Which factors facilitate the management of external knowledge?

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Abstract

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**Title:** Which factors facilitate the management of external knowledge?

**Introduction:** Today more and more organisations are realising that handling internal and external knowledge is a key issue for successful performance. Different theories describe the importance of this topic, for instance, Porter’s Five Forces model and Hedman & Kalling’s General Business Model demonstrate how organizations are strongly influenced by external forces. Hedman & Kalling’s model particularly demonstrates that organizations need to have the competence, capability and resources to effectively manage external knowledge in order to increase their competitiveness and develop and improve their long term survival.

**Purpose:** Nicholas Carr highlights that for the past decade organizational investment in IT and IS has reached nearly 50% of capital expenditure, while the organizations see little or no performance improvement as a result of this investment. While IT systems are good at storing and retrieving information, the success of the systems heavily relies on the quality of the external and internal knowledge used both during development and usage. A deeper awareness of factors which facilitate the management of external knowledge is relevant to IT managers (indeed all managers) as it will help to facilitate the development and implementation of information systems and technology which are designed to facilitate knowledge management in organisations.

**Methodology:** In the thesis factors related to effective management of external knowledge are identified and described. The General Business Model was used as a tool to identify and categorize the literature review into key themes.

**Conclusions** One of the findings is that most published research focuses on factors internal to organizations such as activities and resources and there are few papers dealing with external factors for knowledge management. It was also found that literature which focused on external factors mainly focused on the role of individuals as resources who cross the boundary of the organization in order to acquire and diffuse the external knowledge. In general the topic of external knowledge management is not studied in a holistic way. The acquisition and diffusion processes have been investigated as separate, but not as the whole process.
1 Introduction

It is important for firms to manage change in order to compete competitively as their competitive environment changes at a fast rate (Applegate, 2007). Senge (1992) emphasises that with the fast pace of change in the technology and the business environment it has become even more important for organisations to be able to proactively change with the times, in terms of their ability to learn, adapt and improve the quality of offerings for the customer. Senge believes that in the long term, the only sustainable source of competitive advantage is an organisation’s ability to learn faster than its competitors.

1.1 Why do companies need external knowledge?

Organizations do not exist in a vacuum; they constantly interact with the external environment. With the pace of technological development and rising competition, companies need to be faster than ever before in information processing and knowledge creation to respond to changes in the markets. During the last decades the concepts of “flexible firms”, “extended organizations” have become popular in academic research. Besides the knowledge existing in the organization, companies have to regularly acquire external knowledge from the external environment. The capability for organisations to learn and adapt quickly have become sources of competitive advantage to companies in the network economy (Applegate, 2007).

Studies of external knowledge in organizations, according to literature review, belong to the area of research about innovative performances of organizations or their level of innovativeness. The relationship between external knowledge and product innovation has been being investigated by numerous researchers as the effect of innovativeness of the firm is its ability to respond to changes by making alterations on the offering level. The ability to make changes to the organisation’s offerings and innovate better is, according to the study of Oerlemans et al, “the combination of internal and external resources results in better innovation results” (1998). These changes to the offering are often influenced by the external environment and as March & Simons (1958) state ‘innovation is a result of borrowing rather than invention’. Utterback (1971) claimed that the effectiveness of firms to produce new
product innovations is partly the result of “flows between the firm and the environment”. The forth generation of innovation processes development, according to van der Duin, is characterized by development of innovation projects not only within organizational boundaries, but in broader networks of internal and external players (p. 200, 2007).

Segelod and Jordan (2004) investigated the use and importance of sources of external knowledge in innovativeness of software development process. The authors refer to the study of Håkansson among 123 Swedish companies, who indicated that “30% of all product development projects were carried out in cooperation with customers, suppliers, and other parties” (1989, 1990). Another explanation of usage of external knowledge is given by Knudsen (2007), who indicates that inter-firm cooperation in new product development is conditioned by external challenges and or internal needs (p. 119). Examples of those might be renewal of existing knowledge by using external knowledge or time and cost-saving strategy. Knudsen also notes that new product development requires knowledge creation and utilization with different partners, who might become sources of different types of knowledge. Therefore, according to Knudsen, all possible relationships and their contributions need to be investigated in the knowledge creation process.

1.2 Problem statement

Carr (2003) observes that over the past decade organisations have invested heavily in IT / IS. These investments have included development of capabilities to store, access and disseminate knowledge in order to assist the organisation in adapting to changing environments. Carr also points out these investments in IT have resulted in very little performance benefit for these organisations that invest so heavily. A deeper awareness of factors which facilitate the management of external knowledge is of relevance to IT managers (indeed all managers) as it will help to facilitate the development and implementation of information systems and technology which are designed to facilitate knowledge management in organisations.
1.3 Purpose

The purpose of this research is to identify and describe the factors contributing to effective management of external knowledge.

To achieve this purpose the following research goals have been formulated:

1. To describe theories about external knowledge management.
2. To identify factors related to effective acquisition of external knowledge.
3. To identify factors related to effective diffusion of external knowledge.

To answer the above research questions, a review of literature about external knowledge and its usage in organizations was performed. The literature is categorised according to factors contributing to effective management of external knowledge in organizations.
2 Conceptual Framework

The following chapter consists of the definition of external knowledge and description of the general business model.

2.1 What is external knowledge?

The study of knowledge has a long history and covers many disciplines. Philosophers such as Plato described knowledge as ‘justified true belief’.

For this research work, the definition suggested by Bessant & Tidd (2007) will be used to define information and knowledge:

a. “Information is data that has been organized, grouped or categorized into some patterns.”

b. Knowledge is “information, which has been contextualised and given meaning. The transformation of information into knowledge involves making comparisons, identifying relationships and inferring consequences, which makes knowledge richer.”

Researchers, according to the literature review, use different definitions and have an unclear boundary between information and knowledge. For this reason definitions of information and knowledge are used interchangeably in the context of this study.

Nonaka (1994) states that there are two forms of knowledge: explicit and tacit knowledge. The former can be explained as knowledge which has been articulated in some form and stored. In this way knowledge is easy to share and transfer between individuals. Tacit knowledge is personal, context specific, subjective knowledge, whereas explicit knowledge is codified, systematic, formal, and easy to communicate.

Literature review demonstrated that there is no a clear definition of external knowledge and the definitions found during literature review are somewhat broad. For instance, Sammons defines external knowledge as “new knowledge” which is needed for surviving in the “century of exponential growth of knowledge” (p.xiiv, 2005). Feng et al in their research divide knowledge management into two parts: internal and external (p. 60, 2001). The external knowledge management refers, according to authors, to management of research and development departments, which acquire knowledge from customers to develop products
meeting their needs, sales departments which are in close contact with customers and after sales services which offer “customer service knowledge” (p. 60, Feng et al).

Other researchers concentrate on sources of external knowledge. For instance, Aslesen (2007) et al identified two types of external knowledge sources: “actors delivering knowledge as their core business, most often through formal, traded relations” and “actors delivering knowledge profitless, most often through informal, untraded relations” (p.50). The ability of organizations to effectively use external knowledge for commercial success is dependent on the type of external knowledge basis, indicates Aslesen. Her research demonstrated that organizations involved into traditional sectors are more dependent on synthetic knowledge, which is characterized to be more tacit than analytical knowledge basis. Thus, they are more interested in developing practical skills and have a low level of research and development focusing on “solving specific problems articulated by customers”. In contrast, in biotechnology and information technology organizations are more reliant on analytical knowledge as they use “new scientific or technological, codified knowledge”. Aslesen also indicate that these organizations will be more likely to be involved in radical innovations rather than those which are dominated by synthetic knowledge bases.

Thus, in the framework of this study the authors used the above definitions of information and knowledge and their external sources.

2.2 General Business Model

Hedman & Kalling’s (2002) General Business Model concept presents a framework for describing and understanding the key components of a given business. The business model integrates strategic and operational perspectives into one model to identify the relationships between different business activities and resources, how the different perspectives add value to the organisation and how the elements of the business adapt over time.

The General Business model has been utilised here as it gives an overview of common elements and research perspectives in business models and can be applied to most companies. We use it here as a tool to categorize the research findings on management of external knowledge.
Fig. 1: The General Business Model, Liljefors (2008), adapted from Hedman & Kalling (2002)

The General Business Model outlines seven generic components:

1. Customers
2. Competitors
3. Offerings
4. Activities and organization
5. Resources
6. Suppliers
7. Scope of Management

These seven components can be categorized into four groups of strategic theories explaining performance of a company in a competitive environment; the Porter perspective, Industrial Organization perspective, the Resource Based View and the Strategy Process perspective.

The Porter perspective focuses on the external environmental factors to the firm. This perspective is influenced by the strategic concepts of Michael Porter (1980), particularly the Five Forces model and the generic strategies model, which say that the external environment of firms determines the attractiveness of an industry and the performance of the firm within it.
The Industrial Organisation perspective looks at the internal functions of the firm. Hedman & Kalling (2002) describe this perspective as understanding the structure and coordination of firms in order to determine how well it will perform. This includes the design of processes, patterns of communication, scope of knowledge and culture.

The resource perspective considers the theories of (amongst others) Barney (1986), who suggest that the possession of resources inside a firm e.g. physical assets, financial and human resources determines the success of the firm and its advantages within the industry compared to competitors.

Finally, the Strategy process perspective focuses on the planning and management functions in strategy formulation. Hedman & Kalling (2002) describe this perspective as also including the decision-making, psychological and sociological views of management.
3 Methodology

This chapter presents the processes of data collection and data analysis. This research is of qualitative nature as it is aimed at describing and explaining the relationships between variables without testing particular hypotheses. It is based on the review of available literature about management of external knowledge and factors related to its effectiveness. The literature review of theories about acquisition and diffusion of knowledge as research indicated that external knowledge management seem to get increased attention in knowledge management research. During the literature search a number of studies where encountered which describe factors related to effective management of external knowledge from the perspective of the above theories, while in studies about intra-organizational learning factors related to effective diffusion of new knowledge have been broadly investigated. Thus, the authors mapped the following research areas, which are of relevance to the management of external knowledge management:

![Diagram](image.png)

3.1 Methodological pluralism

As this research focuses on a general topic of external knowledge management, its scope is rather broad, thus, the authors conducted a literature review of studies about acquisition and diffusion of external knowledge from different methodological standpoints. According to Arbnor and Bjerke (1997), there are three methodological approaches in business research, which are the analytical, the systems, and the actors approach. The analytical approach has its origins in classic analytical philosophy and it is assumed that the reality has a summative character. Knowledge is created independently from an observer and
explains causal relationships and logical models. In contrast to the analytical approach, the systems approach assumes that the reality is arranged in such a way that “the whole differs from the sum of its parts” meaning that “not only parts but their relations are essential” (p. 51, Arbnor et al, 1997). The actors approach, according to Arbnor et al, is not interested in explanation, but rather in understanding social wholes (p. 52, 1997). There is an essential assumption that organizations cannot act, only individuals can, which develop meanings and share across organizations. Thus, the literature reviewed by the authors had various methodological approaches. As indicated by Fisher, it is possible to combine different methodologies (p.56, 2007) in one study as long as the chosen approach is “sensible for answering the research question”. As the research question raised in this study is quite broad, the authors have chosen to review studies with different methodological approaches and classify factors identified in studies with analytical, systems, and actors approaches.

The General Business Model was used as a tool to analyze how organizations manage external knowledge to make changes on the offering (products or services) level. The units of analysis are correspondent to the levels in the General Business Model: market/industry level, suppliers, resources, activities and organization, and management processes.

Research on managing external knowledge identifies different aspects of the organizations which are required in order to successfully absorb and exploit knowledge from external sources. With this in mind, the authors of this project describe the key similarities and differences of the research by utilizing the business context set out by Hedman & Kalling’s General Business Model (2002). This model has been selected because it combines three crucial contexts (the external environment, internal activities and resource level) which can be applied to any organization. The General Business model has been utilised here to demonstrate that changes in the external business environment generates new knowledge and requires organizations to develop its internal processes and resources to absorb, diffuse, assimilate and exploit this knowledge with in order to be able to maintain their competitive advantage.

3.2 Literature search

To fulfil the research purposes information has been collected from secondary sources. Secondary sources from an academic journal database (ELIN) as well as popular management
texts available from the university library were used to conduct a literature review of available theories about the topic of the research.

The following search terms were used to find research of relevance:
*External knowledge, external information, knowledge diffusion, innovations, absorptive capacity*

### 3.3 Literature analysis

The literature is analyzed according to the levels of the General Business Model, i.e., suppliers, resources, organization and activities, and market/industry levels. Factors related to management of external knowledge will be categorized according to each level of the model.

### 3.4 Limitations and scope of the study

The effects of the factors identified will also depend of the context of the organisation such as the type, size, nature of the industry, age or maturity of the organisation. However these factors were not investigated and are outside the scope of this thesis. A broad review of literature was undertaken and key theoretical perspectives and factors have been derived.
4 Findings

In this section the findings are mapped to the questions raised in the introduction. First the theories which explain the process of acquisition and diffusion of external knowledge are explored. These theories consider the management of external knowledge as the entire process, while the next sections contain different theories and concepts related to separate processes, acquisition and diffusion.

4.1 Theories about the process of acquisition and diffusion of external knowledge

4.1.1 Absorptive Capacity

“The ability of a firm to recognize the value of new external information, assimilate it and apply it to commercial ends” is defined by Cohen and Levinthal (1990) as a firm’s “absorptive capacity”. The ability to evaluate and utilize outside knowledge is largely a function of the level of the prior related knowledge, according to Cohen and Levinthal (1990). This prior knowledge can be “basic skills or a shared language, but may also include knowledge of the most recent scientific or technological developments in a given field”. Cohen and Levinthal indicate that it can help organizations “recognize the value of new information, assimilate it, and apply to commercial needs” (p.128).

The authors refer to absorptive capacity of individuals in order to explain how prior knowledge is important for assimilating and using new knowledge, however they indicate that organizations’ absorptive capacity is somewhat a different construct, which employs different levels of analysis. To better understand the concept of absorptive capacity of organizations, one needs not only to concentrate on the ability of organizations to interact with the external environment, but focus also on “the structure of communication between the external environment and the organization, as well as among subunits of the organization, and also on the character and distribution of expertise within the organization”. The authors note that absorptive capacity of organizations is dependent on individuals who “stand at the interface of
both the firm and the external environment or at the interface between subunits within the firm”.

What is the link between external knowledge and innovation outputs? Jonsson indicates that the adoption of external information is dependent on the abilities of the firm to “transfer capabilities across the firm boundary and also within the firm” (p. 110, 2000). Cross-boundary adoption, according to Jonsson, depends on the gatekeepers, members of the firm, and their relations and shared knowledge base with players in the external environment. Adoption of the information within the firm is dependent on the homogeneity of the knowledge base and organizational culture. In general, the absorptive capacity of the organization relies on the gatekeepers, as research indicates that “the closer the relationship and the more shared knowledge base between the gatekeeper and the external environment, the better the absorptive capacity of the firm” (p.110).

Much research has been conducted about the absorptive capacity of organizations, however, the link between the external knowledge and companies’ performances, according to Fosfuri et al, haven’t been studied enough (2008).

Zahra and George (2002) suggest that absorptive capacity is a multidimensional construct divided into two subsets, potential absorptive capacity and realized absorptive capacity. Potential absorptive capacity, according to the authors, “enables a firm’s receptiveness to external knowledge”, while realized absorptive capacity “reflects a firm’s capacity to leverage absorbed knowledge and transform it into innovation outcome” (p. 174). According to Zahra and George (2003) the earlier mentioned dimensions of absorptive capacity are acquisition, assimilation, transformation, and exploitation (p. 175). Acquisition, according to the authors, refers to the firm’s capability to “identify relevant external information over the total amount of information that surrounds the firm”. Assimilation refers to “a firm’s routines and processes that allow it to analyse, process, interpret and understand the information obtained from external sources. Transformation consists of the ability to modify and adapt external knowledge and combine it with existing and internally generated knowledge. Finally, exploitation refers to the ability to transform this knowledge into competitive advantage (p. 175). Each of these dimensions “play different but complimentary roles in explaining how absorptive capacity can influence innovation performance” (p.175). Acquisition and
assimilation combine potential absorptive capacity, while the latter ones – realized absorptive capacity.

4.1.2 Exploration versus exploitation

Holmqvist in his research investigates the relationship between two types of ways of experiential learning, exploitation and exploration, and types of organizations, imaginary and formal (2000). Exploration includes search, discovery, novelty, and innovation, while exploitation involves refinement, routinization, production, and implementation of knowledge (p. 14). A formal organization, according to the author, is a legal entity, while imaginary organizations are formal organizations interacting with each other through strategic alliances (p. 16). Holmqvist notes that organizations depending on focusing on either types of experiential learning can experience “success or failure traps”. The author suggests that formal organizations are more likely to be involved into exploitation, while imaginary organizations – into exploration. The underlying problem here is to balance both types of experiential learning. A dynamic learning model is proposed by Holmqvist as a solution to this problem. The model consists of four elements: acting, opening-up, experimenting and focusing (p. 196). Acting means on-going exploitation, opening-up is the transformation from exploitation to exploration, experimenting means on-going exploration, and focusing is the transformation from exploration to exploitation.

4.1.3 Process of managing external knowledge

Research (e.g. Tushman 1980, Sammons 2005, p. 57) describes different parts of the process of managing external knowledge. Different parts of the management process includes the following steps 1) Recognising the need for external knowledge 2) Acquiring external knowledge 3) Absorbing the external knowledge, diffusing and exploiting it.

The first step of recognizing what knowledge is required and takes place within the organization. The process of acquiring external knowledge takes place in the external environment before the final process of absorbing, diffusing and exploiting the knowledge takes place in the internal firm environment.
4.1.4 Culture-space

Bessant & Tidd refer to Boisot who created the concept of C-space (culture-space) as a tool for analyzing the flow of knowledge within and between organizations (p. 190). The concept consists of two elements: codification and diffusion. Codification is “the extent to which information can be easily expressed”, while diffusion is “the extent to which information is shared by a given population”. Boisot suggests depending on codification and diffusion organizations involve in cycles of social learning, which consist of scanning, problem-solving, diffusion and absorption.
4.2 Factors related to effective acquisition of external knowledge

4.2.1. Recognizing the need for external information

Sammons in his book “Buying external knowledge” indicates that organizations experience a constant need for new information depending on different motivations (2005). Sometimes companies need to be competitive, in other cases companies might need more information for learning, according to the author. Organizations need to constantly identify knowledge gaps and search for necessary knowledge.

4.2.2. Individual skills / competencies

At the individual level Cohen and Levinthal (1990) argues that the ability of individuals to evaluate and utilize outside knowledge is related to their level of prior knowledge. They state that prior knowledge increases the ability of individuals to make associations and form creative linkages with new information. This is supported by Utterback (1971), who states that the diversity of prior knowledge allows individuals to form new linkages in their knowledge which drives creativity. Prior knowledge could include skills for learning and also of technical / scientific knowledge, which could be the result of former experiences e.g. R&D efforts or previous experiences in manufacturing.

4.2.3. Communication roles and mechanisms linking the external environment

Some areas of research have highlighted that firms who are successful at utilising external knowledge in order to make changes at the offering level create communication channels in order to effectively transfer external knowledge and create new knowledge. Besides other factors, the role of individuals is very important in transferring knowledge between and within organizations. Tushman (1981) found that an important mechanism by which information is imported into organisations is through individuals who are well connected both internally and externally. He refers to these individuals as ‘boundary spanners’, who are technically competent and respected individuals who facilitate communication across organisational
borders. The role of ‘boundary spanners’ is to gather information from external areas and disseminate this information to their colleagues.

- **Gatekeepers**
Tushman (1977) also describes the role of specialised actors known as gatekeepers, who are defined as ‘those key individuals who are both strongly connected to internal colleagues and strongly linked to external domains’. Tushman found that ‘gatekeepers do more than mediate external information; they appear to facilitate the external communication of their more local project colleagues. Therefore direct contact made by project members to external organisations and contact mediated by gatekeepers, then, are two contrasting ways to link project groups with their external areas’. Cohen and Levinthal (1990) also emphasises the importance of the skills of the wider team members in learning and communicating effectively so that the information is shared widely in the organisation where it could be utilised and possibly turned into new information.

- **Knowledge translators**
According to Bessant & Tidd, knowledge translators are individuals who are able to express the interests of one community in terms of another community’s perspective (p. 195, 2007). For this reason this individual has to be “sufficiently conversant with both domains” and be trustworthy in each.

- **Knowledge brokers**
Another type of individuals who transfer knowledge between and within organizations is knowledge brokers (p. 195, Bessant & Tidd, 2007). His role is different from the role of a knowledge translator due to participation in different communities rather than mediating them. They have weak ties with several communities and facilitate knowledge flows between them.

- **Management**
Löwegren indicates that the companies, where firms’ founders were linked to universities prior to starting business, have higher absorptive capacity due to the level of knowledge, experience, and networks of management (p. 261).
4.2.4. Inter-organizational learning activities

Applegate (2007) explains that organisations are changing their relationships with external business partners, suppliers and even customers in order to compete successfully in a market. Companies benefit by ‘extending their organisation’ to envelop key members of their supply chain. Other popular strategies including strategic alliances, joint ventures and other formal collaborations in order to get access to knowledge and capabilities which are external to their organisation.

Holmqvist (2003) says that inter-organisational learning processes can be seen as “processes in which collaborating formal organisations learn together from experience by producing and re-producing various kinds of rules and routines. This creates certain behavioural couplings between the different formal organisations as their employees ultimately come to behave in very similar ways for instance, creating a “common culture” and a “joint spirit” that have certain behavioural implications e.g. learning to ‘speak a common language’.

Holmqvist points out that “inter-organisational learning literature has concentrated primarily on studying the requirements for successful learning between organisations with the help of such conceptual notions as transparency and receptivity” (Hamel, 1991; Larsson et al., 1998), experiential similarity and diversity (Lane & Lubatkin, 1998; Simonin, 1999), and inter-organisational trust (Dodgson, 1993b; Kanter, 1994).’

Löwegren in her dissertation about new technology-based firms in science parks uses resource-based view as a framework for studying the absorptive capacity of these organizations (2003). The study is aimed at identifying the resources provided by science parks and investigating if absorptive capacity can explain why companies use different sets of resources in science parks. The author identifies the following resources: proximity to facilitate linkages, university links, collective learning, access to university facilities, library, equipment, seminars and workshops, availability of labour, image, reputation, credibility, business services, venture capital, flexibility of premises, administrative facilities, car parking, and science park management.
Sammons (2005) identifies several *strategies for external knowledge acquisition*, such as internal research, acquisition of knowledge-rich firms, joint ventures, and knowledge purchasing (p. 57, 2005). Below is the table with definitions of each strategy:

<table>
<thead>
<tr>
<th><strong>Internal research</strong></th>
<th>Based on employment contract with a high degree of integration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acquisition of knowledge-rich firms</strong></td>
<td>An extension of the firm, since the acquired firm also uses employment contracts</td>
</tr>
<tr>
<td><strong>Joint ventures</strong></td>
<td>Two or more organizations can be involved and the structure may be formal or informal</td>
</tr>
<tr>
<td><strong>Knowledge purchasing</strong></td>
<td>This can be divided into three subcategories: contract research, licensing, and knowledge scanning</td>
</tr>
</tbody>
</table>

*Table 1: Strategies for external knowledge acquisition*
4.3 Factors related to effective diffusion of external knowledge in organizations

4.3.1. Dialogue activities

Senge’s (1990) bestselling book ‘The Fifth Discipline: The art and practice of the learning organisation’ outlined processes for learning within an organisation. The following 5 principles for successful organisational learning:

1) **Personal mastery**: learning to expand personal capabilities and an organisational environment that encourages personal development.
2) **Mental models**: process of clarifying and improving our internal perspectives and understanding of the world, which impacts our actions.
3) **Shared vision**: developing a sense of group commitment of goals and the future.
4) **Team learning**: development of collective thinking to develop intelligence and competencies.
5) **Systems thinking**: How to change systems more effectively and in tune with the external environment by understanding the forces and interrelationships that shape the behaviours of systems.

Senge’s work suggests that there are two important strategies for increasing learning in organisations. These are a) increasing the knowledge of individuals in organisations and b) diffusing knowledge from individuals through the process of dialogue. Senge’s work focuses of the activities at the organisation level and explains that team learning is the process of building alignment i.e. enhancing a team’s capacity to think and act in new synergistic ways, with full coordination and sense of unity. He highlights that team members learn through a process of dialogue which can use their disagreements to make their collective understanding richer. Dialogue is defined by Senge as ‘a sustained collective enquiry into everyday experiences’. He describes the dialogue process as ‘reinforcing the group’s shared attention (i.e. the collective assumptions, intentions and beliefs).’ The dialogue process helps members in the organisation to understand each others perspectives and ultimately change the ‘atmosphere of understanding’ in the organisation. These five disciplines outlined by Senge show the importance of developing the skills of individuals in organisations and also organisational processes for sharing information / knowledge within an organisation in order
to create new knowledge. This is important in order for organisations to be able to adapt to changes in the external environment.

4.3.2. Knowledge Diffusion Techniques / Strategies

Holmqvist (2003) discusses that within organisations ‘The processes of continuously producing and re-producing organisational rules through individual bargaining, compromising and negotiating can be regarded as ‘‘organisational learning processes’’, whereby the organisation creates knowledge in the form of behavioural rules through the transformation of humans’ experience’.

Ahmed et al (2002) suggests systematic management of knowledge to achieve business benefits. The coming together of organisational processes, information processing technologies, organisational strategies and culture for the enhanced management and leverage of human knowledge and learning to the benefit of the company.

A set of cross-disciplinary organisational processes that seeks the ongoing and continuous creation of knowledge by leveraging the synergy of combining IT and the creative, innovative capacity of people. In order to bring organisational benefits KM must be aligned to the company’s strategy.

Fig. 3: Key elements in knowledge management adapted from Ahmed 2002

(Hicks et al, 2006) Integrating approach to identifying, capturing, retrieving, sharing and evaluating organisations information assets. Information assets can include databases, documents,
policies, and procedures as well as the un-captured tacit expertise and experience stored in individual workers heads”

Salisbury (2003) defines knowledge management as the “deployment of a comprehensive system that enhances the growth of organisations knowledge”. Knowledge management is characterized by a cycle of events and to achieve competitive advantage through knowledge management, there has to be an ongoing cycle of creating, preserving and disseminating knowledge, were knowledge refers to the core competency of the organisation.

4.3.3. Tools for diffusion of knowledge

Historically, there have been a number of technologies 'enabling' or facilitating knowledge management practices in the organization, including expert systems, knowledge bases, various types of Information Management, software help desk tools, document management systems and other IT systems supporting organizational knowledge flows.

The advent of the Internet brought with it further enabling technologies, including e-learning, web conferencing, collaborative software, content management systems, corporate directories, email lists, wikis, blogs, and other technologies. Each enabling technology can expand the level of inquiry available to an employee, while providing a platform to achieve specific goals or actions. The practice of Knowledge Management will continue to evolve with the growth of collaboration applications, visual tools and other technologies. Since its adoption by the mainstream population and business community, the Internet has led to an increase in creative collaboration, learning and research, e-commerce, and instant information. (Ahmed, 2002).

There are also a variety of organisational enablers for knowledge management programs, including Communities of Practice, Networks of Practice, before-, after- and during- action, peer assists, information taxonomies, coaching and mentoring, and so on.

Andreu & Ciborra (1995) enforce how an intelligent use of IT can also support the overall learning and knowledge management process in organisations. For example, IT/IS can contribute to the routinization and learning processes in several ways, by facilitating the learning that takes place and spreading it to all the individuals and groups involved. For example one way is through IT applications that facilitate experimentation with new resources, in particular with new sources of information and with IT itself (e.g. encouraging to
use new technologies in pilot projects, etc. Andreu & Ciborra also emphasise that IT / IS tools can facilitate the sharing of work practices that facilitate communication within and among groups. They suggest that ‘Groupware’ is a technology directly relevant for all these purposes. They state that ‘even straight-forward applications based on simple electronic mail infrastructures may be very effective in facilitating work practices; sharing, and in-putting different work practices, ‘owned’ by different individuals or groups even geographically dispersed, to work effectively together’.

Understanding the features of IT that facilitate organizational learning is helpful for management Chou (2003) emphasised that it is important for management to understanding the characteristics of the organizational learning process in an IT-based environment may help us to design the facilitating mechanisms accordingly. Chou’s (2003) study explored the IT features that may facilitate organizational learning. He states that ‘Some of the features are new in supporting organizational learning. They range from representing information (e.g. multimedia), mechanisms to match problems and solutions, storage and organization of expertise for easy retrieval, to mechanisms to maintain up to date knowledge.’

4.3.4. Organizational activities

Cohen and Levinthal (1990) argues that well as the skills of individuals in organisations, the management of external information also includes the organisation’s ability to use or exploit the external information for some benefit. Cohen maintains that an organisation’s direct interface with the external environment and its ability to transfer knowledge across and within the subunits of an organisation will determine how well the information can be utilised.

4.3.5. Activities related to organizational learning

Nonaka (1994) developed a four stage spiral model of organizational learning. The tacit knowledge of key personnel within the organization can be made explicit, codified in manuals, and incorporated into new products and processes. This process they called "externalization". The reverse process (from explicit to implicit) they call "internalization" because it involves employees internalizing an organization's formal rules, procedures, and other forms of explicit knowledge. They also use the term "socialization" to denote the
sharing of tacit knowledge, and the term "combination" to denote the dissemination of
codified knowledge. According to this model, knowledge creation and organizational learning
take a path of socialization, externalization, combination, internalization, socialization, in an
infinite spiral. Learning is the social process of transferring information within an
organisation. Often the knowledge is tacit or acquired from within the organisation. The
importance of the process of transferring or re-using knowledge makes it more valuable
within the organisation.

Fig. 4: Visualisation of Nonaka’s Knowledge Spiral model (Nonaka 1994).

Research focuses on the processes of acquiring and absorbing knowledge from internal
sources. However, in order to develop the core competencies while obtaining complimentary
competencies to become more competitive, companies are now focussing on the benefits of
seeking knowledge from external sources.
5 Analysis

Research has been conducted on different factors of the process of managing external knowledge without explicitly showing or describing the overall process. Making this process explicit (fig 3) together with using the General Business Model a number of factors became visible which are summarized in table 2.

The factors facilitating the effective management of external knowledge have been identified by the different perspectives of the General Business Model, acquisition process and diffusion processes. The majority of the research papers focus on elements in the General Business Model which are internal to the organisation, for example, activities that promote learning, the skills and competencies of individuals in the organisation and human / technological resources.

5.1 Acquisition process

As shown in table 2, the acquisition process involves both intra-organizational as well as inter-organizational activities since during the acquisition process organizations interact with the external environment, which comprise different parties, such as science parks, knowledge networks, partners, customers, competitors, and suppliers.

Relationships with different actors in an organisations’ network also provide access to skilled employees which are valuable resources. However, according to findings, it is not enough to have relationships with different actors or have qualified employees. On the resource level capabilities are also of great importance. Several researchers indicate that it is crucial to have relevant prior knowledge and experience to be able to acquire and later absorb external knowledge. This prior knowledge should be diverse among individuals in the organizations in order to fully exploit external knowledge and create new knowledge in the organization.

In order to be able be acquire external knowledge organizations also need to recognize the need for external information, which means that they constantly review their organizational knowledge portfolio and identify lacking information.
A number of researchers investigated the role of individuals in the acquisition of external knowledge by organizations. For instance, Cohen and Levinthal, indicated that “boundary spanners” are those individuals who connect organizations with the external environment. According to research, there are different types of roles related to this issue, for example, “gatekeepers”, “knowledge brokers”, “knowledge translators”, etc. Their activities and roles are dependent on different variables: communities they interact with, position in the company, participation in the product development process, etc. One of the studies indicate that prior connections of the management of external facilities such as science parks or universities with which organizations cooperate in product development play an important role as it enhances the absorptive capacity of organizations. Perhaps, in this case management plays the role of “gatekeepers” connecting both sides.

On the activities level the organizations need to ensure that units within organizations can communicate with the external environment. The communication mechanisms between units in the organizations should be effective for enabling homogeneity of the knowledge base among them.

### 5.2 Diffusion process

The process of diffusing knowledge within and between organizations is an important process in exploiting external knowledge.

The majority of research shows that organisational learning activities are a significant part of the diffusion process. Activities involving dialogue between individuals and shared experiences often results in the creation of new understanding, knowledge and trust.

Research from the resource perspective showed that the roles of individuals for communicating and sharing knowledge between business units and between partnering organizations is as important in the diffusion process as well as the acquisition process. Research showed that only the technical competence of these individuals is important but also their ability to learn and be flexible in their communicative style.
Resources such as IT and IS play a facilitating role in supporting the learning and communication process by providing novel ways to store, access and share knowledge. The success of the systems heavily relies on the management and developer’s understanding of the organizational processes as well as the quality of the external and internal knowledge used both during development and usage.

Research from the strategy perspective showed that organisational culture fostered by management which promotes the use of such communication mechanisms, boundary spanning roles and working practices is a facilitating factor for effective management of external knowledge.
<table>
<thead>
<tr>
<th>Activities and organization</th>
<th>Management processes</th>
<th>Resources and capabilities</th>
<th>Market/Industry level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acquisition</strong> (need for knowledge and search)</td>
<td>- Communication between the external environment and the organization&lt;br&gt;- Communication among subunits of the organization&lt;br&gt;- Character and distribution of expertise within the organization” (Cohen et al)&lt;br&gt;- Different strategies for acquisition: buying and acquiring&lt;br&gt;- Management’s connection to science parks/universities (Löwegren)&lt;br&gt;- The homogeneity of the knowledge base (Jonsson)</td>
<td>- Prior relevant knowledge (Cohen et al)&lt;br&gt;- Facilities (Löwegren)&lt;br&gt;- Labor at universities (Löwegren)&lt;br&gt;- Ability to identify relevant external information (Zahra et al)&lt;br&gt;- Recognition of the need for external information (Sammons)&lt;br&gt;- Diversity of prior knowledge in individuals (Utterback)</td>
<td>- Knowledge networks&lt;br&gt;- Science parks&lt;br&gt;- Managing relationships with networks’ players</td>
</tr>
<tr>
<td><strong>Diffusion</strong> (knowledge creation, knowledge transfer)</td>
<td>- Ability to transfer knowledge across and within the subunits (Cohen)&lt;br&gt;- “Socialization, externalization, combination, internalization” (Nonaka)&lt;br&gt;- The homogeneity of the knowledge base&lt;br&gt;- Supportive organizational culture (Jonsson)</td>
<td>- Individuals’ absorptive capacity (Cohen)&lt;br&gt;- IT tools&lt;br&gt;- Synergy of combining IT and the creative, innovative capacity of people (Ahmed)&lt;br&gt;“Deployment of a comprehensive system that enhances the growth of organisations knowledge”</td>
<td></td>
</tr>
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</table>

Table 2: Factors that facilitate parts of the process for managing external knowledge
6 Conclusions
The results of the study demonstrate that the majority of the research papers about acquisition and diffusion of external knowledge focus on elements of the General Business Model which are internal to the organisation, for instance, activities and organization level, while considerably less papers explore the processes of how organizations ”recognize the need for external knowledge”. Some researchers have looked at factors outside the organization concerning the acquisition of external knowledge. These papers mainly focused on the role of individuals as resources who cross the boundary of the organization in order to acquire and diffuse the external knowledge. One of the conclusions is that the interaction between the different processes, i.e. the interaction between recognize-acquire, acquire-absorb and absorb-recognize (arrows in fig 3) as been poorly studies.
In general the topic of external knowledge management is not studied in a holistic way. The acquisition and diffusion processes have been investigated as separate, but not as the whole process.
The authors believe that for managers who are involved in designing and implementing information systems and technologies for managing knowledge, it is valuable to have an awareness of these wider facilitation factors outside of the technical domain, which play a strong part in the success of managing external knowledge. It would help to ensure that the design of knowledge management systems fully meets the needs of the business as well as being flexible to cope with the demands of suppliers, customers and other actors in the ‘extended organisation’. Greater awareness of these facilitation factors would also help designing systems and support implementation of these systems in the organisation with a greater rate of acceptance and user value.
7 Recommendations

7.1 What future research can be done?

As there were few research papers on the process for understanding how organisations recognise the need for external information, or the connections between the different stages in the process, this could be a further subject for investigation. In addition, factors contributing to effective management of external knowledge can be classified according to different methodological approaches, analytical, the systems, and the actors in future papers.

7.2 How would we continue to develop this research in an empirical way? / Of use to industry?

It would also be interesting to conduct empirical studies to investigate the success factors for managing external knowledge depending on different types of industry, maturity of organizations and also differences in the way that different counties manage external knowledge.
8 References


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