

# Knowledge Management, Knowledge Creation, and Open Innovation in Icelandic SMEs

SAGE Open  
October-December 2018: 1–13  
© The Author(s) 2018  
DOI: 10.1177/2158244018807320  
[journals.sagepub.com/home/sgo](http://journals.sagepub.com/home/sgo)  


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## Abstract

The aim of this article is to present findings on knowledge management (KM) and knowledge creation, as well as open innovation in small and medium-sized enterprises (SMEs) in Iceland. Two SME company case studies are presented in the form of a case study involving semistructured interviews with managers and selected employees and in-field observation. Company Alpha is a software company, whereas Company Beta is a family company which produces drinks and snacks. Knowledge creation and innovation is a learning process in both companies. The two companies show very different open-innovation models in practice. The findings regarding the two companies are in accordance with the arguments of Chiaroni et al., where they state that high-tech companies tend to prefer inside-out strategies of open innovation, whereas low-tech companies prefer outside-in strategies. Company Alpha relates to customers late in the process, whereas Company Beta relies on knowledge from customers and suppliers and for new knowledge early on in the process.

## Keywords

knowledge, knowledge creation, open innovation, SMEs, case studies, Iceland

## Introduction

To strengthen their innovation potential, companies need to increase investment devoted to knowledge creation and innovation, so they can build new products, services, or procedures. Significant research has been conducted in this context emphasizing the connection between knowledge accumulation and its management on one hand, and novel business ideas and practices on the other. It has been widely recognized by researchers that there is a deep-seated positive correlation between knowledge management (KM) and innovation in business operations (Miller & Morris, 1999; Nonaka, 1991; Nonaka & Takeuchi, 1995; Sankowska, 2013; Wang & Wang, 2012).

New knowledge is frequently engendered by innovative concepts or urgent needs, either arising within the company itself or emanating from external market pressures. Thus, novel and creative perspectives often find their way into a firm through external forces dominating the market or by way of cooperation with academic establishments and research laboratories (outside trends and pressures), or alternatively, they may arise as a result of the originality and inventiveness of company staff, for example, because of pressure from customers, competitive disadvantages, alterations in law which may affect company products or procedures (Daft, 2007; Hughes, O'Regan, & Sims, 2009; Sparrow,

2005). Thus, refreshing a company's products, processes, and its very market or brand image may be a powerful incentive toward innovative and creative ways of approaching situations and solving problems (Ueki, Ueki, Linowes, & Mroczkowski, 2011). Traditionally, innovation was seen to take place within a single company; companies managed innovation mainly by utilizing their own techniques and resources to create innovative goods within their research facilities (Lee, Park, Yoon, & Park, 2010; Wynarczyk, 2013). Open innovation, in contrast, refers to the inflow of knowledge from both the company itself and its customers and sales representatives on the external market which may act as powerful forces for promoting new products and venturing into untested market sectors. It is by no means easy to arrive at a precise definition of such a loose term as open innovation, although vast research is available on the subject, especially in larger, technological companies (Chiaroni, Chiesa, & Frattini, 2011; Lee et al., 2010).

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KM has been defined by Edvardsson and Oskarsson (2013) as: “developing, sharing and applying knowledge within the organisation to gain and sustain a competitive advantage” (p. 13). Moreover, they argue that the “KM literature has focused on internal processes, such as knowledge transfer, knowledge sharing culture, organizational learning, ICT etc., to enhance productivity and sales, lower cost, or increase innovation and quality.” KM, especially, within large corporation has been the subject of wide-ranging research. It would appear, however, that researchers have not been excessively attracted to corporate size and thus tended to look past SMEs which undeniably also deserve their attention (Durst & Edvardsson, 2012; McAdam & Reid, 2001).

Knowledge accumulation, management, and utilization may be classified in a variety of ways, for example, collecting or registering data, packing knowledge in user-friendly formats (data cleaning, formatting, and indexation), as well as distribution and reprocessing (Markus, 2001). During the above processes, novel aspects of knowledge and opportunities for its use may come to light as a result of knowledge adaption and organization. The fundamental emphasis of this article is on the ways knowledge is engendered and created, as well as paying close attention to the character of open innovation; hence, other aspects of the KM process will not be dealt with further.

The engendering of knowledge is described as an ongoing procedure by which knowledge comes into existence through cooperation or individual effort and is refined and enhanced within a corporate system (Von Krogh, Nonaka, & Rechsteiner, 2012).

Knowledge creation can be seen as the starting point of both KM and innovation. A recent literature review indicates that there is little research on knowledge creation in SMEs (Massaro, Handley, Bagnoli, & Dumay, 2016). Growing number of studies have shown that KM strategies could play a significant role in enhancing innovation. However, there are limited researches on the relationship between KM strategies and innovation (Yousif, Al-Hakim, & Hassan, 2013), especially, on the role of KM for the implementation of open-innovation practices (Martinez-Conesa, Soto-Acosta, & Carayannis, 2017). Furthermore, only a few recent studies have analyzed open innovation in the specific context of SMEs (Laursen & Salter, 2006; Lee et al., 2010; Spithoven, Vanhaverbeke, & Roijakkers, 2013; Van de Vrande, De Jong, Vanhaverbeke, & De Rochemont, 2009).

In light of the current situation of limited knowledge on the relationship between open innovation, KM, and knowledge creation in SMEs, this article has the aim of presenting findings on these processes in SMEs in Iceland. Two case studies will be introduced in this context to answer the following questions:

**Research Question 1:** How do Icelandic SMEs deal with knowledge creation, knowledge sharing, and storage?

**Research Question 2:** How are customers and other external stakeholders involved in the innovation process?

The layout of the article is as follows: The next section contains aspects pertaining to theoretical considerations, followed by a methodological section. Findings are then presented and, finally, conclusions.

## Theoretical Background

### KM

KM is, as already noted, focuses on knowledge creation and applications inside a corporate entity for the purpose of strengthening its position on the market (Davenport & Prusak, 1998; Edvardsson, 2009; Jashapara, 2011; Lichtenthaler & Lichtenthaler, 2009). Companies have made extensive use of KM to improve various aspects of their operations, facilitate decision making, stimulate innovation, and enhance productivity (Edvardsson, 2006).

Hansen, Nohria, and Tierney (1999) have identified two fundamental strategies for administering knowledge within a corporation, that is, “codification” and “personalisation.” The first refers to the codification of formal and objective explicit knowledge that relates to words, numbers, and specifications and is generally accessible in data bases for the use of company staff. With the successful use of latest technologies in the field of intranets, data mining, knowledge mapping, and electronic libraries, companies can streamline their operations to improve their competitiveness. Hansen et al. (1999) write, “The reuse of knowledge saves work, reduces communications costs, and allows a company to take on more projects” (p. 110). The uses of knowledge described above are akin to exploitative learning, through which firms can improve their performance in a safe and effective manner (Clegg & Clarke, 1999). Personalization strategy relates to an individual’s tacit knowledge, often shared through personal contacts, where insights and intuition can play a major role in solving complex problems (Clegg & Clarke, 1999). Personalization strategy seeks to create interaction and sharing of tacit knowledge among employees in the company (Meroño-Cerdan, Lopez-Nicolas, & Sabater-Sánchez, 2007), often through person to person communication, the mediation of earlier learning, and shared work practices. This kind of knowledge often takes the form of highly developed expertise which can be used to deal with unique problems where a creative approach is needed, for example, in the field of strategy consulting. Personalization and explorative learning often go hand in hand, sharing common characteristics such as research-based innovation, relaxed controls, and readiness to take a certain degree of risk. Key concepts here are flexibility and emphasis on research and learning to develop new skills and abilities (Clegg & Clarke, 1999).

## Knowledge Creation

Knowledge creation has been assessed in terms of a 3-fold classification, that is, process, volume, and end result (Mitchell & Boyle, 2009). The process aspect evaluates stages of producing innovative knowledge, such as the application of figurative terms in which to render external knowledge. In terms of volume, knowledge generation is measured with a view to its immediate product which generally involves considerable addition to current knowledge, for example, through the presentation of novel concepts. The end result of knowledge generation focuses on a specific value-added process or article such as improved services, replacement of inefficient routines, or an enhanced prototype. All these stages are of course inseparable from the concept of innovation.

The routes to knowledge creation can take many and diverse forms. Nonaka and Konno (1998) and Nonaka, Toyama, and Konno (2000) see the interaction between tacit and explicit knowledge as coming about by means of socialization, externalization, combination, and internalization (SECI), leading to new and enhanced levels of knowledge.

The literature sees learning and knowledge generation more or less as two sides of the same coin. Kolb (1984) argues that the basic function of learning is creating new knowledge, generated by a profound understanding and transmutation of experience. Argyris (1999) maintains that organizational learning consists in identifying errors and putting them right. For this to happen, it is of course necessary to properly understand the cause of the error in question, as well as being able to formulate how it should be corrected. In this manner, firms can turn experience into a learning process and resort to the proper measures to prevent reoccurrence of an error or oversight. Such circumstances, as pointed out by Allard (2003), often spring from an urgent problem whose solution can only be achieved through the creation of new knowledge. According to Nonaka and Takeuchi (1995), knowledge creation often occurs as a result of two kinds of learning which supplement each other, that is, learning how to deal with dilemmas arising from current conditions and subsequently creating a new set of conditions where the dilemmas do not occur. Ueki et al. (2011) maintain that if company staff are presented with challenging situations and trained in developing appropriate solutions this will stimulate corporate knowledge creation. The types of knowledge-enhancing situations in question may involve interdepartmental development tasks, job rotation, various aspects of career advancement, teamwork, and learning through the medium of the Internet. An organization's success and ability to innovate and evolve novel work practices depends on its capacity for mastering complex cognitive learning processes, whereas simpler and more basic learning routines tend to exercise a restrictive influence on knowledge creation and work practices. Simpler forms of learning involve responding to the everyday demands of internal or external circumstances by automatically

resorting to established routines, whereas more advanced cognitive learning will focus on creating original methods and modes of thinking and doing which may engender important innovation in corporate functions (Spicer & Sadler-Smith, 2006). According to Garvin (1993), firms that focus on learning specialize in stimulating innovative knowledge by emphasizing frequent experience in facing and solving problems, testing new methods, benefiting from experience, and communicating knowledge to colleagues. Management should encourage employees to ask questions, debate and challenge diverse opinions, engage in collaborative problem solving, and learn and remain alert to opportunities for innovative approaches leading to knowledge creation. Indeed, increased interest has been noted in the role of managers in the process of knowledge accumulation and transfer (Thompson & Heron, 2005). According to Berraies, Chaheer, and Yahia (2014), managers are often in an ideal position to promote the ideology which leads to an upward curve of improvement and knowledge creation. It is, therefore, of utmost importance that managers should develop and maintain the mode of leadership which stimulates employees and enables them to freely express their individualism.

Collaborative learning is thought to be a fundamental prerequisite for energizing knowledge creation by enabling employees to benefit from knowledge of diverse origin and character. Shared knowledge evolves by means of constant communication and exchange of opinions among employees working together toward a shared goal. The groups stimulate critical modes of thought by challenging current solutions and premises and by suggesting alternatives (Hedlund, 1994; Jakubik, 2008; Nejatian, Nejati, Zarei, & Soltani, 2013). Cooperation is mostly organized and administered through corporate initiatives. However, knowledge generation often occurs spontaneously as a result of communication and cooperation among individuals or task groups where persons with a variety of specializations discover opportunities for practical innovation concealed within a project (Nonaka & Takeuchi, 1995). Teamwork has proven to be an economic engender innovative knowledge and to build a basis for intelligent working procedures and further education among employees (Awad & Ghaziri, 2004; Szarka, Grant, & Flannery, 2004).

## Knowledge Creation in SMEs

SMEs often tend to be low-power hierarchies, characterized by an egalitarian mode of management which can act as a stimulus to originality and creative enterprise; there is an air of informality with few rules, and bureaucracy is kept to a minimum. Often the owner is practically the sole agent of supervision and control (Daft, 2007). In some respects, the structure of SMEs is more flexible and adaptable than that of larger corporations; SMEs have fewer employees who tend to work together more closely. This often makes it easier to

respond positively to innovation, not least because of a coherent small company culture, relatively simple structures, and direct communication with managers. The main drawbacks of SMEs, however, often relate to their limited experiences, insufficient technical manpower, and financial restrictions, all of which can act as barriers to innovation and knowledge stimulation. SMEs are less hierarchical which means that managers are nearer to the operational functions, often close to their markets and thus apt to have a better understanding of their operational circumstances than large corporations with far-flung operations (Wong & Aspinwall, 2004). As referred to above, the control of SMEs tends to be informal and personal, often emanating from the owner/manager (Daft, 2007). Also, decisions can be made more swiftly due to their smallness and simple, flexible management structures (Culkin & Smith, 2000; Wong & Aspinwall, 2004).

Due to limited access to resources, SMEs often need to rely on secondhand knowledge (e.g., trade, academic and professional journals, conferences and research within their own industrial or business sector) or through person to person communication. Only a small portion of the human resources within an SME can be devoted to the gathering and analysis of knowledge; mostly, this would be the function of managers who, however, also have many other tasks to handle (Lowik, van Rossum, Kraaijenbrink, & Groen, 2012). Thus, SMEs are more likely to depend on procedures such as meetings with suppliers and customers, rather than undertaking more formal, expensive, and systematic knowledge acquisition activities (Cegarra-Navarro & Martínez-Conesa, 2007). Given those internal resource constraints to which many SMEs are exposed, external knowledge sources may be assumed to have a critical role in terms of knowledge creation (Egbu, Hari, & Renukappa, 2005) as SMEs seem to look more outwards for sources of innovation (Desouza & Awazu, 2006). A recent case study from Singapore showed that the search for and acquisition of new knowledge was almost exclusively undertaken by an SME owner on whose capability and resources the company had to rely in matters of data and knowledge relating to the industry in question (Wee & Chua, 2013). Durst, Edvardsson, and Bruns (2013) investigated knowledge creation undertakings in small German construction companies and identified external impact on knowledge generation. The researchers also found that although managing directors make use of external knowledge of varying origin, they seem to emphasize the use of reliable knowledge sources. The results of this study contribute to the rather insufficient research on the topic of knowledge generation in SMEs.

### *Open Innovation in SMEs*

No consensus exists as to the precise meaning of the concept “open innovation” (Chiaroni et al., 2011). However, the definition by Chesbrough (2003) has gained popularity, where he explains open innovation as “the use of purposive inflows

and outflows of knowledge to accelerate internal innovation, and to expand the markets for external use of innovation, respectively” (p. 15). Three open-innovation practices are commonly mentioned in the literature: outside-in process, inside-out process, and coupled processes. Wynarczyk (2013) explains these concepts in the following manner:

The “outside-in” process is based on the assumption that the firm adds to its own knowledge-base through inter-firm linkages with suppliers, customers and/or collaboration with other external institutions (e.g. universities). The “inside-out” process refers to generating and accelerating profits by transferring innovative ideas to market, through, for example, selling or licensing out intellectual property (IP). Enkel et al. (2009) argue that this form of open innovation enables firms to reap the benefits of their innovative ideas at an earlier stage rather than attempting to translate them into new products themselves. The “coupled process” refers to partnership or “co-creation” with (mainly) complementary partners through, for example, supply chain, clusters, alliances, co-operation, and joint ventures. (pp. 260-261)

Studies show that open innovation is a positive factor for SMEs to overcome their challenges and increase their profitability (Gassmann, Enkel, & Chesbrough, 2010) as in general, SMEs lack both organizational and technical skills for their effectiveness (Rahman & Ramos, 2010). Studies also indicate that larger companies use open innovation more than smaller companies, although the latter have a lot to gain from this to compensate for limited resources and insufficient market research (Huizingh, 2011; Wynarczyk, 2013). According to some scholars, SMEs gain more from open innovation than larger firms because SMEs are less devolution of authority, are more risk takers, and can react quickly to changes in the business environment (Hossain, 2015).

Open innovation practices in SMEs seem to be more common in the later stages of innovation, especially, when preparing for the actual commercialization of new products or practices. Employee characteristics may matter for open innovation as the adoption of strategies regarding open source software supply is likely to be facilitated by a university-educated workforce. Open innovation seems, moreover, more likely in situations characterized by globalization, new business models, technological intensity, and turbulence (Huizingh, 2011).

Chiaroni et al. (2011) argue that low-tech industries prefer outside-in strategies of open innovation, whereas inside-out strategies are far more common in high-tech companies, in addition Van de Vrande et al. (2009) discovered that medium-sized companies practice open innovation to a greater extent than smaller companies and utilize open innovation for market-related motives or for keeping up with competitors. SMEs face unique challenges for innovation (Hossain, 2015) which include lack of resources, structure of the company, complications regarding scientific field and access to latest scientific developments (Abouzeedan, Klofsten, & Hedner, 2013). SMEs are less active than large



firms in open innovation because of their particular characteristics such as culture and strategy (Hossain, 2015). Also, they face challenges that are related with external factors, such as venturing, customer participations, networking, development and outsourcing (Van de Vrande et al., 2009). According to Laursen and Salter (2006), SMEs that are more open to external sources are more likely to succeed in innovation. Networking can be a useful way to facilitate open innovation among SMEs and to focus to both formal and informal relationships with stakeholders (Lee et al., 2010; Padilla-Meléndez, Del Aguila-Obra, & Lockett, 2013). According to Theyel (2013), SMEs prefer networking with customers rather than suppliers.

A culture that acknowledges and encourages learning and creativity and emphasizes motivation for collaboration and knowledge openness is essential for open innovation (Csath, 2012). Openness can be a managerial challenges in SMEs as it requires some higher order management capabilities to coordinate external knowledge flow within the company's internal innovation activities (Brunswick & Vanhaverbeke, 2015). Such management skills are needed so that the knowledge can be organized and adapted to achieve the company innovation strategy (Robertson, Casali, & Jacobson, 2012).

## Methodology

This research uses qualitative methodology and is designed as a case study (Eisenhardt, 1989). A qualitative research design was chosen as we are dealing with complicated little-known phenomenon. A case study was chosen because the phenomena under study consist of iterative activities which makes this a viable approach. Because of limited KM, knowledge creation, and innovation in SMEs in Iceland, this approach enables a more contextual assessment of social phenomena in real-life contexts (Yin, 1994) and insufficient prior research means that themes and patterns need to be located rather than confirmed (Edmondson & McManus, 2007; Eisenhardt, 1989). This exploratory research consists of two case studies in SMEs in Iceland. To identify relevant cases for the study, the authors utilized nonprobabilistic sampling which is acknowledged as the most appropriate strategy in qualitative research designs (Merriam, 1998). The most common form of which is the purposeful sample strategy (Patton, 2002), which was used to select cases for this research. The motive behind purposeful sampling relates to selecting "information-rich" cases, providing an in-depth insight into the phenomena being researched. Intensity sampling was adopted where the researcher had to carry out a preliminary investigation to decide on the type of variation characterizing the situation under study. One can then sample intense examples of the phenomenon of interest—KM, knowledge creation, and open innovation in SMEs (Patton, 2002). Intensity sampling was used for the purpose of selecting the companies considered most interesting to examine and most suited to the subject of the research. The companies

were chosen according to size and nature of operations. Previous research on SMEs has shown that company size does have an impact on formal strategy, decision making, formalization, and KM practices (Edvardsson, 2009). The chosen companies were also prominent in innovations and innovation activity.

Six interviews were conducted with managers and key employees in the KM, knowledge creation, and open-innovation process, three in each company. The interviews were recorded and transcribed; field notes were also taken. Other documentation relating to the companies, addressing relevant issues were also examined, as well as the companies' web pages. Data collection took place in April to October 2015. Interview duration was 60 to 90 min. Observation in the companies was used to gain insight into the work environment and to formulate a comprehensive understanding of the phenomena under study. It improved the quality of the data collection and interpretation and facilitated the development of new research questions. Field note framework was developed and written in reports. Other documents related to the companies and addressed relevant issues on KM, knowledge creation, and open innovation were also examined, as well as the company web pages. Document analysis provided data which supported the lines of data coming from interviews and observations.

Qualitative case study data analysis commences as soon as researchers begin assembling data from the case under investigation (Merriam, 1998; Miles & Huberman, 1994; Stake, 1995). This case study, contained two stages of analysis: within-case analysis and cross-case analysis. The within-case analysis involves detailed write-ups for each case, resulting in strong familiarity with each case which, in turn, facilitated comparison between different cases. The analytical process of data started alongside data collection to find emerging themes, the process of making meaning out of the data (Merriam, 1998). After transcription of each interview and observation, notes were read thoroughly to see which codes and themes emerge from the data. The researchers used codes to classify a series of otherwise independent events, statements, and observations collected from the data (Charmaz, 2014). First, open coding was applied where concepts are established, and their attributes and characteristics are identified in data. During open coding, the data are separated into discrete parts, analyzed in depth, and similarities and differences noted (Strauss & Corbin, 1998). Step 2 was axial coding, involving restructuring the data which have been fragmented through open coding, by establishing links between categories and their subcategories (Strauss & Corbin, 1998). Finally, selective coding was used to merge and filter the categories, thus accounting for the phenomenon under analysis (Darke, Shanks, & Broadbent, 1998). Once each individual case had been analyzed, cross-case analysis commenced, in which the authors compared findings across cases and looked for similarities and differences between the two cases.

## Findings

### *Knowledge Creation, KM, and Open Innovation in Company Alpha*

Company Alpha is a high technology company, where program development is the core business activity. The company has received many awards for its products and innovations. Alpha is a leader in finance technology solutions, combining technological innovation and entrepreneurship. The products and solutions are used worldwide by institutions, companies, and individual consumers. The company is one of those that came out of the financial collapse of Iceland and is a fast growing concern with around 100 employees. Alpha uses the Scrum development framework, and most projects are implemented in teams. The management team consists of eight people, three of whom are the founders of the company. Company Alpha has participated in various competitions and conferences relating to innovation and received awards for its products. The majority of the staff has a university education, are 30 to 40 years of age with more than 10 years' work experience.

*Knowledge creation* within Company Alpha is mainly a group process, where the expertise of staff members is the main resource, giving the company a leading edge. Managers rely strongly on employees for identifying new possibilities. "We work hard trying to find something new," one interviewee said. Employees have the flexibility to create and come up with new ideas; they must, however, make all decisions in cooperation with their team. Employees begin by selling the team their idea and then a decision is made on whether it should achieve a high ranking. Teams are the main company units, and support for these units and their structure is of prime importance.

More precisely, new ideas come to light in connection with product development in the company, both from employees and from customers. According to one interviewee, there are often several hundred ideas on the table and about half of them could be of interest. New knowledge is mostly gained in connection with problem solving. "The chances of solving a problem at the first attempt are minimal," according to one interviewee. Continuous learning takes place by doing a task repeatedly with new and varying methods. Most effort goes into simplifying tasks to such an extent that people begin to understand them. Making things simple takes a lot of time; employees work on a problem for a long time and then all of a sudden there is a "eureka" moment when someone realizes that the proposal for a solution was too complicated or that the task was developing into something quite different.

All respondents saw teamwork as a key element in knowledge acquisition. Most projects in Company Alpha are implemented in teams. Teams enjoy considerable autonomy and thus have the freedom and flexibility essential to the knowledge creation process. The teams are very independent

and strong and actually operate as small individual start-up companies according to one interviewee. The production process is extremely disciplined and employees use a roadmap to define and organize procedures. According to one interviewee, the whole process needs to be monitored; new knowledge can be generated at all stages on the journey toward creating new products or service. Training and further education is mostly conducted within the company and, according to all of the interviewees, employees gain new knowledge from the specialists being brought to the company who then work closely with the employees on on-going projects. There are not many instances of employees going to courses or conferences external to the company.

*External sources* are not of great importance in the developmental process, but their feedback is essential at its later stages. Many ideas or comments from clients (individuals) reach the company every day. Also, courses for customers are held, thus engendering feedback about the company's products. One interviewee said, "I hardly ever go to a reception without taking out my phone and showing someone something new or talking about it, so one always gets feedback." Representatives of client companies often voice their own opinions on product design. Another interviewee commented on this in this way: "[often these are] ideas we have tried and that we know have not worked for us; so at times the interplay can be quite entertaining." The interviewee also mentioned that, in addition, ideas were put forward which were a bit outside the framework and which might or might not be feasible; a situation where possibilities are limited, and there is a question of what the system can or cannot do and what is the most sensible route to take.

When new ideas in Company Alpha are promoted to development work, the whole team is called to a meeting, and a design sprint is implemented to understand the problem and to create what are called "personas." According to the interviewees, this is extremely fast creative work. Meetings and brainstorming sessions with customers are widely used when new ideas are promoted to development work. When the process has reached the stage of testing a product, a group of users is brought in to test the innovation. As one interviewee stated,

We take people who are completely "cold," it could be people from the street, employees or their partners. In some instances this testing is recorded by video and customer reactions to the product are monitored. This is in fact the way to create a kind of demo edition of the product; we then let someone use it and provide us with feedback.

The testing department has also sent out requests to people for assistance in testing a new product and for gathering opinions. The company is a leader on the market, so that competitors look to them for innovation. Interviewees emphasized that there is very significant competition in this sector, but mostly with foreign parties. The interviewees all

had good contact networks in this field of enterprise when the company was founded, and they have been maintained. This has a major impact on appointing employees, as well as gaining customers and access to the knowledge they need. According to interviewees, employees are very active in using their contact networks to increase their knowledge and to gain new customers which can, among other things, lead to a new service, strategy, or product.

*Knowledge sharing activities* within Company Alpha are mainly according to a personalization strategy. The shared space for employees to discuss projects is considered by the interviewees to provide the company with valuable new knowledge, for instance, Q & A meetings and Techtalk which is held twice a week, where an employee presents a project solution he or she is working on. Employees gather at these events and follow developments. To a large extent, knowledge sharing takes part in conversations between employees and within groups. The teams all have their own organizational walls which show their work. One interviewee said this was a good example of brainstorming between employees and there was a strong flow and continuous dissemination of knowledge throughout the whole day. The emphasis is on creativity where employees are encouraged to create and share new knowledge with special Idea Days where employees present their ideas and solve problems they have long struggled with. Regular meetings are held with each team where employees go over the status, and problems are discussed and larger meetings convened with all employees. One interviewee mentioned that in spite of all the communication paths to which employees have access, it is important to communicate face to face. As he described here:

Forwarding information can be difficult, I want people to talk to each other. You can enter whatever you like on Wiki and into any other system, but it that does not ensure that someone is going to read it. So I would say, rather, just stand up and ask the person next to you; find out whether he has solved a similar problem . . .

Employees use the intranet, email, blog, chat threads, Slack, Hangouts, Twitter, and Facebook to share knowledge and provide new solutions and ideas. Employees submit questions relating to problems that need to be solved and receive information from other employees who have encountered the same problems, or they are referred to documentation that can prove useful. Twitter has been the main source of new knowledge for many of the company's employees as one interviewee described, "I take the advice from people who are working in this sector. They put articles on the wall or their thoughts, on something that is innovative." Employees regularly try new media that facilitate their access to knowledge, and the interviewee added that "The really important thing here is to have your finger on the pulse. Regardless of whether it is Twitter or SnapChat, to be an early adopter and use the best practice that we know others have used successfully."

*Documentation and archiving of knowledge* is conducted in a structured manner in the company. The publishing process demands that everything is documented. The gathering of knowledge from employees is mainly by a chain of experiments and tests by the employees in question: "It requires many diagrams and many pages that are written then discarded, and the whole process started again from scratch. Then we progress to testing and iterations in repeated cycles." According to an interviewee, all staff are expected to toe a very strict line, and they have access to an inner network in which everything is registered. "Nevertheless, I would say that we can do better there." The company's inner network is where staff record interesting information. One interviewee described it more fully as follows:

So that if you find some article, presentation or something that has caught your interest, you just post it and then people may or may not have time to look at it. Also, we have an instrument to manage ideas so that all staff access these and post suggestions for some innovation and other members of staff can make their own choices.

The interviewees say that this is a web tool to which everyone has access, and each and everyone can go on it and contribute their ideas. Then, other staff members can comment on these and choose between the ideas. This is followed up and a decision is made on whether or not the idea will be placed on the agenda for further development.

### *Knowledge Creation, KM, and Open Innovation in Company Beta*

Company Beta is a family company which produces drinks and snacks. It distributes its goods to shops and also has its own retail outlet. The company also offers many kinds of services connected to their products and has been in business for over 20 years. At first, the founder of the business was the only staff member and, as a consequence, had to handle all aspects of the company himself. He advertised his products, held courses, and tried to sell his goods in restaurants and supermarkets. It was 5 years from the founding of the company that its first outlet opened. Today, the company has a great many sales outlets, a production/factory, and around 100 employees. The staff members fall into two categories: on one hand, managers and key employees who have worked for the company for a long time and have gained a great deal of experience and on the other, young people who are working alongside study programs. Staff turnover is, therefore, high as is usual in this type of business.

*Knowledge creation* in Company Beta is based on various paths, such as the staff of the company, making trips abroad, attending conferences, reading journals, and using Internet media. New knowledge is frequently acquired through contacts with customers and suppliers. The work is diverse, and innovative ideas come in from all directions and by different



routes. The management and its staff are also an important spring of creative innovation, and company management look, in a significant degree, to foreign shores where most of the suppliers are situated, to gain yet more knowledge. Organized training and education is mostly held within the company itself. The “educator” sees, for the most part, to the training of staff. He has worked for the company for 10 years during which time he has developed considerable expertise with regard to the company’s products and marketing techniques. He forwards the information to the staff through interviews, individual training, or the communal networks. The director of the company also attends to the education and training of staff, writes newsletters containing various information about the products and operations at any given time, and is in charge of training branch managers with regard to a deeper knowledge of goods and services. Courses are also held by parties outside the company. Training inside the company is mostly informal. Staff learn from each other, and those who have longer experience are encouraged to pass on information to new recruits. The role of the educator is also to monitor the competition environment and assess whether there is a need for increased knowledge, as well as being on the lookout for any innovations. If this is the case, a prompt response must be shown regarding education and training in accordance to interviewees. “Staff must be a little on their toes about this,” says one interviewee. Another considers the tried and tested method of consulting staff members who one knows and trusts is the best method of gaining knowledge. Competitions within Company Beta are used for training and innovation. In such competitions, employees are given the opportunity to present their ideas, and usually, a new product comes into being as a result. According to the interviewees, this method is seen as a suitable platform for the creation of new products or services, as well as offering opportunities for enhancing staff knowledge. Employees learn a good deal by observing one another in these competitions and by staging their own ideas, where the aim is to harness employees’ initiative and creativity. Staff participation is voluntary, but those who take part are rewarded with a salary increase, and the positive attention earned by the winners. The interviewees agree that the in-house contests already held, stimulate staff creativity and often serve as catalysts for innovative ideas, which may bear fruit in the creation of new products. Employees are encouraged to present ideas which they would like to try out. A Facebook group has been set up in relation to the competitions, where innovative products are announced, including the name of the employee who originated the idea and won the contest on each occasion. Employees also participate in various larger competitions abroad, where innovation is stronger and more diverse than in Iceland. In the context of all in-house idea processing, a team of employees is always formed to further develop the concepts in question, tests are conducted, and subsequently the project is presented to a group of employees for feedback. All new products are subjected to tests and

experiments, and each stage is recorded. When an experiment has been completed, a meeting is held, and the whole process is revised to determine whether the innovations have been granted enough time to prove themselves. The interviews clearly established that communication with customers is of vital importance with regard to the origin of new knowledge. Suggestions and recommendations from customers, and even suppliers, constitute a highly significant source of new knowledge within the company. The provision of information to customers can also be of high value. The company strongly emphasizes being able to tell the story behind the products and inform customers about aspects they take a special interest in, for example, the origins of raw materials or how the name of the product came about. This kind of information is important to some customers and provides opportunities for a dialogue and contact with customers, whose perspective of the products is highly significant and carefully listened to, according to the interviewees.

Demands are made on businesses to master the latest developments in their sector, and this depends on certain fluctuations in fashion at each time. The interviewees agree that customers’ opinions are a tool of the greatest importance, that is, listening to the client and understanding his or her wishes as long as they conform to the company’s values. Customers are also important in connection with innovative ideas, and their feedback is of great help. Employees are generally encouraged to test and further develop their ideas in cooperation with the company’s customers who are often asked to taste the product and provide feedback. In general, this applies to regular customers, both individuals and groups. “The entire process revolves around customer demand, that’s the source and origin,” according to one interviewee.

There are instances that when employees have inadequate knowledge of the product requested, they do not hesitate to consult the customer if he or she is knowledgeable about a product he or she wishes the company to make. Thus, the employee and the client cooperate in further developing the product and a transfer of new knowledge from client to company occurs. In such cases, these are often products similar to those customers have received abroad. In some cases, customers have special requirements, and some of them have developed their own product in cooperation with company staff and can then order it when it suits them. When customers ask for products that are not available, employees often access the Internet to seek information and knowledge, so that they can respond to their customers’ wishes. Such processes often lead to innovation. One interviewee gives an example of a customer relationship which is likely to stimulate innovative product development. As he describes the process, a customer who had been with the company for several years made contact to discuss the products which he felt were not as good as they used to be. The company responded by saying that they follow the flow of new times and different fashions and that their products had developed and



changed accordingly. After considering the matter, however, it was decided to comply with the customer's wishes and develop a new product in consultation with the customer. Company staff further developed the concept, and this work led to a new product currently about to be marketed.

The competitive environment strongly influences whether and when a company needs new knowledge. The interviewees say there is intense and steady competition, and therefore, companies are constantly trying to create something new to reach more customers. This sector is growing rapidly at present, and the competition is intense. The competitive environment largely revolves around demand and reputation. There is hardly any contact between competing businesses; cooperation is almost nonexistent as is communication with companies in the same sector, according to the interviewees—the focus is all on tough competition.

Employees use, among other things, Internet media, meetings, and discussions to *share knowledge*. The interviewees agree that knowledge should be disseminated through informal communication between individuals and by attending meetings and happenings on offer. A large number of workstations can be a certain barrier to knowledge communication, and therefore, it is important to make good use of the media the company has access to to maintain contact with as many employees as possible. "It is of course a bit of a challenge to be involved in many workstations and link employees by discussion," says one interviewee and emphasizes, at the same time, that the sharing of knowledge always constitutes a challenge. Regular meetings are convened where current projects are discussed and results analyzed. The results then become new knowledge which can be used in future projects. Employees and managers introduce their own ideas at meetings, as well as present suggestions from other staff members. Those can be innovations or improved goods and/or services. If the idea is considered viable, it is developed and tested. The interviewees made clear that sharing of knowledge occurs mostly through conversations between staff members and within groups. A personalization strategy is in place.

Customers have expressed the wish that the company should be accessible on social media. When managers travel abroad to meet suppliers, information relating to the trip has been uploaded for customers' benefit. The interviewees believe Facebook constitutes a good avenue to meet as many customers as possible. To reach the younger generation, the communication medium Snapchat currently appears to be the main platform: "We must 'snap' to be ahead of the com[petition]." One interviewee says the company has gradually moved in the direction of listening more to what the customer says. It is not only important for customers to gain an insight into the production process or where the raw material comes from, according to interviewee. Staff awareness of the origin of raw materials is a foundation for employees' ambition to expand their knowledge about the product they are involved in.

*Documentation of knowledge* is done within data bases and computer systems, where information is recorded with regard to projects, work procedures, and communication. It varies, however, to what extent employees use the systems in their daily work. No formal strategy exists in connection with the preservation and recording of data and information. All courses, recipes, and other materials of practical use are recorded and saved as information useful to employees. The interviewees agreed that the storage and documentation of knowledge was sometimes rather loosely organized and that stricter rules and formal procedures should be put in place. One interviewee stated that, nevertheless, employees had ready access to everything that has been recorded and emphasized the material presented in the social media: "But then there are the human resources, you see, they are irreplaceable; if I quit, my knowledge would no longer be available . . ." Employees make use of social media to access and distribute information. Facebook is used a good deal for communication, but one interviewee says it poses a significant challenge to use those media, although, in fact, that applies to all media.

### Comparison of the Two Cases

Table 1 highlights the similarities and differences in KM, knowledge creation, and open innovation in Company Alpha and Company Beta.

Both of the companies are SMEs with around 100 employees. They operate in different industries; high technological software company and manufacturer of drinks and snacks. As such they provide intense examples of the subject under study. The companies show a vast difference in the knowledge creation process and how they relate to external sources. They show similarity, however, in this way they share knowledge in a personal way, through social media, and within teams. The two companies document core knowledge in a systematic way, but other knowledge tends not to be documented.

### Conclusion

The objective of the article was to present findings on KM, knowledge creation, and open innovation in SMEs in Iceland. Two case studies were presented seeking answers to the questions: (a) How do the Icelandic SMEs deal with knowledge creation, knowledge sharing, and storage? and (b) How are customers and other external stakeholders involved in the innovation process?

New knowledge in Company Alpha originates from new business ideas and problems that need to be solved. Groups of employees work on the development of new solutions by experimenting and sharing knowledge through brainstorming and discussing ideas, which can be described as collaborative learning. As previously stated, Alpha operations involve a great deal of teamwork. Teams are considered to enhance

**Table 1.** Characteristics of KM, Knowledge Creation, and Open Innovation in the Two Case Companies.

	Company Alpha	Company Beta
Number of employees	Around 100.	Around 100.
Main activity	Software development.	Drinks and snacks.
Knowledge creation	New ideas come to light in connection with product development among staff. Teamwork of expertise as key element.	Staff go abroad, attend conferences, read journals, etc. Competitions within and outside the company are sources of innovation.
External sources (customer, suppliers, etc.)	Not important until late in the process. Meeting and brainstorming sessions with customers widely used.	Customers and suppliers are very important in promoting new knowledge, both regarding raw materials and end products.
Knowledge sharing activities	Largely takes part in conversations between employees and within groups. Social media also used to share knowledge.	Personal conversations, teamwork, training, social media.
Documentation of knowledge	The documentation of the software is highly structured, but not other knowledge.	Receipts, course material, and other practical materials are saved in data bases. No formal strategy exists on documentation of knowledge.

Note. KM = knowledge management.

mindful working practices, and employees have the opportunity to create a new vision, to provide information and research it from various viewpoints, and to gain and create new knowledge. It may be said, therefore, that the company has built up a structure which acknowledges and encourages learning, creativity, employee motivation, and ambition for knowledge openness, as well as collaboration; all of this being of importance for open innovation (Csath, 2012).

Customers and external stakeholders are rarely consulted until the end of the process. Although their feedback is important, it is only limited in the knowledge creation process in general. The company focuses on one main product, software, where customers are most likely to be involved when the process has reached the stage of testing a product. Customers' suggestions or requirements regarding new products and the company's working practices are of vital importance as catalysts for new knowledge within the companies. Company Alpha has, accordingly, some features of an inside-out innovation model (Chiaroni et al., 2011; Wynarczyk, 2013).

In company Beta, knowledge gathering by employees takes place largely through training and education. Employees also seek knowledge from other employees through communication channels within the company. New knowledge originates mainly from new ideas on product development where employees work on the development of new solutions by experimenting and sharing knowledge through testing and discussing ideas; this can be described as individual and collaborative learning (Hedlund, 1994; Jakubik, 2008; Nejatian et al., 2013). The findings show that most learning takes place when employees have the possibility of gathering new knowledge through experiments and tests where they have the opportunity to disseminate their own ideas and to learn from others. In-house events such as competitions are, therefore, important to create this forum. With this arrangement, the company supports learning and knowledge gathering,

which according to Csath (2012) is important for open innovation. Customers and suppliers are heavily consulted in the development and testing of products. Company Beta, thus, has many features of outside-in innovation practice (Chiaroni et al., 2011; Wynarczyk, 2013).

Communication with customers is extremely important as a source of new knowledge within the company. Customer demand for new products and services and the willingness of employees and managers to meet these requests play a major role in the company in seeking new knowledge, at the same time being the basis for innovation. For this reason, the company uses networking extensively in connection with innovation which, according to Lee et al. (2010) and Padilla-Meléndez et al. (2013), can be an important factor in open innovation. Innovation, therefore, largely occurs as a result of communication with customers.

The two case companies share many characteristics of SMEs; they lack some formal strategy on KM, dissemination, and storage (Durst & Edvardsson, 2012; McAdam & Reid, 2001). Knowledge creation and innovation is a learning process in both companies. Knowledge sharing is mainly through personalization strategy, although the development process is intensively documented. They come close to the findings of Garvin (1993) where he argues that new knowledge is created in organizations by a constant process of problem solving, experimenting with innovative methods, learning from experience, and sharing knowledge. Collaborative knowledge acquisition is also prevalent in the two cases, where new knowledge comes into being through critical dialogue among employees working together in a collaborative effort to find joint solutions to work-related problems (Hedlund, 1994; Jakubik, 2008). Both companies have thus developed a learning culture which supports learning and knowledge creation, which is important in open innovation Csath (2012), but each in its own way. As openness can be a managerial

challenge for SMEs (Brunswick & Vanhaverbeke, 2015), the companies have the resources to make extensive use of KM to improve and stimulate innovation (Edvardsson, 2006). It is interesting to note that both companies leverage social media and networking to disseminate and receive knowledge internally. Employees have the freedom to continue developing ideas with customers, and management supports an increased flow of knowledge from the outside. In both companies, various factors relating to KM support open innovation, and the companies also have to overcome challenges and barriers.

Interestingly, the two companies show very different open-innovation models in practice and that shows the diversity among SMEs. The findings regarding the two companies are in accordance with the arguments of Chiaroni et al. (2011) where they state that high-tech companies tend to prefer inside-out strategies of open innovation, whereas low-tech companies prefer outside-in strategies. The latter rely on knowledge from customers, suppliers, and research institutions for new knowledge. Company Alpha seems to be more in line with earlier studies which show that SMEs more often use open innovation at the more advanced levels of the innovation process (Van de Vrande et al., 2009). Both companies are open to external sources, but at different stages, and then more likely to gain a higher level of innovation performance (Laursen & Salter, 2006).

The findings indicate that SMEs can benefit from open innovation to provide new products, prototypes, and processes. Accordingly, open innovation can enhance their competitive advantages that is in line with former research (Hossain, 2015; Huizingh, 2011). The two companies in the study lack a formal KM strategy, dissemination, and storage. Potential knowledge creation opportunities may, therefore, be lost. There is thus a room for improvement in the field of KM in SMEs as has been pointed out by McAdam and Reid (2001).

The research presents some limitations that in turn provide an opportunity for future research. It is of considerable interest for further research to understand the differences in KM, knowledge creation, and open innovation manifested in the two companies. With a view to the fact that our research has the rather limited foundation of only two case studies from Iceland, we recommend extending future research to a larger number of companies, thus endeavoring to come to grips with the complex aspects of KM, knowledge creation, and open innovation. Paying specific attention to size and cultural differences could also be of interest in this context. The Icelandic companies, however, give an insight into how this is managed in Iceland and various aspects, such as the small size of the country, the competition environment, access to customers, and management practices, among other things, can vary between countries. It would, therefore, be interesting to study more Icelandic SMEs and compare these factors in an international context.

## Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: One of the author received a doctoral scholarship from University of Iceland to conduct the research.

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