	75
NTT DATA	6	1189

List of consulting firms in Germany with more than 30 employees (Bartsch, 2014)

Name	Offices in Germany	Employees in Germany
OC&C Strategy Consultants	2	100
Oliver Wyman	5	300
P3 group	6	668
Plaut Deutschland	2	95
plenum Management Consulting	6	80
Porsche Consulting	2	360
PPI AG	4	350
PricewaterhouseCoopers	26	1830
Prognos AG	5	111
PROTEMA Unternehmensberatung	1	41
Q_PERIOR	4	420
Rödl & Partner	23	255
ROI Management Consulting	1	65
Roland Berger Strategy Consultants	6	1250
rpc - The Retail Performance Company	1	36
SAP Consulting	19	17000
SCHICKLER Managementberatung	1	50
Senacor Technologies	6	250
SHS VIVEON	4	200
Siemens Management Consulting	1	130
Simon-Kucher & Partners	4	400
SMP	1	54
Software AG	10	5238
Solon Management Consulting	1	60
SPH AG	1	40
Star Consulting	3	78
Staufen	1	104

List of consulting firms in Germany with more than 30 employees (Bartsch, 2014)

Name	Offices in Germany	Employees in Germany
Steria Mummert Consulting	8	1775
Stern Stewart & Co.	1	50
Stratley	2	35
Struktur Management Partner	2	100
Tata Consultancy Services	7	537
TCI Transformation Consulting International	3	70
tempus-Consulting	1	50
The Advisory House	2	80
Tilia Umwelt	1	35
TIM CONSULT	1	55
TMG Consultants	1	60
Towers Watson	5	825
Volkswagen Consulting	1	100
von Rundstedt & Partner	13	151
Wassermann Unternehmensberatung	1	100
zeb/rolfes.schierenbeck.associates	6	750

B. Overview of inquiry paradigms

Basic beliefs of inquiry paradigms (adapted from Lincoln et al., 2011; Onwuegbuzie et al., 2009)

Item	Positivism	Postpositivism	Constructivism	Critical Theory	Participatory	Pragmatism
Ontology	Naïve realism—"real reality", but apprehensible	Enquiry should be objective	Multiple contradictory, but equally valid accounts of the same phenomenon representing multiple realities	Virtual reality influenced by social, political, cultural, ethnic, racial, economic and gender values that evolve over time	Subjective-objective reality co-created by mind and given world order	Multiple realities (i.e., subjective, objective, intersubjective) reject traditional dualisms (e.g., subjectivism vs objectivism; facts vs values): high regard for the reality and influence of the inner world of human experience in action; current truth, meaning and knowledge are tentative and changing.
Epistemology	Dualist / objectivist; findings are true	Researchers should eliminate the biases, remain emotionally detached and uninvolved with the objects of study and test or empirically justify the stated hypotheses	Subjective knower and known are not separable; transactional/subjectivist co-created findings/ meaning	Transactional/subjectivist value-mediated findings	Experiential, propositional and practical knowing; co-created findings	Knowledge is both constructed and based on the reality of the world we experience and live in; justification comes via warranted assertability
Methodology	Experimental / manipulative; verification of hypotheses; chiefly	Time-context-free generalisations are desirable and possible and real causes of social scientific outcomes can be determined reliably	Hermeneutical/dialectical; impossible to differentiate fully causes and effects; inductive reasoning; time- and context-free	Dialogic/dialectical	Political participation in collaborative action research; emphasis on practical	Thoughtful/dialectical eclecticism and pluralism of methods and perspectives; determine what works and solves

Basic beliefs of inquiry paradigms (adapted from Lincoln et al., 2011; Onwuegbuzie et al., 2009)

Item	Positivism	Postpositivism	Constructivism	Critical Theory	Participatory	Pragmatism
	quantitative methods	and validly by quantitative (and sometimes qualitative) methods	generalisations are neither desirable nor possible.			individual and social problems
Quality criteria	Objectivity	Reliability, Internal validity, external validity, objectivity	Trustworthiness, dependability, confirmability, transferability, authenticity	Historical situatedness; reduction of ignorance and misconceptions; involve participants in knowledge construction and validation	Congruence of experiential, presentational, propositional knowing leads to action to transform the world	Reliability, internal validity, external validity, objectivity, trustworthiness, dependability, confirmability, transferability; authenticity
Inquirer posture	Objective scientist	Objective scientist and informer of decision makers, policy makers and change agents	Passionate participant as facilitator of multivoice reconstruction	Transformative intellectual as advocate and activist	Primary voice manifest via aware self-reflective action, secondary voices in revealing theory, narrative, etc	Offers pragmatic method for solving traditional philosophical dualism as well as for making methodological choices

C. Literature analysis

Literature analysis—KM activities and research methods											
# of articles	KM activities discussed				Research methods used						
	Creation	Codification	Sharing	Innovation	Case study	Essay	Literature review	Mixed Methods	Research Design	Secondary data	Survey
12	X					3	2	1			6
1	X	X				1					
2	X	X	X			1					1
15	X	X	X	X	2	3	1		1		8
2	X			X		1					1
4	X		X		3						1
2	X		X	X	1	1					
12		X			4	4		1			3
10		X	X		2	2	1		2		3
84			X		21	12	2	3	2	6	38
6			X	X	1		1	1			3
18				X	3	4		1		2	8
21	*no discussion of KM activities*				1	4	6	1	4	5	1
189	7	5	7	5	38	36	13	7	5	9	80

Literature analysis—KM drivers and research methods											
# of articles	KM driver groups				Research methods used						
	Culture	Management	Social	Technology	Case study	Essay	Literature review	Mixed Methods	Research Design	Secondary data	Survey
14	X				5	2		1	1		5
1	X	X			1						
3	X	X	X			1					2
4	X	X	X	X		1	1				2
2	X	X		X							2
5	X		X								5
1	X		X	X							1
34		X			5	5		4			20
12		X	X		4			1	1		6
3		X	X	X	1						2
5		X		X		1					4
39			X		11	6	2	2	2	3	13
1		X	X			1					
9			X	X	1	3				3	2
9				X	3	1				1	4
47	*no discussion of KM drivers*				7	15	10		1	2	12
189					38	36	13	8	5	9	80

Literature analysis—KM activities and geographical region											
# of articles	KM activities discussed				Region in which research was conducted						
	Creation	Codification	Sharing	Innovation	Africa	Asia	Australia	Europe	Middle East	North America	No region
12	X				0	0	1	2	0	4	5
1	X	X			0	0	0	0	0	0	1
2	X	X	X		0	0	0	1	0	0	1
15	X	X	X	X	1	2	0	2	2	3	5
2	X			X	0	0	0	1	0	0	1
4	X		X		0	1	0	0	1	1	1
2	X		X	X	0	0	0	0	0	1	1
12		X			1	2	2	1	0	2	4
10		X	X		0	1	0	1	0	2	6
84			X		0	24	1	16	0	11	32
6			X	X	0	3	0	0	0	2	1
18				X	0	2	0	4	1	7	4
21					0	1	0	0	1	3	15
189	7	5	7	5	2	36	4	28	5	36	77

D. Hypotheses and questionnaire questions

Hypothesis		Construct relationship	ID	Question text	Statement text
H01	Successful knowledge creation has a positive influence on overall KM success in consulting firms	Dependence	Q1_1	How would you rate the KM performance of your firm? Please rate to what extent you agree with the following statements	My organization creates a lot of new knowledge
H02	Successful knowledge codification has a positive influence on overall KM success in consulting firms	Dependence	Q1_2		My organization gives me access to a lot of knowledge (e.g., through a KM system)
H03	Successful knowledge transfer has a positive influence on overall KM success in consulting firms	Dependence	Q1_3		My organization enables and encourages knowledge sharing between me and my co-workers
H04	Successful innovation activities have a positive influence on overall KM success in consulting firms	Dependence	Q1_4		My organization frequently produces innovations (e.g., new services for our clients)
H01 H02 H03 H04	Successful knowledge creation/codification/transfer/ innovation has a positive influence on overall KM success in consulting firms	Dependence	Q1_5		I believe that my organization has successful KM
H10	A shared culture has a positive influence on the motivation of consultants to participate in KM activities	Dependence	Q2_1	Knowledge creation means that you generate new personal knowledge / new ideas for yourself, but in the context of your work, e.g., you design an Excel model that makes a task easier, or you read an article about your next project. Please think about the reasons why you create new knowledge for your organization and rate to what	My cultural background motivates me to create knowledge
H05	Recognition from others has a positive influence on motivation of consultants to participate in KM activities	Dependence	Q2_2		Recognition of my co-workers motivates me to create knowledge

Hypothesis		Construct relationship	ID	Question text	Statement text
H11	Fear has a negative impact on the motivation of consultants to participate in KM activities	Dependence	Q2_3	extent you agree with the following statements	Fear that others will use my newly created knowledge to gain an advantage over me stops me from creating knowledge
H12	Attaching the name of the creator to knowledge has a positive influence on the motivation of consultants to participate in KM activities	Dependence	Q2_7		Having my name attached to the results motivates me to create knowledge
H09	Technology has a positive influence on the motivation of consultants to participate in KM activities	Dependence	Q2_4		Access to specific technology (e.g., KM systems, research data bases) makes it easier for me to create knowledge
H08	Leadership support has a positive influence on the motivation of consultants to participate in KM activities	Dependence	Q2_5		Support and encouragement by my managers motivate me to create knowledge
H06	Monetary incentives have a positive influence on motivation of consultants to participate in KM activities	Dependence	Q2_6		Monetary rewards motivate me to create knowledge
H12	Attaching the name of the creator to knowledge has a positive influence on the motivation of consultants to participate in KM activities	Dependence	Q3_3	Knowledge codification means writing down or communicating knowledge in a way that can be understood by others, most often by writing down your solution to a problem, e.g., you write documentation for your Excel model. Please rate the following statements to show what motivates you to codify knowledge	Having my name attached to the results motivates me to codify knowledge
H09	Technology has a positive influence on the motivation of consultants to participate in KM activities	Dependence	Q3_1		Having access to sophisticated tools makes it more likely for me to codify knowledge (e.g., sanitizing tools, templates, advanced KM systems)
H09	Technology has a positive influence on the motivation of	Dependence	Q3_4		Being able to reuse my own knowledge at a later point motivates me to codify knowledge

Hypothesis		Construct relationship	ID	Question text	Statement text
	consultants to participate in KM activities				
H06	Monetary incentives have a positive influence on motivation of consultants to participate in KM activities	Dependence	Q3_2		Monetary rewards motivate me to codify knowledge
H05	Cultural drivers predict the motivation of consultants to participate in KM activities	Dependence	Q4_1	Knowledge transfer means sharing knowledge with others, e.g., your colleagues, your company or the entire world. Sharing can occur in many ways, e.g. by uploading a slide deck to the KM system of your company or telling your colleagues about it personally. Please think about the reasons why you share knowledge with your colleagues and your employer and rate to what extent you agree with the following statements.	A shared cultural background (e.g., speaking the same language, coming from the same region) makes it more likely for me to share knowledge with others
H05	Recognition from others has a positive influence on motivation of consultants to participate in KM activities	Dependence	Q4_2		Receiving valuable knowledge in return motivates me to share knowledge with others
H05	Recognition from others has a positive influence on motivation of consultants to participate in KM activities	Dependence	Q4_3		Receiving recognition motivates me to share knowledge with others
H11	Fear has a negative impact on the motivation of consultants to participate in KM activities	Dependence	Q4_5		Fearing that others might receive an advantage if I share knowledge with them stops me from sharing knowledge with them
H07	Social capital of others has a positive influence on motivation of consultants to participate in KM activities	Dependence	Q4_6		Having a good relationship with someone motivates me to share knowledge with them
H07	Social capital of others has a positive influence on motivation of consultants to participate in KM activities	Dependence	Q4_7		If someone is well-respected in the company I am more likely to share knowledge with them

Hypothesis		Construct relationship	ID	Question text	Statement text
H07	Social capital of others has a positive influence on motivation of consultants to participate in KM activities	Dependence	Q4_8		If someone is not very respected in the company, I am reluctant to share knowledge with them
H09	Technology has a positive influence on the motivation of consultants to participate in KM activities	Dependence	Q4_9		Having access to sophisticated technical solutions (e.g., collaboration solutions, document management, communications) makes me more likely to share knowledge with others
H06	Monetary incentives have a positive influence on motivation of consultants to participate in KM activities	Dependence	Q4_4		Monetary rewards motivate me to share knowledge
H08	Leadership support has a positive influence on the motivation of consultants to participate in KM activities	Dependence	Q4_10		Managers that lead by example motivate me to share knowledge with others
H08	Leadership support has a positive influence on the motivation of consultants to participate in KM activities	Dependence	Q4_11		A clearly communicated KM strategy motivates me to share knowledge with others
-	-	Dependence	Q4_12		I share knowledge with others regardless of the rules and processes of my organization
H05	Cultural drivers predict the motivation of consultants to participate in KM activities	Dependence	Q5_1	Innovation means that you combine your own knowledge and the knowledge shared by others into new knowledge or, ideally, a new service or product. Following the example of your Excel model, you might take the feedback from your co-workers to improve it and then share it with the client.	I am more innovative if I work with others from the same cultural background
H07	Social capital of others has a positive influence on motivation	Dependence	Q5_2		I am more innovative if I work with others that I have a good relationship with

Hypothesis		Construct relationship	ID	Question text	Statement text
	of consultants to participate in KM activities			Please rate the following statements to show what motivates you to be innovative	
H05	Recognition from others has a positive influence on motivation of consultants to participate in KM activities	Dependence	Q5_4		I am more innovative if I receive recognition from my peers for my innovations
H06	Monetary incentives have a positive influence on motivation of consultants to participate in KM activiti	Dependence	Q5_3		I am more innovative if I receive a monetary reward for my innovations
H08	Leadership support has a positive influence on the motivation of consultants to participate in KM activities	Dependence	Q5_5		I am more innovative if the company has a strategy that rewards innovation within the workforce (e.g., 5% of my time can be dedicated to innovation)
-		Control	Q6	How many years of experience in the consulting industry do you have?	Dropdown menu: <2, 2-5, 6-10, 11-20, >20
-		Control	Q7	How many consulting firms have you worked for in total?	Dropdown menu: 1, 2, 3, >3
-		Control	Q8	What is the size of the consulting firms you currently work for?	Select: 1-10, 11-100, 101-1.000, 1.001-10.000, >10.000
-		Control	Q9	Did you experience significant differences between KM at different consulting firms?	Likert scale from “Definitely yes” to “Definitely not”
-		Control	Q10	In which regions is your consulting firm active (home office or project work)?	Region selection
-		Control	Q11	Which industries has your consulting firm worked for?	NAICS industry classification

E. Correlation matrix for factors affecting KM