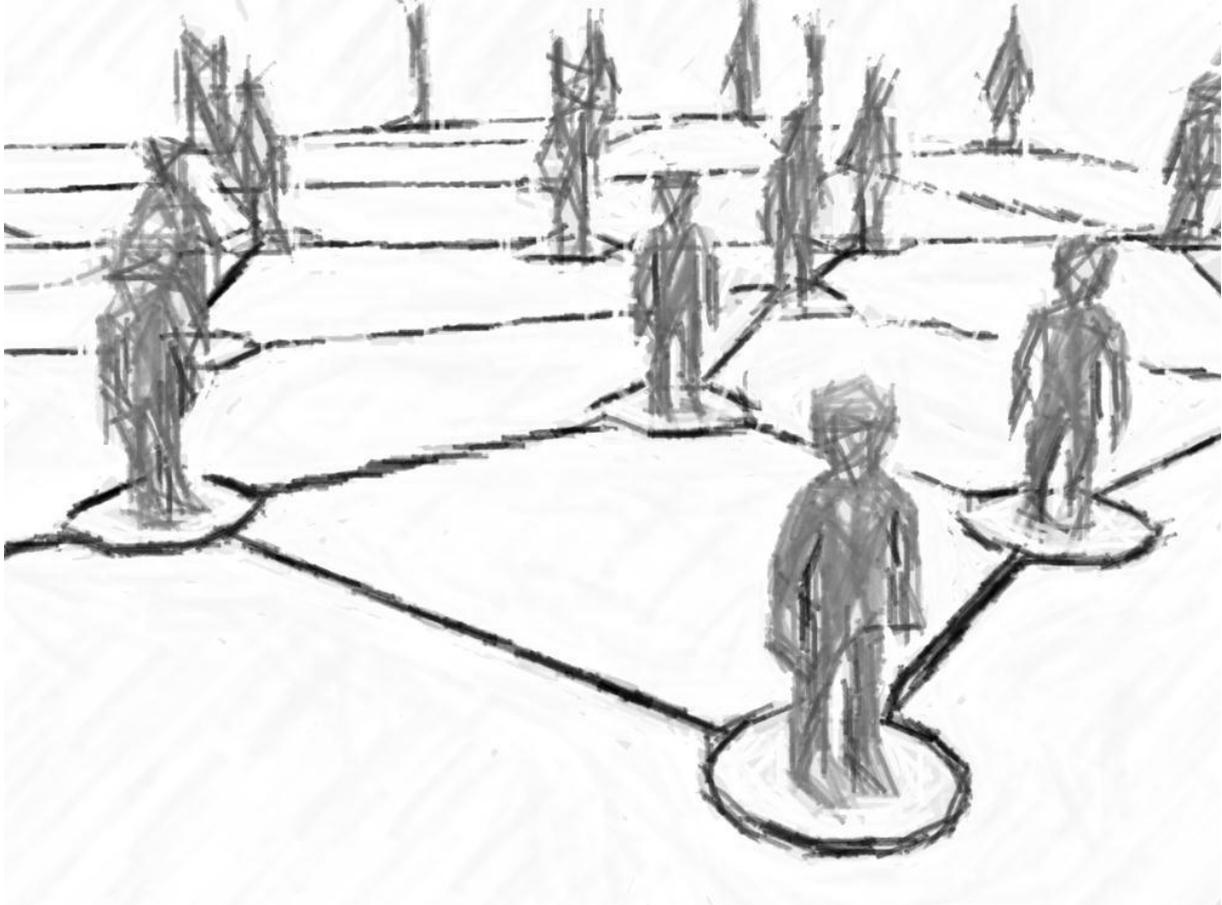


Knowledge Management as Competitive Advantage



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Abstract

Knowledge is apparent everywhere nowadays in every organization. Handling this knowledge is one of the key problems to overcome if this knowledge is to be used effectively. Knowledge management is the field that tackles this problem. Many research studies have been conducted in this field, I have used around 50 of these studies to explain several methods and how they can become effective and eventually a competitive advantage. After researching the topic, there is no definitive conclusion as to which method is the best; the best method for an organization is based on its organizational structure and the industry it acts in. Knowledge management methods may however be more generalized.

Keywords: *knowledge, knowledge management, competitive advantage*

Table of Contents

Abstract	III
Table of Contents	V
Introduction.....	1
Research methods.....	1
Knowledge Management	2
Definitions	2
Brief description	2
Forms of knowledge management.....	3
Competitive Advantage.....	6
What is competitive advantage?.....	6
Sustainable Competitive Advantage	7
Examples of competitive advantage	7
Knowledge Management as Competitive Advantage	10
Examples of knowledge management based competitive advantages	10
MIS in knowledge management and their competitive advantage	14
Knowledge transfer	15
Discussions, Limitations and Suggestions	19
Discussions	19
Limitations.....	20
Suggestions.....	21
Conclusions.....	22
Appendices.....	
References.....	

Introduction

Humanity has always possessed over knowledge, knowledge acquired from observation or from past experiences. In order to preserve this knowledge, they told stories to one another, passing down through generations. While these stories could usually be taken with a grain of salt, the knowledge behind them was still intact and helped humanity progress over thousands of years. This storytelling turned into writing knowledge and stories down, preserving them more adequately. Eventually this evolved into knowledge databases as we know them today. All of this passing down knowledge can be seen as forms of knowledge management.

While this knowledge management is applicable to nearly every factor in life, the more prominent use of the term and the use of it can be applied to companies and how they maintain and exploit their knowledge. Obtaining superior knowledge management can lead to a plethora of positive things within a company: cutting costs, speeding up development/production time, more effective training of employees, competitive advantage, etc. This research will focus on the last of these examples, competitive advantage. How can knowledge management be done in a way that a company can become the best in its industry and moreover, maintain the position as market leader.

This leads to the main research question being: *How can knowledge management affect competitive advantage?* Besides researching how it can affect competitive advantage, there will also be some suggestions as to what forms of knowledge management are more effective and which forms should be researched more.

The research will be divided into three research questions, which are required to answer the main research question. These questions are as follows:

- (1) What is knowledge management?
- (2) What is competitive advantage?
- (3) How can knowledge management lead to competitive advantage

After answering these questions, I will discuss the findings, state the implications of the research and form a couple of suggestions. Afterwards the conclusion will follow and the main research question will be answered.

Research methods

The research methods used and location of the sources will comprise of knowledge derived from a combination of journal articles, books and conference proceedings. All of the sources were found through Google Scholar; the library located at Tilburg University, Tilburg, the Netherlands and its online catalog; and the online library services provided by Bentley University, Waltham, MA, United States.

Keywords used were “Knowledge management”; “Competitive advantage”; “Knowledge management” AND “Competitive advantage”; “Knowledge Transfer”. Within the actual results from these queries as well as the references found in the aforementioned locations, additional resources were gathered specializing in specific topics that are covered in this research. As can be seen in the references at the last pages, I gathered around five books related to the subject, around ## journal articles and two conference proceedings over the course of this research.

Knowledge Management

As mentioned, the first sub-question is 'What is knowledge management?' This question will be answered by providing a definition, a brief description and will include several forms of knowledge management.

Definitions

Knowledge is a very difficult term to define with a single phrase; knowledge management is even harder to define. There is no true agreements upon what these definitions are, leading to many different definitions floating around. While knowledge management in a broad sense applies to a lot of aspects, I will limit myself to a business point of view for the sake of this research.

To define knowledge management, a definition of knowledge has to be put forth first. Oxford Dictionary (2012) defines knowledge as "1: facts, information, and skills acquired through experience or education; the theoretical or practical understanding of a subject. 2: awareness or familiarity gained by experience of a fact or situation". These definitions are a fine start for a business point of view and will be used to further define knowledge management. The addition of knowledge management is that knowledge is organized and managed in order to use within an organization (intra-organizational) and sometimes even between organizations (inter-organizational) (Subramani & Venkatraman, 2003). Furthermore, you want this knowledge to have the best practices for everything in order to maximize efficiency and effectiveness. Hence the definition used for knowledge management will be as follows: "Knowledge shared about best practices for tasks, in order to achieve maximum efficiency and effectiveness throughout all the processes in an organization".

This definition, while not universally applicable, will help understand the concepts explained in the following pages and thus applies mainly to this research. Seeing as knowledge management is used as competitive advantage, best practices will be assumed as this would yield the highest advantage obtainable.

Brief description

Knowledge management within the company has seen a surge in the past two decades with the dawn of the information age (Spender & Grant, 1996). While in the past there was a focus on improving processes within disciplines such as finance, accounting and marketing, there was still a lack of optimizing between these disciplines. Knowledge management introduced a concept that allowed these different disciplines to become a more cohesive unity. This integration of disciplines leads to further optimization of the processes by creating more similarities and ultimately leading to removal of now obsolete processes.

In the past, knowledge management was only seen as part of overall strategic management. Top management would be the only place in the organization that knowledge was important, as this would then be used in order to steer the company in the strategic direction that its mission statement and company goals determined. The rest of the company would just follow the instructions and do their work themselves. Knowledge of why processes have to be done in a certain way was not important for the 'lower' employees. This led to the focusing on their own disciplines, as knowledge about other departments of the company was virtually non-existent.

The introduction of knowledge management has thus led to the ability to identify similarities within an organization's knowledge development paths (Teece, 1988). This caused knowledge to be used outside upper management and at the very least 'lower' management had possession of the knowledge that would improve business processes. While this is an excellent form of knowledge management, it is far from the only one and actually rather primitive. The identifying of these consistencies and storing them somewhere central for reference is known as 'knowledge creation' (Nonaka, A Dynamic Theory of Organizational Knowledge Creation, 1994). The problem with focusing on just identifying the consistencies is that while you do generate knowledge, not much extra is done with it. In order to maximize the use of this knowledge it should also be further developed and retained, or maintained as it is more commonly known (Menzies, 1999). Furthermore - probably the most important - knowledge should be transferred.

While it is very nice to have the knowledge in-house, it is not very effective if the employees do not understand why the way they have to perform tasks is the best one. When people understand concepts and practices more thoroughly, they can further improve upon this as they are learning. The transferring of this knowledge is one of the concepts that will be further elaborated later on in this research.

The biggest problem with knowledge management is the fact there are two 'archetypes' of knowledge, namely *explicit knowledge* and *tacit knowledge*. Explicit knowledge is knowledge that can be easily articulated, stored, codified and transferred (Nonaka & Takeuchi, The Knowledge-creating Company: How Japanese Companies Create the Dynamics of Innovation, 1995). Tacit knowledge on the other hand is abstract and much harder to be transferred (Polanyi, 1966). The latter one can only be transferred through active involvement. Tacit knowledge is also the more important of the two in regards to knowledge management and competitive advantage. Reason for this is that the abstractness makes it applicable to multiple things rather than a specific thing that explicit knowledge would be able to describe. Tacit knowledge is also the basis for further developing knowledge in-house. Moreover, it is harder to copy tacit knowledge, leading to competitive advantage as can be read further on.

The relatively new concept of knowledge transfer also introduces a more effective exchange of knowledge between employees and uplifts a company as a whole. This leads to more evenly spread knowledge between the employees, diminishing problems if a 'high-knowledge' person becomes unavailable for whatever reason. The exchange of knowledge is what is assumed to be the prime source of competitive advantage for knowledge management. Michael Earl (2001) has set up a summary of schools in regards to knowledge management. The table for this can be found in appendix A and several of these forms which can be seen as more effective will be explained.

Forms of knowledge management

The overarching schools of knowledge management are technocratic, economic and behavioral. Technocratic schools are based on information or management technologies, it is largely in place to support and condition employees in everyday tasks. The economic school is on itself, as it uses knowledge management in order to create revenue streams through exploiting knowledge and intellectual capital. The behavioral schools are schools that promote sharing, creating and using knowledge as a resource (Earl M. J., 2001).

Technocratic schools are more based on storing explicit knowledge and to a lesser degree tacit knowledge, mainly due to the natures of these types of knowledge. The first of the schools here is the systems school, which focuses on creating knowledge bases. This is probably the most common form of knowledge management as well as the oldest form known. A knowledge base basically captures specialist knowledge into knowledge bases, bases ranging from databases to DVDs and even to floppy disks in the past. This knowledge can then be accessed by other specialists or by qualified people and thus having shared the knowledge. These bases are usually limited due to domain-specificity, but work out well in that respect. This whole school is solely handling explicit knowledge that can be written down and thus stored. It is very much based on the creation of knowledge and to some extent maintaining knowledge (Davenport & Prusak, *Working Knowledge. How Organizations Manage What They Know*, 1998).

The cartographic school comes closer to tacit knowledge as it sets up knowledge directories, which is basically some sort of database that stores who has knowledge about what. While this leads to tacit knowledge being put to use, it still lacks the transferring of knowledge. It can be somewhat compared to the yellow pages, working the same as the well-known book, only focusing on who knows what within the company. This initiates communication between two employees and thus allows exchange of tacit knowledge to some extent as well. While it does have a similar basis as the systems school, it is more prone to being maintained as the knowledge is stored with people rather than on a static drive (Hansen, Nohria, & Kierney, 1999).

The engineering school focuses on knowledge flows. It allows different divisions within a company to gain similar knowledge. Knowledge gained in one part of the company is sent to another part and thus makes it possible for them to obtain this knowledge. This leads to knowledge being spread corporate wide, but with the impediment of it being mostly, if not fully, based on explicit knowledge. The only plus compared to the systems school is the fact that it is less domain specific. It focuses on knowledge creation and somewhat on knowledge exchange (Davenport, Jarvenpaa, & Beers, *Improving knowledge work processes*, 1996).

The economic school, which is aimed at creating revenue streams, but while it is a separate school, it can be applied across all schools, as knowledge management eventually does lead to higher revenues or at the very least to higher profit margins due to integration and more knowledgeable employees. The reason this is a separate school is the fact it solely focuses upon exploiting knowledge rather than use it as an additional revenue stream. A good example of a company in this school would be one that engages in the trading of trademarks, or licensing patents like IBM does (Willigan & Mullen, 2000). This school is a very special one which I think cannot be placed with creation, maintenance or exchange due to the fact the knowledge is obtained from somewhere and then sold again to another person or company.

The behavioral schools come closest to the ideal of exchanging knowledge and uplifting the company as a whole. Very notable is the fact that knowledge is being used as a resource, which fits very well with the resource-based view of competitive advantage. The behavioral schools are divided in three: organizational school, spatial school and strategic school. Each of these schools, while sharing similarities, incorporate a different aim to meet their focus.

The organizational school uses organizational structures to share or pool knowledge. These structures are often called communities and are usually created to organize a group of people with a common interest, problem or experience. Note that these can be both intra- and inter-organizational. The goal of these communities is to bring together knowledge from different people and have them learn from one another. While this is very similar to a knowledge base, which holds knowledge about practices within the company, one of the main differences is the fact that these communities allow for tacit knowledge to be exchanged more easily, more specific questions can be asked to the people who hold the knowledge. This makes learning and understanding of knowledge a lot easier (Earl M. J., 2001). A good example of these communities is virtual teams. Like the similar knowledge bases, it focuses on knowledge creation, but with some more exchangeability than said knowledge bases.

The spatial school is a very common concept; while it is a very simple idea, it turns out to be a very effective way of knowledge management. This school focuses on using a specific space to facilitate knowledge exchange (Nahapiet & Ghoshal, 1998). Common examples are the water-cooler, the coffee-bar or a 'knowledge café'. Like with the organizational school, an exchange of tacit knowledge is easier here due to the fact people talk to one another and are discussing different concepts. An addition is that with this spatial school the people you discuss practices with are not picked based on what they know, but they are just there. This facilitates inter-departmental cooperation and leads to people talking to colleagues they would normally not talk to as they on first sight provide no direct benefit for your task (Earl M. J., 2001). This school is focused on knowledge exchange.

Lastly there is the strategic school, which directly meets the main research question, as it sees knowledge management as a dimension of competitive advantage. It is seen as the essence of a firm's strategy. It focuses on exploiting intellectual capital and knowledge to propel the company up to the position of market leader, by making it a competitive advantage. This school uses parts of all the other different schools. The reason this is a school on its own is that it uses the concepts of all the schools as the key resource and competing is done on knowledge. Knowledge creation and use drive the competitive strategy rather than just support it (Earl M. J., 2001). This last school has no specific focus as it uses various concepts of knowledge management.

While the last one is a great example of how knowledge management can be used as competitive advantage, it is far from the only way. Competitive advantage can also be obtained when knowledge management has a more supportive role and leads to optimization of business processes. While it can definitely be one of the resources for competitive advantage, it can also support other core competencies in a company.

Competitive Advantage

What is competitive advantage?

Competitive advantage is something every company should be striving for in order to become the market leader for their industry. A common view on how to assess competitive advantage is the ‘resource-based’ view, proposed by Michael Porter in his book “Competitive Advantage” from 1985. The goal in mind for achieving competitive advantage is to produce high-quality goods that can be sold for high prices on the market. The quality should be higher than that of the competition, while the profit margin and revenue are not lower than industry rivals. The latter one is the case because the offset in quality should not lead to diminished margins in comparison to that of competitors.

Porter defines competitive advantage as “...the ability gained through attributes and resources to perform at a higher level than others in the same industry or market” (1980, 1998). It basically suggests that when one of the attributes or resources of a firm are superior to that of any other firm in the same industry or market, a competitive advantage is created. This advantage can then be leveraged in order to retain superior earnings, creating a higher market share and eventually become the market/industry leader.

A basic assumption of this resource-based view is that the resources and capabilities for production are heterogeneous across competitors (Barney, Firm resources and sustained competitive advantage, 1991). This assumption means that firms in the same market have varying capabilities and should at least be able to breakeven. These varying capabilities mean that some firms have limited, superior productive factors. The scarcity of these factors (resources) cannot be expanded quickly and thus lead to some firms having superior production compared to competitors. This immediately suggests that competitors possess inferior resources and thus will have a lower ability to compete. This was elaborated in early economic studies (Ricardo, 1817) and still applies to this day. The firm with superior resources has a lower marginal cost, leading to more revenue and/or profit as can be seen in Figure 1 (Rumelt, Theory, strategy, and entrepreneurship, 1987).

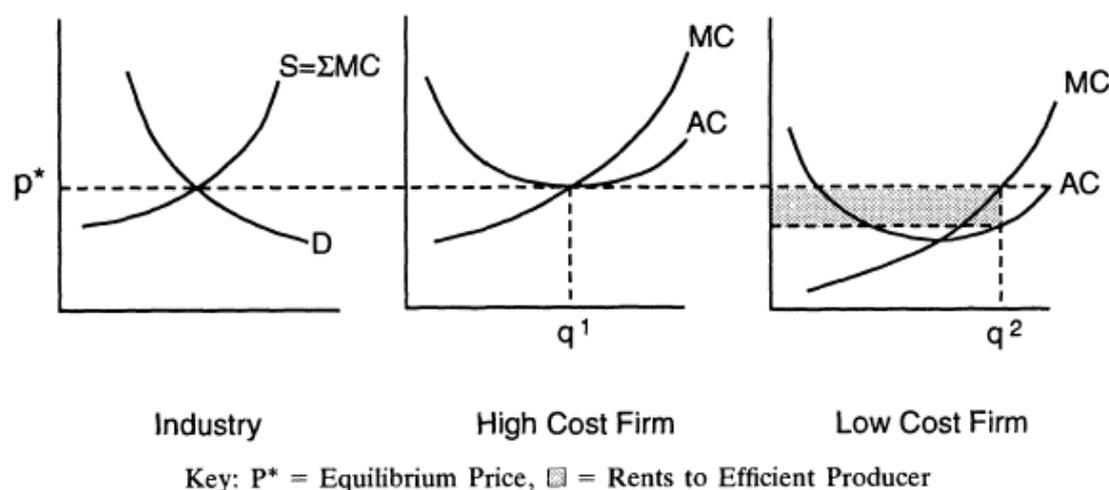


Figure 1: Differences between firm with inferior resources (High Cost Firm) and firm with superior resources (Low Cost Firm), compared to the industry supply and demand. P* = Optimal Price; S = Supply; D = Demand; MC = Marginal Cost; AC = Average Cost; q = quantity. Extracted from Theory, strategy and entrepreneurship; by Rumelt (1987)

Sustainable Competitive Advantage

While it is nice if at any point in time your resources are superior to that of the competition, it is still kind of worthless if the resources can be imitated or are easily substitutable (Rumelt, 1984). This is why an important amendment to the original competitive advantage theory is 'sustained competitive advantage'. It is exactly what the name suggests, competitive advantage that is sustainable and leads to a superior resources over an extended period of time. If a competitive advantage is not sustainable, the low-cost firms in Figure 1 will move closer to the high-cost firms and thus only breakeven, losing their advantage.

Especially with manufacturing goods a sustainable competitive advantage is hard to obtain and serves as an example. The main resource one company would want to upgrade is ones that improve manufacturing. These will be hard to sustain due to the fact machines are imitable or will become inferior quickly due to substitutability. A good example of this is Caterpillar, a company which produces construction equipment and vehicles. While it is very innovative on construction vehicles, especially ones used on tough terrains (such as the rocky underground in Japan), the equipment is subject to imitation rather easily.

While some authors suggest that there is a certain time that a competitive advantage should remain an advantage in order to qualify as sustainable (Porter, 1985), it should actually not be a fixed amount of time. A company should actually strive to never lose its advantage or at the very least aim for as being sustained for a period that lasts as long as possible as proposed by Barney (1991), this is obtained through inimitability. Mind that it does not last forever; it just cannot be competed away. Structural changes may make a competitive advantage invaluable, theoretically disqualifying it as an advantage. The focus for competitive advantage should also be on resources developed rather than acquired from another organization, because exclusivity is one of the key parts of sustainable competitive advantage (Barney, Strategic factor markets: Expectations, luck and business strategy, 1986).

There are as many possibilities for competitive advantage as there are resources. Some resources prove to be easier for obtaining and sustaining an advantage. Most of these 'easier' advantages are related to people-based and service-based resources, such as distribution, innovation, company culture and knowledge management. The reason for these types of resources being more 'effective' as (potential) advantage is the fact they are intangible. Mind that the resources that lead to competitive advantages differ per industry and that they also change over time (Lumpkin, Dess, & Eisner, 2010).

Examples of competitive advantage

There are many companies out there that have a sustainable competitive advantage; needless to say not all of these will be covered. Some well-known examples however are worth mentioning to provide some further insight as to how big companies gain competitive advantage through intangible resources rather than full on money-throwing and having monopolies on key minerals and other raw materials. While some intangible resources are obtained by using big bucks, there is no real necessity for it if everything is planned right!

Apple

An often researched company, also one of the most famous 'new' companies of the past years is Apple, Inc. The company famous for products such as the Macbook, iPod, iPad and iPhone is clearly keen on their electronics and moreover the innovation on widely used products. The individual products are of relatively high quality, partially shown in the price, which already puts the company high up there on innovation level. However, one of the key success factors of the company's products is the fact that they are extremely inter-compatible. Where other companies may outshine the Apple products individually (examples being Samsung's phones on raw specifications, Sony's TVs, several companies developing laptops, etc.), one of the features that make Apple products stand out is the seamless way their products integrate. Especially with Apple's use of cloud computing lately, they proved to be the best for the overall experience.

The most notable part about this advantage, which can be assumed is their biggest success story, is the fact it is very sustainable. Reason for this itself is not the actual technology or the physical part of the advantage – those can be imitated easily – but the so-called 'track record' the company has. Other companies may start integrating their products, but it will take a while to get at the integration level Apple has at the moment, and by the time companies do get there, Apple will be far ahead again. Reason for this being that the company started developing their products from as early as 2001 with the iPod with the mindset to integrate all their devices. The fact that innovation as their key 'resource', and that it is showing high path dependency makes it a big sustainable competitive advantage for Apple (Yoffie & Kim, 2010).

Coca Cola

Another excellent example of a sustainable competitive advantage can be seen with The Coca Cola Company. Whenever this icon can be spotted on a drink – especially on the Coca Cola soft drink itself – people know that the drink is very likely to be of good quality. For the majority of the people on Earth, if you mention cola, they immediately think of Coca Cola and its characteristic red label and calligraphic name.

This link, called brand association, is rather exceptional across every industry but can clearly be seen as a sustainable competitive advantage. It would take years upon years of reputation building and name building in order to obtain the same brand popularity that Coca Cola has (Rao & Ruekert, 1994). Only few examples of such brand popularity can be thought of – once again Apple is one of the other good few.

Microsoft

A third example of a company with excellent sustainable competitive advantage is yet another globally known company with products used on a daily basis by pretty much everyone in the entire world. While several companies may fit this description, I am talking about Microsoft. As a relatively young company, operating in a similarly young industry, they are most well known for their computer operating system Windows. While several companies have attempted to get a foothold in this industry, it has been proven over and over that it is very hard and can merely chip away some of the market share that Microsoft holds.

Their competitive advantages can be found in their continuous development, the wide range of hardware and software compatible with the Windows OS and their loyal customer base. The last

one of these is likely to be due to the ease of use of the OS and the familiarity that people have with it (Smith & Wright, 2004). While new OS may be better and probably run more efficient and effective, the switching 'costs' are rather high, especially for lower frequency users that 'just want to look on the internet' or 'just want to type a document'. However, if another company takes this approach, it is unlikely that it will get at Microsoft's level with their OS. Why switch to another, similarly functioning product if the "good ol' Windows" still does the job? The only way to stop this competitive advantage is by Microsoft making a mistake themselves, and even then it can be helped, take a look at Windows Vista for example (Orion, 2008).

As can be seen, a good sustainable competitive advantage comes from intangible resources that are hard to imitate. Knowledge management is also an intangible resource, and if done right it can also lead to sustainable competitive advantages. Knowledge just so happens to be one of the most intangible resources out there, knowledge is very abstract after all. This immediately leads to the last sub question of this research: How can knowledge management lead to competitive advantage?

Knowledge Management as Competitive Advantage

Combining knowledge management theory and competitive advantage theory lead to the derivation following research model:

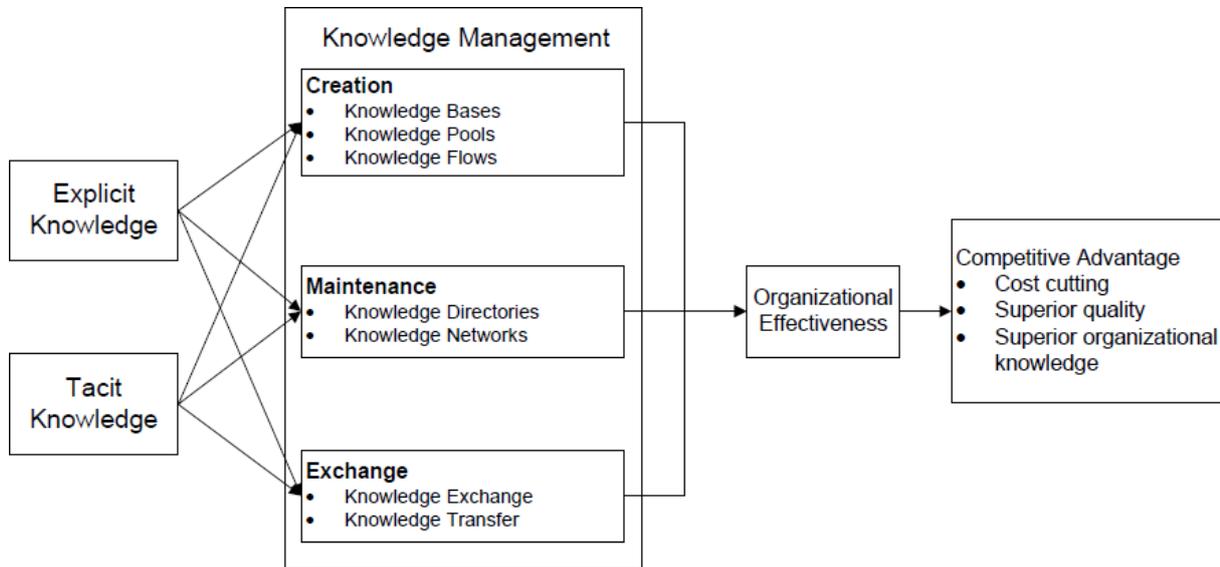


Figure 2: *Research Model: Explicit and tacit knowledge, are used in all of the components of knowledge management. The different methods discussed are what turns the knowledge management into an organizational effectiveness and may lead to a competitive advantage.*

There is explicit knowledge and tacit knowledge; both of them are part of every component of knowledge management. While explicit knowledge generally focuses more on creation due to ease of sharing the knowledge, tacit knowledge focuses more on exchange due to difficulties in sharing. The second part of the model shows knowledge management and its components, which, as mentioned earlier in the first chapter of this research, can either be created, be maintained, be exchanged or a combination of these in order to be talking about knowledge management. The examples in each component do overlap with other components but its primary focus lies with the component they are mentioned in. Following will be examples of knowledge management as shown in the model and how they can create organizational effectiveness.

Examples of knowledge management based competitive advantages

As mentioned earlier, the behavioral schools within knowledge management provide the most broadly viewed advantages of the field, uplifting a company as a whole, rather than only specific parts. Rather than focusing solely on sharing knowledge, the behavioral schools also promote creation of knowledge and maintaining their level on a company wide basis, instead of putting that responsibility on individuals.

Knowledge pooling

As mentioned by Earl (2001), knowledge pooling makes use of communities in a company to provide expert knowledge (knowledge communities) that can be used in other parts of the company, as well as companies outside when allowed. For this purpose, I want to show a few more examples

as to where competitive advantage has been obtained in the past by companies using these behavioral schools. Firstly with the organizational school, that focuses on knowledge pooling.

While this is similar to knowledge bases, there are some key differences between the two methods. The method of storing the knowledge is different, rather than just text it is more common to capture the knowledge on video by means of an interview. Also, whatever the knowledge pool can lack in knowledge is usually made up for by using references, similar to a knowledge network which has the added benefit of limited exchange of tacit knowledge (Smith E. A., 2001)

Pooling of knowledge requires a channel that will be able to store and expose the knowledge to be shared. So, the coordination mechanisms are supposed to support some kind of physical or virtual space for knowledge sharing (Christensen, 2007). This immediately leads to a certain requirement to not just put everything in the knowledge pool, but actually keep it concise, yet thorough and as complete as possible. This form of knowledge management is focused on the creation part of knowledge management, focusing on actually assuring that knowledge is stored somewhere. BP Amoco shows an excellent example of this form of knowledge management and how it may in fact be seen as a sustainable competitive advantage.

In BP Amoco, the mother company of British Petroleum, the knowledge management program actually came forth out of former CEO John Browne's drive to create a learning organization (Prokesh, 1997). The initial idea was to create knowledge mapping, finding out who knows what and connecting people who needed specific knowledge. But rather than keeping this within one location, BP set out to connect knowledge across sites, divisions, functions and even countries. It went further than knowledge flows, which share explicit knowledge. The knowledge pool was the prime source for the sharing of knowledge.

I would argue that the goal with this connecting was to increase productivity and to accelerate learning. Rather than learning the same thing in thirty different places, it was now known corporate-wide if one team managed to learn something. This also indirectly led to better decision-making, better development of tools and an increase of process efficiency among other things. Another small plus that is one of the main reasons this knowledge management worked out so well, is the fact the employees showed willingness to share knowledge and profiled themselves that way. This increased the sharing of knowledge and most likely is the leading cause for BP's knowledge sharing methods to become a competitive advantage. The centralizing of the knowledge that is obtained and the similarities to knowledge bases show that this specific form of knowledge management focuses a lot on knowledge creation.

Knowledge exchange

The more interesting example however can be found in the spatial school, with British Airways. The spatial school itself, as mentioned earlier, focuses on exchanging knowledge at certain places such as the oft-used metaphorical water cooler or coffee machine. While the idea itself sounds stereotypical it exists for a reason – it works! Knowledge exchange as I see it can be loosely defined as “transferring knowledge to one another in order to obtain new insights on business processes”.

The spatial school adopts a view of strategic human resource management as is covered thoroughly in other research studies (Collins & Smith, 2006) (Becker & Huselid, 2006). Humans are generally 'social beasts' (Larsen & Buss, 2010) that love to talk to one another. Creating an environment that simulates employees to meet one another and talk to one another directly stimulates the discussion of work-related topics (Nahapiet & Ghoshal, 1998). This discussion is likely to happen across levels and across departments, which may in return lead to new ideas springing off by combining the works of employees who generally are oblivious to what one another does in the company. Sometimes ideas can even be found between two totally different companies, such as the creation of the Senseo coffee machine of Philips in collaboration with the coffee company Douwe Egberts (Chantier et al., 2009).

This in essence is a form of knowledge management, while it may not directly seem to be that way. Knowledge is exchanged between employees with these conversations. When management stimulates a place for employees to meet in a fashion that stimulates communication, it will basically be a form of knowledge management. Obviously this form of knowledge management focuses on the exchange of knowledge as mentioned in the research model.

As one of the world's biggest and well-known airline companies, British Airways also has interesting knowledge management methods which transform normal airline processes to also include some knowledge management in order to uplift the company even more (Earl & Scott, 1998).

The often seen premium lounges of some airlines are already a good place for networking with other companies, but this concept can also be applied to a company itself. In the new head office of British Airways (BA) near Heathrow Airport is also built in an open-plan fashion, encouraging communication between employees even more. This is a pretty basic practice; the real experiment that BA has been doing however, is on their ground floor.

Their ground floor is built as a very wide, medieval street which people need to walk through constantly in order to navigate through the building. Besides being their main navigation point, there is also a café, grocery store, newsstand, as well as other facilities to be found. The design of the floor makes the company feel less formal, which makes employees feel more comfortable and directly leads to people being more open to conversation. While it does not always lead to company-related conversations, there is knowledge being shared among employees, making it a prime way of knowledge exchange, both intra and inter-divisional, as each division shares the same ground floor.

This almost unorthodox method of knowledge management has led to more team cohesion and to ideas being developed that normal business processes would have been unlikely to create. Next to that advantage, the fact that employees feel more comfortable also leads to increased employee loyalty and satisfaction, which in return leads to improved business outcomes (Harter, Schmidt, & Hayes, 2002). An added benefit of cross-departmental cooperation is that the innovative capabilities are heightened due to the knowledge exchange that can be seen here.

Knowledge capitalization

As a sort of ideal form of knowledge management in regards to competitive advantage there is the strategic school. As mentioned earlier, this school focuses on knowledge management as the essence of the company and the very middle of the company strategy. The keyword with this school

is sustainability, which just so happens to coincide with sustainable competitive advantage. The strategic school has knowledge management as prime source for competitive advantage (Barnes, 2002) (Giju, Badea, López Ruiz, & Nevado Peña, 2010). As definition for knowledge capitalization I propose “the capitalization of knowledge within a company in order to attain competitive advantage”.

It is referred to with the metaphor ‘umbrella school’ by Earl (2001), meaning that it incorporates several different practices which can be seen throughout other schools. Knowledge management as we know it now, with the use of IT, is not that thoroughly researched yet and remains one of the newer forms of obtaining competitive advantage (Wong, 2005). Companies that act within the strategic school are fully aware of the low coverage of the topic and are very aware of the potential that explicit and tacit knowledge has for the creation of a competitive advantage. Among other things, knowledge management is also what both inhibits and facilitates innovation together with the organizational culture, climate and environment. Different combinations of the organizational structures and forms of knowledge management determine how well the innovative capability of the organization is (Mukherjee, Ganesan, & Hashmi, 2011). While companies using knowledge capitalization as their form of knowledge management, it does not necessarily mean that they integrate the different aspects of knowledge management (creation, maintenance, exchange), but rather use all of them. A company acting within this school is one of the world’s largest consumer goods company, Unilever.

The company’s vision includes the following line: “Our deep roots in local cultures and markets around the world give us our strong relationship with consumers and are the foundation for our future growth. We will bring our wealth of knowledge and international expertise to the service of local consumers – a truly multi-local multinational” (Unilever, 2012). The company expands even further on the idea that BP had with sharing knowledge.

Due to the nature of Unilever and its many subsidiaries, there will be a large division in company culture and practices. In order to somewhat maintain a similar path, the company sets up so called ‘knowledge management workshops’. These workshops help executive teams examine the different processes are being handled in one of the subsidiaries and moreover how they can use the knowledge in a better fashion and thus create a competitive advantage. This can be done either by assessing the knowledge acquired and try to create generalized, corporate-wide processes with it to increase efficiency. However, knowledge about certain foods within a subsidiary can also be used in order to develop entirely new products, at the subsidiary itself but also with other subsidiaries within the vast network of companies that Unilever owns. Thus this creation of knowledge can also be seen as creation of value, but also as value realization as the company has knowledge management as their essence, showing that there is already an expectation for this created knowledge to hold some value. Unilever’s practices also allow them to get new insights into how their information systems are being used throughout different subsidiaries. Again this can be used as an opportunity to optimize processes, the usage of information systems and moreover the usage of management information systems. All these different methods used by Unilever optimize business processes performed within the organization, leading to increased organizational effectiveness and possibly leading to a competitive advantage.

The improvement of efficiency on the MIS level can be shown throughout every school of knowledge management and process to be an important catalyst in the usefulness created by effective knowledge management.

MIS in knowledge management and their competitive advantage

One of the key components that is almost always required for competitive advantages through knowledge management is the availability of management information systems (MIS) (Sambamurthy & Subramani, 2005). Different schools use different MIS for this purpose as can be seen in appendix A. The technocratic schools are more focused on using databases, either to actually virtually store the data or to save references to people who are knowledgeable about a certain topic, as can be seen with knowledge bases and knowledge directories. The economic school on the other hand uses MIS for decision making in order to determine what intellectual property to sell for what price or whether a deal should be made or not.

Behavioral schools on the other hand, use MIS far more than the other schools. Some of their MIS are databases, again to serve as data store or to contain references as mentioned with the technocratic schools. However, the MIS are also used to create knowledge, to expand existing knowledge, to link existing knowledge and so forth. This eclectic usage of MIS can be found most in the strategic school. While it is also used by the other two behavioral schools in some sense, the bulk of the knowledge exchange is done through other channels and the MIS merely register it. More information systems are used for representation and interfaces for accessing the data. As mentioned with Unilever earlier, the knowledge management can also have MIS optimization as result. While the systems are used in order to perform knowledge management, they can also very much so be part of the solution when improving your company.

The importance of MIS for knowledge management is the fact it is far more efficient to store data on them rather than doing it with 'old fashioned' pen and paper. Using MIS makes it much easier to index the data this way, easier to represent data, easier to edit data and dependent on the rules set within the MIS allows multiple accesses to the same data at the same time. Besides these apparent advantages of using MIS for knowledge management there are dozens more other advantages (Davis, 1989).

The bigger a company is, the harder it is to have an effective and efficient network of information systems, more so MIS. With such companies, competitive advantages can be obtained if they manage to optimize this network in order to have sub-second response times, near-100% uptime, among other 'basic requirements' that most IS networks have. Especially with the strategic school such an optimized network can make the difference between a market leader and a company further down low. This school tends to have the most extensive mix of networks, systems, tools and knowledge repositories (Earl M. J., 2001).

Ensuring optimal flows of information allows management to make decisions more readily, while simultaneously being more thoroughly informed about the different options in a decision. In order to convert the data flows into proper information that supports the decision process as well as making suggestions, there are decision support systems that are heavily dependent on proper knowledge management (Alavi & Leidner, 2001). A recent addition that is coming up in the field of knowledge management is the incorporation of social networks. The inherent property of a social

network – as the name suggests – is that it enables easy communication between people. This can also be used by organizations to stimulate communication between employees. Colleagues tend to follow one another on social networks (e.g. Twitter, Facebook) where they can obtain knowledge that is shared by fellow colleagues (Borgatti, Mehra, Brass, & Labianca, 2009).

Knowledge transfer

Culminating from the research shown so far, there seemed to be a lack of integration between the different components of knowledge management. Most knowledge management strategies are focused around the first two parts of knowledge management as proposed: the creation of knowledge and the maintenance of this created knowledge. However, creating and maintaining knowledge is useless if the knowledge is not exchanged – or transferred – effectively. Knowledge transfer however, is a field within knowledge management that focuses on sharing the right knowledge to the right people, assuring integration and in-house utilization of all the components.

Several research studies that cover knowledge transfer give it the attribute that it is the core of how knowledge management can become a competitive advantage in different sectors (Baum & Ingram, 1998) (Epple, Argote, & Murphy, 1996). The weight and sustainability of the competitive advantage created through knowledge management is fully dependent on the effectiveness of the knowledge transfer. Knowledge transfer can be defined as: “the process through which one unit (e.g. group, department or division) is affected by the experience of another” (Argote & Ingram, 2000); or as “the communication of knowledge from a source so that it is learned and applied by a recipient” (Ko, Kirsch, & King, 2005). Both definitions cover the fact that a recipient unit becomes more knowledgeable about a subject through the knowledge acquired from a source unit that already possesses this knowledge. While knowledge transfer on an individual level is important, looking at the spatial school for example, the transfer of knowledge is even more important with bigger groups when thinking of organizational knowledge.

While it is important that your individual members have the skills to effectively perform their tasks, it is even more important that *all* the employees that are involved with a specific process are aware of this knowledge. An additional advantage of knowledge transfer is that it provides a method to compare the effectiveness of knowledge management to a certain extent. The effectiveness of the knowledge transfer can partially be measured by means of the performance mutations (Darr, Argote, & Epple, 1995). Difficulty with measuring it through performance is the fact that experience gain can also lead to increased performance. Measuring it solely through knowledge gain – exams for example – also proves to be insufficient due to the aforementioned difference between tacit and explicit knowledge (Nonaka, *The knowledge-creating company*, 1991). Besides the issue with tacit knowledge, knowledge gain is hard to measure for a unit other than just an individual.

Several researchers have contributed to the field of knowledge transfer with frameworks covering how knowledge is stored and transferred between units (Walsh & Ungson, 1991); (Starbuck, 1992); (Arrow, McGrath, & Berdahl, 2000). Culminating from this research, the framework for knowledge reservoirs was developed by J.E. McGrath and L. Argote in 2000, and was adapted until 2003. It focuses on reservoirs, referring to the ability of reservoirs to store something for future use (in this case knowledge). This model proposes that knowledge is embedded within three elements in

an organization: members, tools and tasks. These three elements and the combination of them map the knowledge that is embedded in an organization.

‘Members’ includes all the human parts in the organization, i.e. the employees. ‘Tools’ refers to everything that is used by the members to assure completion of their task. ‘Tasks’ refers to the goals an organization has, the processes that need to be accomplished by the members. The combinations of these elements lead to the combinations shown in figure 3.

All parts of the framework have knowledge embedded in them and have the capability to be optimized in order to increase organizational performance. The original coverage of this framework continues to mention that there should be both internal and external compatibility with networks. Internal compatibility means within a sub-network itself, such as defining what tools are most effective for a task within the task-tool sub-network. The external compatibility, meaning compatibility between sub-networks, would be if the member-tool network defined what member is most capable with a tool and through the linking between the member-tool and task-tool sub-networks (latter storing what tool is best for what task), that member gets assigned a specific task based on his capability with a tool. This assignment is part of the division of labor and thus is part of the member-task sub-network. This compatibility of components has been covered by many research studies in the past and present (Leavitt, 1961); (Merali, 2000); (Cummings, 2008).

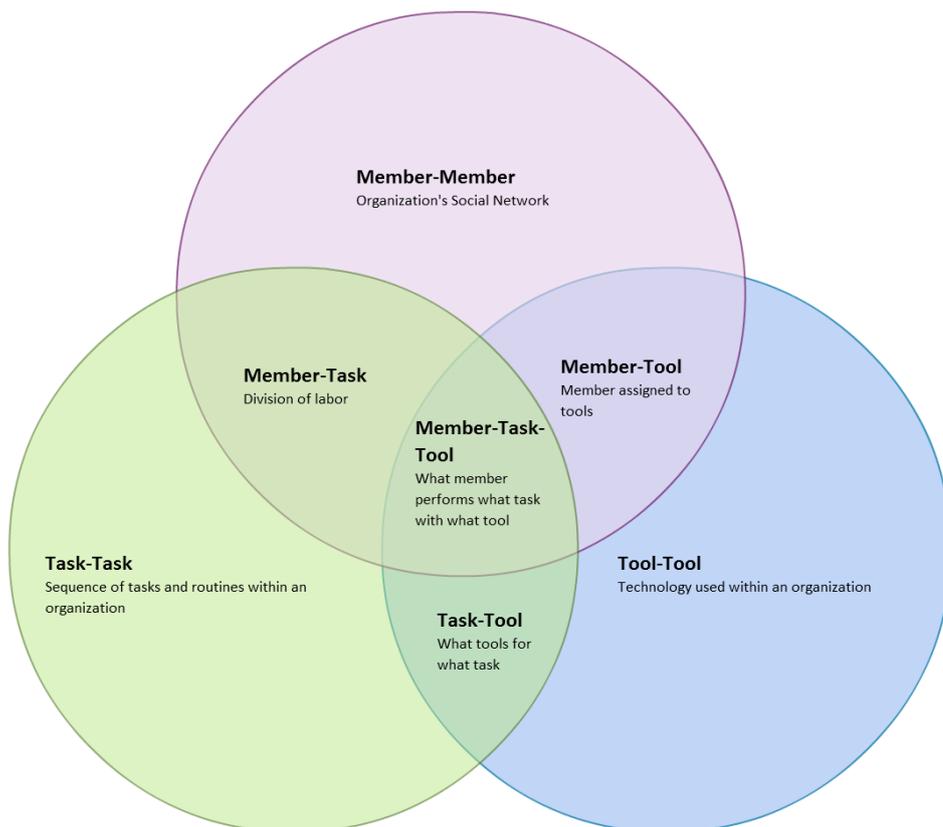


Figure 3: Venn-diagram showing the knowledge reservoirs and the relations between the different reservoirs.

Depending on the sub-network, there is a difference between the type of knowledge (tacit or explicit) that is stored and the method it is stored. While some of the knowledge is tacit and stored on an individual, such as the skill with a certain tool in the member-tool network, other knowledge is very explicit and stored in a simple database, such as what tool is good for a certain task in the task-tool network. It can even differ within the sub-network itself, as the member-task network states who does what task with what method – explicit knowledge – yet it also includes the experience of a member at such a task which is tacit knowledge.

The knowledge transfer comes in when the experience of a unit and the related knowledge is transferred to another unit. This transfer can be explicit, when one unit communicates with another unit and in the process there is some exchange of knowledge that leads to an increase of performance in the future. It can also happen implicitly, when the receiving unit has increased performance by the usage of knowledge, but has a hard time to explain why, an example would be optimization of the value chain by adding a process during a task without the member performing the task knowing the underlying reason.

As mentioned before, the most sustainable competitive advantage is that which is created in-house. Organizational knowledge such as covered in the framework of knowledge reservoirs is a prime example of in-house knowledge and thus a great source for sustainable competitive advantage. So looking at the organizational knowledge as prime resource, a more thorough look at what sub-network is most effective would be required.

The hardest parts to transfer are the knowledge in the sub-networks that include the most unique components of an organization – the members. A member-task assignment is based on the capability of the member; member-tool knowledge is heavily dependent on experience with the tool. The difficulty with these two immediately leads to difficulties in the member-task-tool sub-network as per the theory of external congruence of the components. The interdependence of the sub-networks is also what makes knowledge transfer more difficult (Lam & Lambermont-Ford, 2010). The framework makes it easier to identify the interdependencies regarding knowledge reservoirs, which in return makes it less difficult to see what knowledge is better to transfer.

An experiment by Gruenfeld et al. (2000) showed a method to stimulate knowledge transfer using members. Individual members could be moved across groups, but when the moved individual was in a new group (group N), his ideas were less influential than those of members that have been in the group for longer. The knowledge of group N however, is transferred to the moved individual. When the individual returns to his old group (group O), his ideas were different as they incorporated knowledge obtained from group N, yet they were also being listened to unlike during the individual's trip to group N. This led to knowledge being transferred between groups as the other members of the group O obtained the knowledge of group N as well.

Transfer of tool-related sub-networks (tool-tool, tool-task, member-tool, and member-task-tool) is a bit easier, as it usually involves using new technology. Difficulties can arise if the technologies are rather context-related and should be adapted to the recipient site (Leonard-Barton, 1988). If the knowledge in the tools is embedded within them (e.g. in-house developed software) it is more easily transferable whereas when there is knowledge required to use a tool, the transfer

usually requires accompanying personnel in order to render the transfer successful. The benefit of the latter case is that, when this is a competitive advantage, the sustainability is a lot higher.

For the task-related sub-networks research is very limited and the concept is rather vague. Most of the studies focus on moving routines (Szulanski, 2001) (Gersick & Hackman, 1990), which can be rather effective but is dependent upon the capabilities of members and the availability of required tools. A routine that works well with the resources in one organization may not work as well in another organization. The knowledge embedded in the task-tool sub-network is probably the easiest to transfer due to the lack of a need for members within this knowledge; it merely states what tools are most effective for a specific task.

In the end, the success of knowledge transfer heavily depends upon how well the knowledge embedded in the networks fits with the existing components and the compatibility with the context of the new unit. With an eye on sustainable competitive advantage however, it is best to have knowledge embedded in the members. The main reason for this being their innate ability to hold tacit knowledge and to some extent is capable of transferring it to other units as opposed to tools and tasks. Moreover, due to training, communication and selection processes, members are more similar than between organizations due to group heterogeneity. This allows members to have an easier time to transfer knowledge with their own colleagues, while it will be harder to transfer it to another organization (Huang & Wang, 2002). Knowledge transfer happens in all companies, but most companies are probably unaware of it and thus do not capitalize on the fact it happens within their organization. An example of this can be found with the ERP-system that the University of Nebraska implemented in 1999 (Lee & Lee, 2000).

While an ERP-package may at first glance just be a software package that collects information about resources within an organization, it also affects the way people work due to the new methods to obtain information and even with all new information that was never obtained before (Lee & Lee, 2000). Badaracco proposed that this change in working methods is '...related to a difficult-to-migrate portion of organizational knowledge which is deeply embedded in complex social interactive relationships within organizations (1991). In the case study that I used by Sieber et al. (1999) the purchasing process changed and consisted of only two third of the tasks of the old purchasing process. This saved days in the overall process, while it also saved paper and was automated for the larger part.

In addition, the new methods to obtain information lead to information being more widespread within the company, causing organizational knowledge to be lifted as explained for the idea behind knowledge transfer. Also the implementation of the new ERP-system, while showing some problems as can be expected with the implementation of any system, showed a decent example of knowledge transfer as people obtained the knowledge about its usage (the creation) was spread rather quickly (the exchange).

Discussions, Limitations and Suggestions

Discussions

Knowledge management as we know it today and the research related to it is acting in a relatively young field, a field even younger than that of IT, being an established discipline since 1991 (Nonaka, The knowledge-creating company). This means that there are no really solid paradigms within the field and research tends to be rather scattered. Many different forms of knowledge management are being used at the moment, while all of them have a decent basis that causes them to increase organizational effectiveness within organizations; some methods tend to be better than others.

Much of the organizational effectiveness is based on the field the knowledge management is used. Knowledge management involving a lot of human relations tends to require a lot of tacit knowledge, making knowledge exchange ideal for it. On the other hand, knowledge management that handles a lot of explicit knowledge – for example that in technology based companies – would benefit more from knowledge pooling and knowledge bases.

During this research I saw a clear division between the knowledge management of tacit and that of explicit knowledge. The management of explicit knowledge was very much focused on the creation of knowledge and to some extent managing this created knowledge. No real thoroughly embedded activity stimulating the exchange of knowledge can be found in the systems. The unit that requires the knowledge would have to look it up or actively search for it themselves. Examples of this would be knowledge pools, knowledge bases and knowledge directories. These methods save the knowledge or referrals to who possesses the knowledge at a centralized point such as a database.

The management of tacit knowledge however focused a lot more on the exchange of created knowledge. While creation of knowledge obviously is still important for tacit knowledge, it is not really focusing on this specific component of knowledge management. The problem with tacit knowledge, as mentioned, is that it is hard to write down; exchanging it through means of communication between human-based units is the way to go. Examples of this are knowledge transfer and knowledge exchange. These thoroughly discussed methods focus on the transfer of knowledge from a source unit to a recipient unit, with the recipient unit gaining the capability to apply the acquired knowledge.

Furthermore there is a hybrid 'method', which basically uses several knowledge management methods to optimize different business processes, addressing both tacit and explicit knowledge through the use of these different methods. The organizational effectiveness and consequently possible competitive advantage acquired from these three branches depends on the industry and the rate of integration of the method in the knowledge management of the organization. The following table shows the more thoroughly researched methods, their possible competitive advantage and mentioned examples.

Earlier in my explanation of competitive advantage I mentioned several well-known companies and their competitive advantage which was somewhat unrelated to knowledge management. However, these companies can gain additional advantage and solidify their market position by incorporating knowledge management methods.

Apple is prized for its innovative capabilities, which happens to fit very well with knowledge exchange. In order to acquire new ideas for products, employees of different divisions within Apple may benefit from having spaces such as a knowledge café or something similar to British Airways' ground floor to further improve their innovative capabilities in years to come.

Coca Cola mentioned competitive advantage is a solid reputation and brand association. While it is hard to incorporate knowledge management with these competitive advantages, the company could improve one of their business processes such as the bottling or the actual production of the soda drinks. While it is very possible this is already applied within The Coca Cola Company, they could apply a specific method for these processes and apply them throughout all their plants and subsidiaries. The knowledge required for this is rather explicit as these processes involve a lot of machines, so knowledge bases or knowledge pooling is an excellent method for this company.

Microsoft needs to continue to develop reliable and up-to-date products in order to remain in their advantageous position. Thorough reporting of the results of working methods have to be saved. Successes and failures should be known throughout all the employees involved in the creation of a new product or service in order to weed out factors that would impede the market performance of a product, while applying methods that led to success in the past. Because the creation of a new product or service requires several processes which require a decent amount of both tacit and explicit knowledge, Microsoft would focus on knowledge capitalization and applying different other knowledge management methods in order to assure the delivery of a product that is in line with their reputation.

KM Method	What CA?	Example	Possibilities for
Knowledge Transfer	Superior organizational knowledge	University of Nebraska	Every organization
Knowledge Pooling	Superior productivity	BP Amoco	Coca-Cola
Knowledge Exchange	Innovative capabilities	British Airways; Philips	Apple
Knowledge Capitalization	Business Process Optimization	Unilever	Microsoft

Table 1: A list of the researched KM methods, their associated competitive advantage, an example and also where Apple, Coca-Cola and Microsoft fit in here

Limitations

Knowledge management is a broad field of research and thus is near impossible to fully research in one paper. This led to this research being narrowed down and focusing on only several forms of knowledge management. Beside this, I have limited knowledge about the field and thus may have possibly included earlier knowledge or introduced some fallacies in the research that have been rejected in the past. Thus, the first limitation is the author's limited knowledge in the field.

Furthermore, non-English sources have been omitted from this research for the sake of consistency in research and assuring it was not affected by cultural differences. While this may not be the case, it was a risk that was not required to be taken as sufficient sources were available in

English. However, it is possible that said non-English sources would have provided an even more solid basis for this literature research.

Lastly, only knowledge management sources that were related to the fields of computer science, social science and economics were used. Knowledge management is used throughout all industries as discussed and thus cannot be fully based on research done in this field. These sources may have proved to benefit more from knowledge management methods that have been depicted as having more difficulty to gain competitive advantage.

Suggestions

Furthermore, I would like to suggest a couple of things that I thought of during the creation of this research paper but was not in the scope of my research or applies in a more general sense for research studies within the field of knowledge management.

(1) Future research about knowledge pooling. In this research I found it rather difficult to find sufficient and decent resources about knowledge pooling and knowledge pools that would be in line with the general style and context of this paper. While this method is close to knowledge bases, it has the key difference that it provides at least limited saving and exchanging of tacit knowledge. This is a key difference in my opinion. Knowledge pools could be integrated with knowledge bases for more complete knowledge or even replace knowledge bases as a whole when applied properly.

(2) Focus on a more people-based approach. While a lot of knowledge management involves explicit knowledge, there is still some part that is based on the people using the systems. The knowledge eventually exists to serve the employees and thus is always used by people, whether they create it, manage it or are the end-users. This means that all methods researched should at least involve something about the people that are involved in using a specific method.

(3) Integrate different knowledge management methods. All of the methods that exist may possibly be narrowed down to fewer methods or at the very least methods that use the same type of system. While all of them have some distinct characteristics, a lot of them focus on similar methods of managing the knowledge. There are several methods that focus on saving explicit knowledge and making these available, others focus on saving references to knowledgeable sources, and others again focus on exchanging knowledge between different units. It may be beneficial to research the possibility of narrowing the methods down to leave only a few methods, albeit they would be more abstract than the current methods.

(4) Further qualitative research. As already suggested years ago (Liao, 2003), a lot of suggestions have been made about knowledge management methods while not including qualitative research. Even though there were good suggestions in these papers, the lack of qualitative research have forced me to omit it as a source for this research. While this paper can also be placed in line with the papers I did not include, it proposes ideas which could possibly be a basis for research in the future.

Conclusions

This paper focused on the research question “How can knowledge management affect competitive advantage?” While initially the idea was that knowledge management merely as a supporting role regarding competitive advantage, it quickly changed into proving to be viable source for competitive advantage rather than support another resource as competitive advantage. Knowledge management can lead to a plethora of competitive advantages; it all depends on what method is used and what industry an organization conducts business in.

A lot of research can still be conducted in the field of knowledge management, which is to be expected with a young field. Further research may totally change the focus of knowledge management, but only time will tell about this. Integration of different methods may lead to more focused research on applying knowledge management in the field rather than sticking to ideas that only work for a small section in knowledge management.

Appendices

Appendix A: Schools of Knowledge Management (Earl M. J., 2001)

SCHOOL ATTRIBUTE	TECHNOCRATIC		ECONOMIC		BEHAVIORAL		
	SYSTEMS	CARTOGRAPHIC	ENGINEERING	COMMERCIAL	ORGANIZATIONAL	SPATIAL	STRATEGIC
FOCUS	Technology	Maps	Processes	Income	Networks	Space	Mindset
AIM	Knowledge Bases	Knowledge Directories	Knowledge Flows	Knowledge Assets	Knowledge Pooling	Knowledge Exchange	Knowledge Capabilities
UNIT	Domain	Enterprise	Activity	Know-how	Communities	Place	Business
EXAMPLE	Xerox Shorko Films	Bain & Co AT&T	HP Frito-Lay	Dow Chemical IBM	BP Amoco Shell	Skandia British Airways	Skandia Unilever
CRITICAL SUCCESS FACTORS	Content Validation Incentives to Provide Content	Culture/Incentives to share Knowledge Networks to Connect People	Knowledge Learning and Information Unrestricted Distribution	Specialist Teams Institutionalized Process	Sociable Culture Knowledge Intermediaries	Design for Purpose Encouragement	Rhetoric Artifacts
PRINCIPAL IT CONTRIBUTION	Knowledge-based Systems	Profiles and Directories on Internets	Shared Databases	Intellectual Asset Register and Processing System	Groupware and Intranets	Access and Representational Tools	Eclctc
"PHILOSOPHY"	Codification	Connectivity	Capability	Commercialization	Collaboration	Contactivity	Consciousness

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