



GÖTEBORGS UNIVERSITET

# **Findability of Information: Organizational Approaches to Search**

**A quantitative study of factors affecting perceived satisfaction**

**Möjligheten att hitta information: organisationers  
tillvägagångsätt för sökhantering**

**En kvantitativ studie av påverkande faktorer gällande den upplevda tillfredställelsen**

**Filip Gårdelöv  
Viktor Larsson**

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## **Abstract**

Seldom is there time to search through every single document available when we want to find information at work. With the modern information technology, the accessible information volume in organizations has grown rapidly and continues to do so. The importance of why people must be able to find what they are looking has increased in pace with the abundance of information. Therefore, the area of investigation for this thesis is information-seeking from an organizational perspective.

Our purpose with this thesis is to make a contribution of new knowledge to the research regarding how findability and satisfaction are affected by the way organizations addressing search. Thus, the aim of our study is to make an attempt sorting out how organizations' reason when it comes to matters regarding search and how these affect the perceived satisfaction level. To achieve this purpose, six hypotheses was tested concerning how organizations managing the search of information.

To collect the data needed for hypotheses testing a quantitative analysis was conducted. A questionnaire was constructed and distributed in collaboration with a company active in the business of search management and information seeking. A number of 140 organizations of various sizes, world-wide geographical locations and from many different industries answered the questionnaire. This generated a sample that could represent the larger population.

Statistically significant evidence was found indicating a relationship between organizational size and employed people's perception of their ability to find the right information. In addition, results show a correlation between the involvement of a CIO and their relation to strategies. Further, a strong positive linear relationship is showed between the organizations' perceived satisfaction level regarding search performance and to which extent the employees perceive their information to be findable.

The conclusion is that the involvement of a CIO and formulated strategies concerning search most likely leads to more satisfied employees and increased productivity within the organization.

The following report is written in English.

Keywords: Findability, information –seeking, search strategy, search investments, , organizations

## Abstrakt

Sällan finns det tid att söka igenom varenda tillgängligt dokument när vi letar efter information på vår arbetsplats. Den moderna informationsteknologin har lett till att den informationsvolym som finns tillgänglig vuxit snabbt och så kommer det att fortsätta. Betydelsen av varför människor måste ha möjligheten att hitta det de eftersöker har ökat i takt med att information en ökar. Av den anledningen är den här uppsatsens undersökningsområde informationssökning sett ur ett organisationsperspektiv.

Forskningsområdet angående informationsökning med organisationen i fokus är relativt outforskat. Således är syftet med denna studie att tillföra ny forskning och kunskap till området. Således kommer ett försök att reda ut hur organisationer resonerar kring sökhantering att göras. För att möjliggöra detta har sex hypoteser testats gällande hur organisationer hanterar informationssökning.

En enkät framställdes och distribuerades i samarbete med ett företag verksamma i IT-branschen med fokus på organisatorisk sökhantering. Totalt svarade 140 organisationer av olika storlekar med stor geografisk spridning och verksamma i många olika branscher på enkäten, vilket gav oss ett urval som avspeglar populationen.

Genom att testa de formulerade hypoteserna hittades statistiskt signifikanta bevis som tyder på en relation mellan organisationsstorlek och de anställdas uppfattning om deras möjligheter till att hitta rätt information. Vidare påvisade resultaten en korrelation mellan en CIOs deltagande i en organisations sökprogram och huruvida en sökstrategi fanns utformad eller inte. Studien avslöjade även ett förhållande mellan en existerande sökstrategi och tillfredsställelsenivån gällande sökapplikationer hos de observerade företagen och även en stark positiv korrelation mellan de anställdas tillfredsställelse gällande sitt företags existerande sökapplikationer och i hur stor utsträckning information går att hitta.

Slutsatsen är att när en CIO är involverad och formulerade strategier kring sökhantering är realiserade leder det sannolikt till att personalen upplevs som mer tillfredsställd.

Rapporten är skriven på engelska.

Nyckelord: Informationssökning, sökinvesteringar, sökstrategier, hittbarhet, organisationer

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## **1. Introduction**

The episode below contains a background regarding the area of concern that is investigated in this thesis. Later in the chapter, we present our purpose with the study, sort out our boundaries and untangle some relevant terms.

### **1.1 Background/Area of concern**

By year 2020, International Data Corporation (IDC) foresees that the digital universe, i.e. the amount of digital information available, will be approximately 35 zettabytes which is more than 19 times as large as it was 2011 (Clarke & O'Brien, 2012). Beath et al (2012) studied 26 varied sized organizations and according to them modern organizations are lavished with data and in many of those cases the increase in data volume amounts to between 30% - 50 % on a yearly basis. On average, the organizations in the same study process more than 60 terabyte of information every year which is 1000 times more than the situation was ten years ago. Furthermore, McAfee and Brynjolfsson (2012) assert that at US-based retail giant Walmart, it is estimated that more than 2.5 petabytes of digital information is collected every hour from customer transactions which, put into perspective, are approximately 20 million filing cabinet's worth of text (McAfee & Brynjolfsson, 2012). Information that is created, gathered and handled by these organizations are more often than not unstructured and stored in word processing documents, spreadsheets or images - hence difficulties appear when it comes to extract and interpret the digital information (Beath, et al. 2012).

Often, we want to find information immediately when conducting tasks at work. Seldom is there time to search through every single document and folder that is available. In opposition to recent decades with the domination of paper-based environments where the critical part was to know the approximate location of the information, the new digital era with all its electronically stored information leads to a hardship in locating the information sought (Fanning, 2009). Beath et al. (2012) state that organizations collect information from several different sources; inventory levels, transportation movements and financial transactions which enable them to improve their communications with their costumers, optimize the business processes and identify new opportunities. Furthermore they argue that, in best case scenario, information about transactions are collected and stored once but in practice, many organizations have redundant applications and databases that cause higher storage costs and

make the data much harder to find. Good management and clear strategies regarding information-seeking can generate business benefits (Beath, et al., 2012). John Glaser, former CEO for an American pharmaceutical company describes the benefits: "[w]e can cut the cost of research by a factor of five, and the time required by a factor of ten. This is a big deal. And even if those [improvements] are halved, this is still a really big deal" (Beath et al. 2012, p 19).

McAfee and Brynjolfsson (2012) claim that people nowadays rely too much on experience and intuition and not enough on information. This may be an incentive to prioritize search applications and review search strategies when questions regarding how to invest effectively in IT are under consideration. In sum, the amount of data is increasing rapidly in modern organizations. In a study conducted by LaValle et al. (2010), 3000 organizations in over 30 different industries were included and 60 percent of these organizations agreed that they had more data than could be used effectively. According to Wu and Brynjolfsson (2012), organizations' ability to collect and analyze the immense amount of data enables them to sharpen their strategies and significantly increase the profit. In regards to that matter, the CIO have an important role because he/she focuses on leveraging IT- systems to add value and support business strategies while developing process innovations (Chun & Mooney, 2009). Having said that, is it automatically harder to find the right information from a larger amount of information? Or is it still possible to search and find information with satisfaction by a dint of adequate strategies regarding the organizations' way of managing search?

## **1.2 Problem**

We have noticed that there has been a lot of research done regarding information-seeking with the individual in focus, which often deals with behavior when searching and cognitive characteristics. However, there is not much, if any, work done concerning how to manage search and information seeking from the point of view of an organization. Managing digital search as an organization is somewhat a question about strategies regarding investments in IT. Therefore, we will relate our study to IT investments and what impact those investments have on modern organizations, an area where much work already has been done.

### **1.3 Purpose and aim of study**

Our purpose with this thesis is to make a contribution of new knowledge to the research regarding how findability and satisfaction are affected by the way organizations addressing search. The aim of our study is to make an attempt sorting out how organizations' reason when it comes to matters regarding search and how these affect the perceived satisfaction level. In order to achieve the purpose, the following propositions which are represented as the following six hypotheses:

- *H1a: An organization's size has an influence regarding to which extent information can be found.*
- *H1b: An organizations' size has an influence regarding to which extent the employees are satisfied with their search applications.*
- *H2a: Outlined strategies regarding search has an impact on the extent to which the organization seen as a unit is satisfied with how they perform search.*
- *H2b: There is a linear relationship between an organization's satisfaction level in terms of how they perform search and their perceived ability to find information sought within the organization.*
- *H3a: There is a relationship between the involvement of a CIO in an organization's search programme and the existence of an established search strategy*
- *H3b: There is a relationship between a CIO as the final decision-maker regarding IT-investments and the presence of a search strategy.*

### **1.4 Definition and boundaries**

As we initially pointed out, it is necessary to define some fundamental terms that will appear frequently in this thesis.

Bocij et al. (2008) define "information" as; a) data that has been processed to something meaningful, b) data that has been processed for a specific purpose, c) data that has been interpreted and made understandable by one or more employees.

According to Drnevich and Corson (2013), "strategy" is defined as a number of management decisions. These concern how to balance an organizations' considerations



between being efficient (reducing costs) and being effective (creating and capture value) to achieve the business goals.

“Findability” is defined as how easy or difficult it is to find information within the organization we define “search” as a way of finding information needed within an organization.

In this thesis our focus will be on how organizations are perceived to reason when it comes to IT support for information seeking. Accordingly the individual will not be a central figure in our study as we have noticed that much research already have discussed this issue. As mentioned before, our aim is to look at organizations as units, not as individuals.

## **2. Theory**

In order to generate a greater understanding for why we have chosen to investigate this problem, there is a need to highlight some of widely-spread research and literature that already exist within the area of Information seeking. In this section we also outline the six hypotheses which are based on the theory presented. To describe the area of concern more extensively we see it as a necessity to explain what happens in a person's mind when he/she is searching for information, hence the section about the information seeking process (ISP).

Moreover, we address IT investments as an area of relevance as people's ability to search, and find the information desired, may or may not depend on what types of search applications or tools they have at their disposal. Possibly, that is a direct consequence of whether or not investments in search tools have been a priority. In addition, we believe that IT investments regarding search depends on if the organizations have established search strategies and whose being responsible for these.

### **2.1 The Information seeking process**

Spink and Cole (2006) affirm that humans have been seeking, organizing, and using information for resolving problems related to staying alive, managing work and solving everyday challenges for thousands of years. They define information seeking as a subset of information behavior including the process of seeking meaningful information in relation to an established goal (Spink & Cole, 2006). The term information itself has been defined in many different ways over the years and Buckland (1991) identified three principal uses of the word information; (1) Information-as-process, (2) Information-as-knowledge and (3) Information-as-thing. In this paper, the third principal, Information-as-thing is in focus, which implies that the term information is used attributively for different objects, such as data and documents (Buckland, 1991).

Researcher's common view regarding information seeking is that the objective is to answer a specific question or to locate sought information. Consequently, the main goal of information seeking is to find relevant and useful information (Kuhlthau, 1997). According to Marchionini (2006) there are three kinds of search activities; lookup, learn and investigate. Lookup is the most basic kind of search task and has been the focus of developing database management systems. Typical lookup questions are who, when and where and return information such as

numbers, names, short statements or specific files of text. He argues that information database management systems enable fast and accurate answers. Learning searches on the other hand return sets of objects that require cognitive processing and interpretation such as graphs, maps or texts. Searches that support investigation dig even deeper and involve several iterations and return results that often need to be critically assessed (Marchionini, 2006). He clearly states that tasks referred to as lookup have been one of the most beneficial computer applications. On the other hand, as people have gotten used to searching and browsing the web to a much higher extent and have become information seekers, in order for them to be productive, they have started to expect more from their available search tools. The aim for these search tools must be to offer outcomes beyond lookup (Marchionini, 2006).

Kuhlthau (1991) talks about the way information systems (IS) traditionally have been managed and according to her it derives from a bibliographical paradigm that has focused on gathering and classifying text in order to outline search strategies for information retrieval. She emphasizes that this approach has encouraged to a view of information use from a system's perspective which in itself has meant that the information that has been retrieved when performing a search query above all has matched the system's representation of text rather than giving the user an answer to a specific problem (Kuhlthau, 1991). However, Marchionini (2006) argues that the existing applications for data retrieval and data storage today have made people more demanding in terms of getting exactly what they want information-wise. Nevertheless, Edmunds and Morris (2000) claim that while there are many obvious benefits from the accessibility of information, evidence has been found that information overload can lead to loss of job satisfaction and poor physical health. Generally, when an employee receives too much information it becomes a jumble which is more than the receiver can process. This results in stress, decreasing productivity, increasing stress and other costs for the organizations (Edmunds & Morris, 2000).

Tidwell (2011) means that there are many ways to support and facilitate an employee when searching for information. According to her the systems' interfaces for information seeking should be: A) *Highly interactive*, the systems' respond as quickly as possible to the users' searching. B) *Iterative*, the systems let the searchers refine and edit their search until a desired result is received. C) *Contextual*, the systems present the result in context with surrounding information in order to make it easier to understand where the searchers are in the information space. D) *Complex*, make it possible to specify combination of conditions for showing the

information and not just turn information sets on and off. These four will make the searcher test hypotheses about the information and explore it in a more creative way (Tidwell, 2011). Furthermore, Marchionini (2006) contributes to this and argues that systems' interfaces should be highly interactive to engage human control over the information seeking process which can lead to increased productivity. (Marchionini, 2006)

In a study conducted by Aral et al (2007), they discuss productivity in the perspective of an information worker and in what way use of IT and information seeking habits affect output at the individual level. In their findings they reveal ulterior mechanisms that drive performance and moreover, the results indicate that IT use in the sense of information seeking does in fact foresee economic productivity at a significantly higher level. Aral et al (2007) also conclude that workers that use tools to help them find information, i.e. performing search queries in databases, also perform more work simultaneously and finish projects faster. Lastly, they establish that employees that use databases on a regular basis create more earnings for the organization per time unit (Aral, et al., 2007).

In summary, in order to take advantage of the information available and increase the organizations' productivity, it is possible to distinguish incentives for investing in IT. An assumption will be made here that this is applicable when it comes to incentives for investing in search as well.

## **2.2 The incentive for investing in Information Technology**

According to Khallaf (2012), the reason organizations make investments in the area of IT is to strengthen their strategic position and reach sustainable competitive advantage. IT investments have led to enhancements in businesses and Khallaf specifically talks about product quality, customer relations and innovation. Some of the literature that exists within this area talks about the intangible benefits of IT investments (Bocij, et al., 2008). Bharadwaj (2000) discusses how easily IT-investments can be duplicated by competitors and therefore, an investment in itself cannot contribute to a sustainable competitive advantage. Furthermore, he argues that it rather depends on how a firm uses their investments in order to create overall effectiveness (Bharadwaj, 2000). Devaraj and Kohli (2003) also point out the importance of the correct use of an IT investment. They mean that there is evidence proving that investments in IT have monetary gains when usage of the technology is considered (Devaraj & Kohli, 2003). Conversely, in a survey conducted by the IT consultancy CSC and the Financial Executives Research Foundation, out of 782 US-based executives in charge of IT, only 10%

believed that they were getting significant returns from IT investments and moreover, 47% felt that returns were low, negative or unknown (McAfee, 2006).

Bharadwaj (2000) discusses the relationship between IT capability and firm achievement, which refers to how a firm uses their IT-resources and associated performance. His results show that firms with high IT capability tend to exceed a random sample of organizations in terms of profit and cost-based performance. His starting point is that an organization's operating performance varies by sector and size. He states that literature in accounting has acknowledged that size, for instance, is a strong predictor in regards to the choice of how to calculate costs (Bharadwaj, 2000). Given that size tends to be such a vital factor in other major business areas, and adding earlier conclusion about the immense growing of information volume in organizations, it might be possible to distinguish differences in findability-level regarding search and retrieval of information between various-sized companies. Consequently, we suggest the following hypotheses:

- *H1a: An organization's size has an influence regarding to which extent information can be found.*
- *H1b: An organization's size has an influence regarding to which extent the employees are satisfied with their search applications.*

Bocij et al (2008) mean that despite a large investment in IT, it is not totally clear to which extent those investments benefit the organization. This illustrates the importance of a distinct strategy to make the IT investment support the organization's business goals. Furthermore, they argue that it is relatively easy to identify the cost concerning IT investments but harder to detect and quantify the benefits with the reason being that the benefits often are intangible and therefore harder to ascribe a financial value (Bocij, et al., 2008). According to Mellville et al (2004) the different types of benefits can be formulated as efficiency and effectiveness, where efficiency addresses cost-reduction and increased productivity in a certain business process. Effectiveness on the other hand, refers to the intangible achievements such as improved relation to the organization's environment (Melville, et al., 2004). Bocij et al (2008) argue that the benefits from IT investments appear when organizations manage to do things that they could not do or did not do very well before (Bocij, et al., 2008). To make this possible, the IT tools in use for instance have to be searchable and respond to user's questions with adequate information (Kuhlthau, 1991).

Mithas et al. (2012) found empirical evidence that proves that IT investments per employee have a positive and statistically significant association with revenue. Their research show that increased IT expenditure per employee by \$1 is associated with over a \$12 increase in sales per employee. Even in the sense of IT investment versus advertising they found statistically significant differences at 99%, which showed that IT investments on profitability are even greater than other major investment areas within a company, such as advertising (Mithas, et al., 2012). In addition to this, Miller & Monge (1986) emphasize that there are more to it than the financial benefits from the increased productivity that comes with IT investments. Here, they argue that the increased productivity leads to a higher degree of participation among the employees which leads to a higher level of satisfaction (Miller & Monge, 1986). Their arguments are supported by Ostroff (1992) who states that organizations that have more satisfied employees are more productive. We believe that having a strategy may play a significant and substantial role to gain recently mentioned benefits from IT investments.

According to Drnevich and Croson (2013), IT is able to adapt various significant roles, each with considerable performance implications in a firms' strategy at the business-level. They argue, for instance, at the level of business strategy ITs roles might be to encourage improved firm performance by lifting current non-digital capabilities and allow fresh digital capabilities to produce and capture value. They underline that such elements of value generating and seizing are fundamental aspects of business-level strategy (Drnevich & Croson, 2013). An assumption will be made that investments in search is a part of organizations' IT investments and associated strategies and we want to investigate if this has anything to with the level of satisfaction within the organization (H2a). In addition, we suggest that the findability of the information assist the workers in being more efficient and productive when searching, hence more satisfied (H2b). As mentioned before, Miller and Monge (1986) state that productivity leads to more satisfied workers. Conversely, Ostroff (1992) argues that evidence shows that the relationship between satisfaction and productivity is relatively low. Therefore, the following hypotheses are formulated:

- *H2a: Outlined strategies regarding search has an influence on the extent to which the organization seen as a unit is satisfied with how they perform search.*
- *H2b: There is a linear correlation between an organization's satisfaction level in terms of how they perform search and their perceived ability to find information sought within the organization.*

Who might be responsible for this issue? It might be the Chief Information officer or similar. The CIO is, according to Banker et al. (2011), a role within a company that has become more and more influential throughout the last decades as a direct consequence to the entering of IT. A study conducted by Raghunathan & Raghunathan (1989) showed that the CIOs ability to influence decreased significantly when he/she is operates two or more levels below the CEO. This goes in line with Chun & Mooney (2009), as they mean CIOs adapt s role as executive-level leaders and generally report directly to the CEO. Banker et al. (2011) propose that the CIO tends to engage in several different responsibilities such as being in charge of the IT function, manage information resources and vouch for IT as a means for business change (Banker et al. 2011). Therefore, there is reason to believe that the CIO also makes final decisions and is involved in managing matters about employees' abilities and utilities in order to find accurate information.

Edmunds and Morris (2000) argue that an information specialist with overall responsibilities for the content of the organization's information is important. According to them, in opposition to general IT experts who often wants to provide fast access to larger quantities of information, an information specialist rather provide information of good quality and ensures the usefulness for the organization's employees. Furthermore, a well-established thought is that technology solely is the solution to find necessary information. However, an information specialist might play a key role in the matter of making the information searchable. If not, the information will be hard to find and manage (Edmunds & Morris, 2000).

- *H3a: There is a relationship between the involvement of a CIO in an organization's search programme and the existence of an established search strategy*
- *H3b: There is a relationship between a CIO as the final decision-maker regarding IT-investments and the presence of a search strategy*

### **3. Method**

A deductive approach was applied in this study and according to Patel & Davidsson (2011), this approach is normally characterized by the fact that conclusions are made from general principles and existing theories about single occurrences. They state that from a theory that already exists, hypotheses can be derived and subsequently empirically tested by conducting a quantitative study. In this particular case, Patel and Davidsson (2011) underline, the chosen approach is best described as hypothetical-deductive as hypotheses were extracted from common theories regarding the area of search within companies/organizations. In order to do this, it was important to thoroughly create a survey where questions and associated answer choices were formulated in the right way.

The literature chosen was found and examined through comprehensive searching in different types of databases, for example google.scholar.com and Gothenburg University's own digital library GUNDA, in order to find scientific articles. Search phrases and search words have been formulated in a way that is closely related to our area of concern. Some well-cited authors were found that appeared frequently and they became pillars in our theoretical section.

According to Newbold et al, (2010) a sample is an observed subset of a given population. The sample used in this thesis intends to represent a larger population, which in our case are all organizations that potentially conduct information seeking. To make the sample representative and valid for the larger population, the questionnaire has been sent out to organizations from many different industries with relatively wide geographic spread and of various sizes. In addition, due to survey distribution through for example secondary emails, organizations that did not get an invitation also had the possibility to respond which lead to a randomness among respondents. This randomness is according to Patel and Davidsson (2011) the most important factor to obtain a sample reflecting the population targeted. Thus, the results are based on sample data and are because of that fact called statistics. Conversely, Newbold (2010) states that if the results were based on population data it would be called a parameter. (Newbold, et al., 2010)

#### **3.1 Quantitative study**

A questionnaire with a total of 71 questions was initially constructed in consultation with an organization operating in the sector of information seeking. The company at hand was



founded in 2005, hence they have almost ten years of experience in the search sector and therefore a great network of relevant connections. In order to optimize the questionnaire at hand and ensure a presence of objectivity all along, the idea was to give the chosen questions credibility by basing them upon literature discussing how to structure a those kinds of questions.

The group of people that worked with the survey consisted of four students and a senior researcher. The survey was relatively vast and we decided to divide the questions into segments in order to be able to give a better focus. That was followed by a meeting where the new questions were discussed and later established. The process was iterative with four meetings where overall progress was checked and thereby it was ensured that the questions were measuring what they were intended to.

An empirical study was conducted using data gathered from the questionnaire distributed by the company operating in a related sector. The company at hand is well known for their services within the area of information seeking. The survey targeted CIOs, IT managers and other responsible employees with insights that participated in the survey in order to obtain data regarding information seeking

The survey was not anonymous given that it was an individual that spoke for an organization as whole. Because of that it had to be verified that the person responding to this survey was duly qualified with appropriate knowledge about the organization strategies regarding information seeking. However, the respondents were handled confidentially which meant that the information regarding who answered the survey was known, although that information remained undisclosed.

### 3.2 Study design

Figure 1 is an overview that illustrates the design of this study. In the chapter regarding related work the intention is to give the reader a knowledge platform concerning how organizations manage their investments nowadays with search in focus. This will hopefully provide a good understanding for the study. Furthermore, a survey was the basis of the data gathering process which is constructed in consultation with a company operating in a related sector. Hypotheses were formulated and the data gathered from the survey served as basis for statistical analysis.

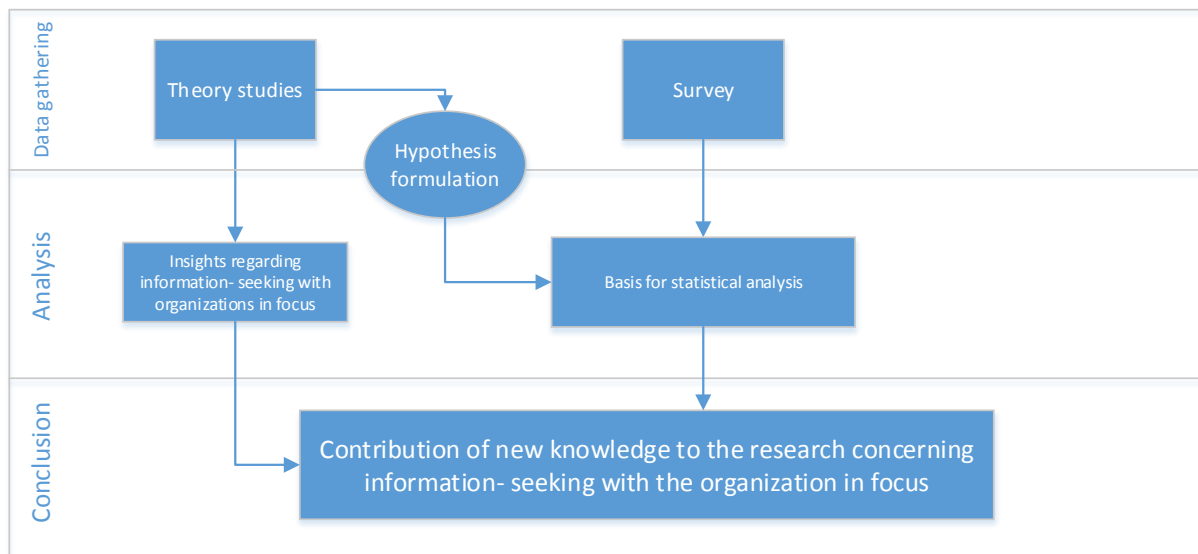


Figure 1. Overview of the working process

### **3.3 Design of questionnaire**

Rogers et al (2011) state that the benefits of designing a survey properly are several; one being that it enables the researcher to get answers to specific questions from a larger group of people, especially if the same group is spread across a big geographical area (Rogers, et al., 2011). It is of great importance that the questions asked are clearly worded and that the data collected can be analyzed and interpreted in an efficient way. Clearly worded questions are particularly important in this case because there is no researcher present when the respondents' answering our questions and therefore nobody that can unravel any ambiguities or misunderstandings (Rogers, et al, 2011).

The questionnaire starts by asking a few questions about demographical information about the respondent as an individual and the organization he/she works for. According to several references is this background information useful for putting the questionnaire responses in a bigger context (Rogers et al, 2011; Patel & Davidsson, 2011). When constructing questions for a survey are there few formulations one should avoid; long and detailed questions, leading questions, negations and presumptions questions. This to evade misleading answers (Patel & Davidsson, 2011). To assure that these common pitfalls were avoided, comprehensive evaluation of the literature was conducted. In addition, these matters were discussed at meetings with the same working group mentioned above.

The questionnaire is categorized into seven different sections to give the responder a context to each and every question asked. According to Patel & Davidson (2011) it is important to give the responder a feeling of progression when answering the questionnaire to keep them motivated. Those categories generate a sense of leaving a subject of questions for another which create the feeling of progress. The questionnaire categories in chronological order; 1)Your role and your organization 2) The user's perspective on search 3)The business perspective on search 4) The organizational perspective on search 5) The information perspective on search 6) The technological perspective on search 7) About the survey. *See Appendix.*

### **3.4 Distribution**

The questionnaire was distributed online using several different channels such as email, slideshare, linkedIn, Twitter and Facebook. Using email is favorable over web-based instruments in the way that particular recipients can be chosen and therefore selects a certain sampling method (Rogers et al, 2011). In the case of this study, some of the receivers of this survey were handpicked because of their position in the company they worked for. Therefore, the sampling method used was not entirely random. This questionnaire was distributed in consultation with the company operating in the industry of search and it was in their interest to distribute this survey in branch-specified forums. Consequently, this meant that; 1) the questionnaire reached a broader range of organizations worldwide, 2) assured that people with adequate competencies were the ones responding and 3) the questionnaire reached organizations of various size.

### **3.5 Data collection**

According Baruch (1999) there are two main reasons why people do not return a questionnaire. The first common reason is that the intended responder simply did not receive the questionnaire. In this case the researcher has much of the control where control of addresses and e-mail lists can reduce the risk of the responder not receiving the survey. The second reason why people do not answer the questionnaires is the fact that they just do not wish to answer it (Baruch, 1999).

140 organizations started to answer the questionnaire and out of these, 112 actually finished by answering every single question. Responses were collected by the same company as mentioned before using a web application tool. At collecting date, the questionnaire had been available for fourteen days and no reminders were sent out during this period.

This was the third consecutive year that the company sent out the survey and the number of responses received was in parity with 2012 and 2013. Hence, there is little reason to believe that the respondents are disreputable in any way.

### **3.6 Analysis**

Four different statistical methods were used in this study for the six stated hypotheses. This is motivated by different kinds of variables used from the survey questions. In the ANOVA-test, there were six categorical variables and one continuous variable whereas in the chi-square-

test, there were two categorical variables where strategy was dependent. In addition, when a z-test was conducted there were one categorical and one continuous variable and the dependent variable was strategy as well. For testing correlation a Pearson's  $r$  Correlation-test was used.

For hypotheses H1a and H1b, an Analysis of Variance (ANOVA-test) was conducted. For H1a, the categorical variable was question no. one "How many employees are there in your organization?" and the dependent continuous variable was question no. five "How difficult is it for users to find the information they are looking for within your organization today?". All "Don't know" answers as well as responders answering only one of these two questions were excluded from the test. Number of respondents (N) was 125. For H1b, the same categorical variable as in H1a was used but the dependent continuous variable here was question number seven "In general, how satisfied are users with the existing search application(s) within your organization?". N was 121.

When Z-test for hypotheses H2a was conducted, all "Don't know" answers were excluded, both from question no. seven "In general, how satisfied are users with the existing search application(s) within your organization?" and question no. eleven "Does your organization have a strategy for search?" For H2a, the categorical variable was found in question eleven and the continuous variable in question seven.

For testing H2b a Pearson's  $r$  correlation test was conducted. The variables used were question no. 5 "How difficult is it for the users to find the information they are looking for within your organization today?" and question no. seven "In general, how satisfied are users with the existing search application(s) within your organization?". All "Don't know" and responders only answering one of these questions were excluded, which left the test N=122. According to Newbold (2010) a Pearson's  $r$  will measure the standardized linear relationship between two variables and provides both the direction and the strength of the relationship. The correlation coefficient ranges from -1 to 1, where 0 says that there is no linear relationship between the two variables tested (Newbold, et al., 2010).

When conducting a chi-square test in hypothesis testing, conventionally you compare sample numbers referred to as observations with what would be expected if the a stated hypothesis was false (Newbold, et al., 2010).

For H3a and H3b, the chi-square test was conducted with following two categorical variables used in; 1) question no. 14 "Who is involved in the governance/steering of your organization's search programme?" and 2) question no. seven "Does your organization have strategy for search?". The approach of this chisquare-test was to test a 2x2-matrix where the CIO-role was separated and the other roles bundled together. In the test, the responses was sorted by whether they had a strategy for search or not and if they had, how many times were the CIO involved in the steering of the organization's search programme. All "Don't know" answers were excluded from the test. Likewise, all responders solely answering one of these questions were excluded. When testing variables for H3a and H3b, N = 111 in both cases.

In question no. 14 "Who is involved in the governance/steering of your organization's search programme?" multiple answers were aloud. The focus for testing H3a was on whether or not a CIO was involved. All responses that consisted of CIOs were taken to the test. However, we took no account of whether they had answered that more roles were involved in the steering of the organization's search programme. The same approach was taken in H3b regarding final decision makers.

### **3.7 Method reflections**

In this section, different kinds of tests regarding stated hypotheses that have been conducted will be discussed and evaluated. Furthermore, the validity of the findings and the quantitative study in general will be discussed.

An important aspect of the method-section is to evaluate the validity of the quantitative study that has been conducted. It is important to highlight the fact that throughout the entire survey, there is only one person speaking for their organization as a whole. Therefore, all the numbers and percentages that are presented are all estimates from an individual with adequate knowledge at each company. This method has been chosen since to apply the approach of asking each and every employee in hundreds of organizations would be far too comprehensive. Therefore, it affected the validity of this study in the way that only perceived opinions from one individual could be obtained which makes the study slightly less valid.

According to Patel and Davidsson (2011) a study with high reliability means that the same result would be obtained even if the study was conducted from another sample within the same population. Also, they state that it is beneficial to store the data collected in order to have ability to perform the analysis again. The data collected was examined multiple times

and random checks were made in order to ensure that the analysis was trustworthy. In addition, the data is stored to enable a repetition of the analysis.

Survey question no. 11 "Does your organization have a strategy for search?" has predefined answer choices that range from having a business-focused strategy to a combined business and IT-strategy. One quick look at it and one might think that respondents who have chosen this option not actually state that his or her organization has an explicit strategy for search. Nevertheless, the question is specific in the sense that it actually asks for a search strategy. Therefore, an assumption will be made that the respondents that have chosen options "Yes - a business-focused strategy" and "Yes - both a business and an IT-focused strategy" declare that their very own search-related strategy matters are integrated within these overall strategies.

Furthermore, one of the answers choices stated "Not yet but planned". These responses were accumulated together with all responses saying no as they were considered similar in the way that them both declare a lack of strategy at the moment.





## 4. Descriptive results

Hereafter, we will present the response results of our questionnaire and illustrate this with proper graphs and charts. To give an idea of the extent to which the questionnaire was spread, basic demographic information we found to be relevant will be presented initially.

### 4.1 General information

When asking about what sector the respondents considered themselves mainly to be operating in we received the distribution of responses illustrated in figure 2.

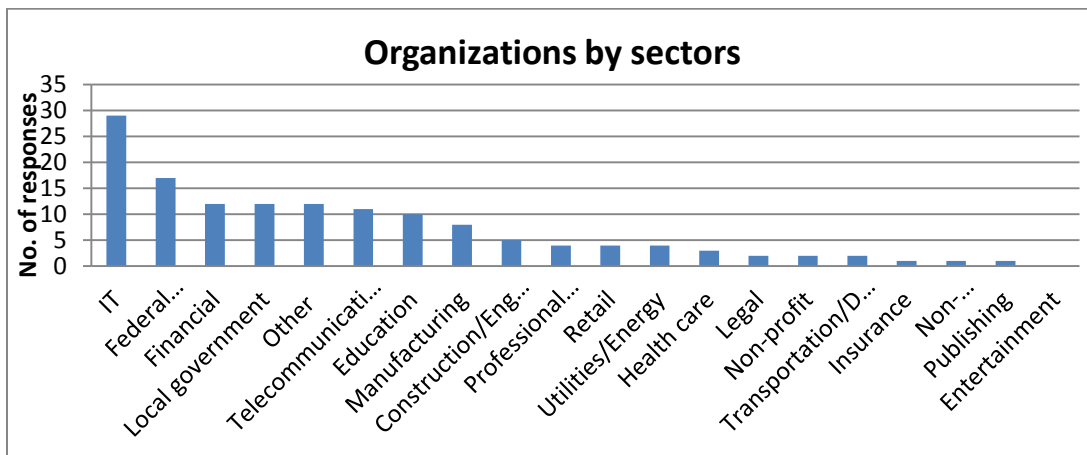


Figure 2. Survey question number 2: “In what industry is your organisation (mainly) active?”

Among the 128 responses to this question, the largest group (29 respondents) answered that they operate within the sector of IT. The second most frequently appeared industry among the responses was Federal government (17 answers). Industries Local government, financial firms and companies within the Telecommunications/Media-sector accounted for 35 responses, while 12 responders declared other varied sectors such as e-commerce, recycling, security industry and maintenance services.

We examined what kind of roles the survey’s respondents had within their organization and it varied a bit.

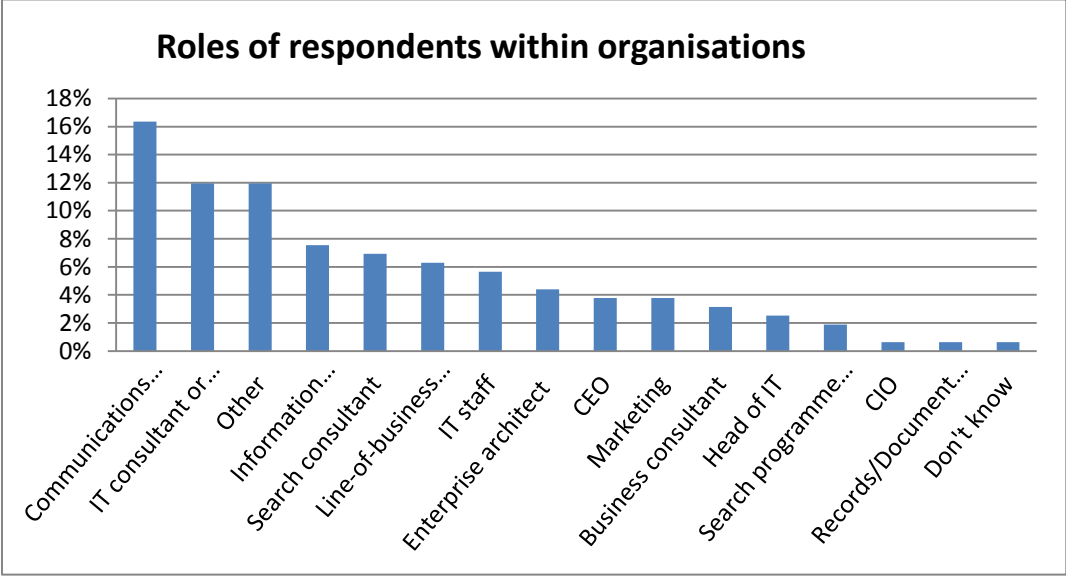


Figure 3. Responses to survey question no. 3: “Which of the following alternatives best describe your role within the organization?”

As illustrated in figure 3, the most frequently occurring role answering our questionnaire was a person from the communications department (closer to 16%). Employee roles operating within the IT-related sector (Head of IT, IT staff or IT consultant) amounts to almost 23% while other specified roles were approximately 14%, including roles such as functional manager, web strategist, IT manager, intranet team, HR manager and head of webb.

Furthermore, the survey consisted of a question about the location of the organizations. The distribution of the answers are illustrated in figure 4.

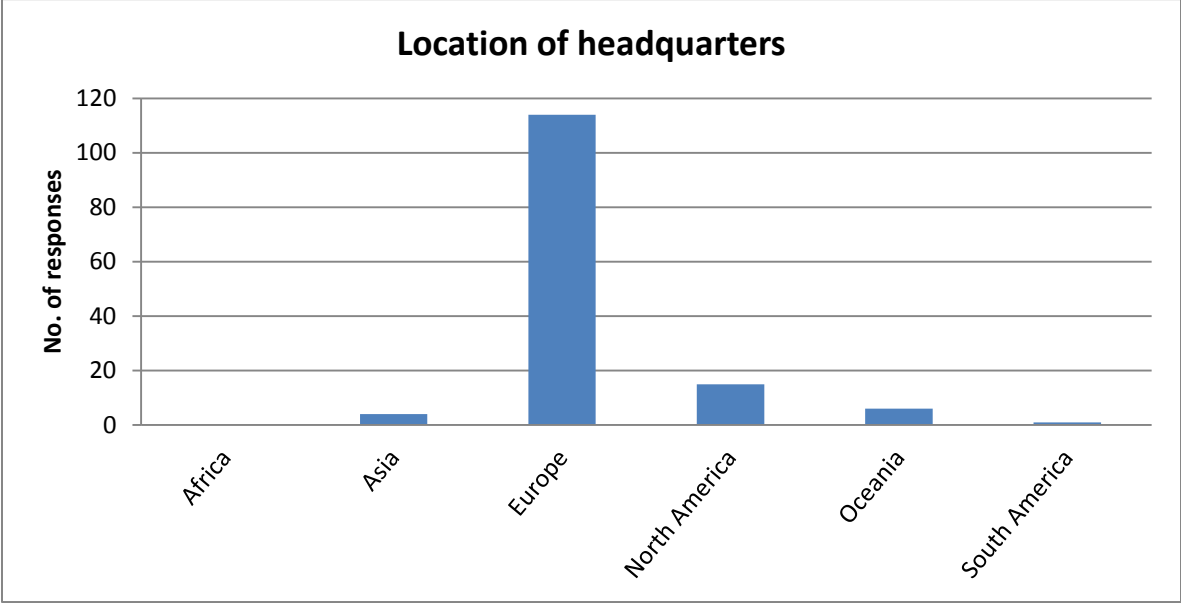


Figure 4. Responses to survey question no. 4: “Where are your headquarters located?”

A total of 140 responses were collected on this question and 114 respondents have their headquarters located in Europe. We did not receive any responses from Africa but a few from the rest of the world with North America being the second most occurring response, 15 answers.

## 4.2 Presentation of statistical variables

The following depicts to present responses for questions that are used as variables in our six different hypotheses. The section starts to present sizes of the organizations in terms of numbers of employees answering the questionnaire. This is done in figure 5.

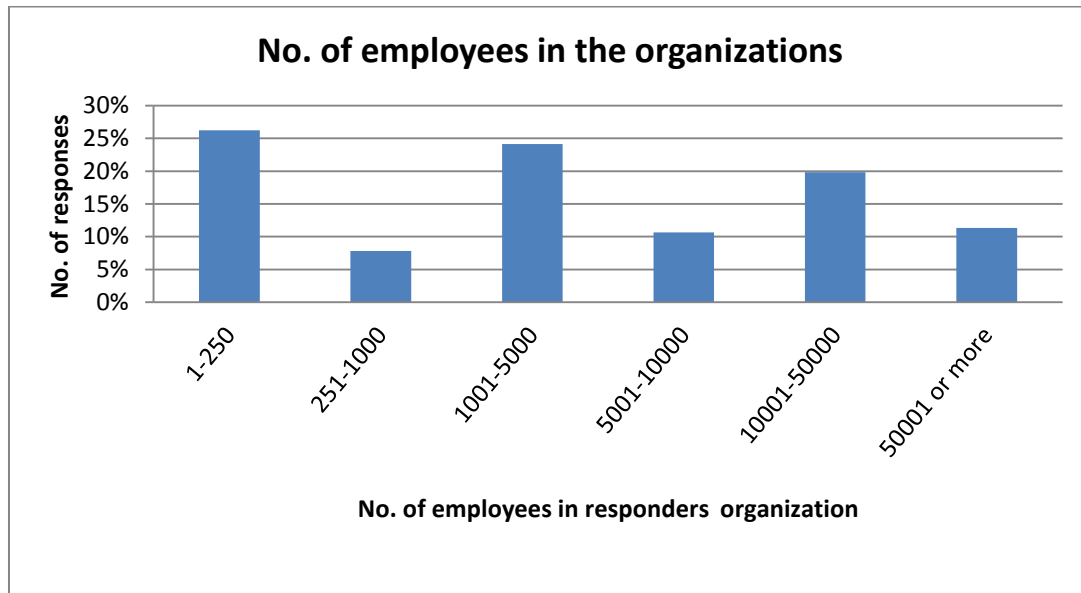


Figure 5. Responses to survey question no. 1: "How many employees are there in your organization?"

The sizes of the organizations responding to this survey vary a lot. 11% have 50 000 employees or more and as much as 26% of the organizations are extreme in the other direction as they declare having a number of employees equal to 250 or less. Overall, 66% of the respondents work for companies with a number of employees exceeding 1000 people.

The satisfaction level of present search applications within the companies is illustrated in figure 6



Figure 6. Responses to question no. 7 “In general, how satisfied are users with the existing search application(s) within your organization? “

When asking how satisfied the users are with their existing search application(s) within the organization, closer to 40% considered the users to be dissatisfied or very dissatisfied with their search application(s). About 41% believed that the employees’ satisfaction level was about average. In contrary, only 19% was satisfied or very satisfied.

In the section *The user perspective on search*, the respondents were asked to estimate how difficult the employees within their company think it is to find information.

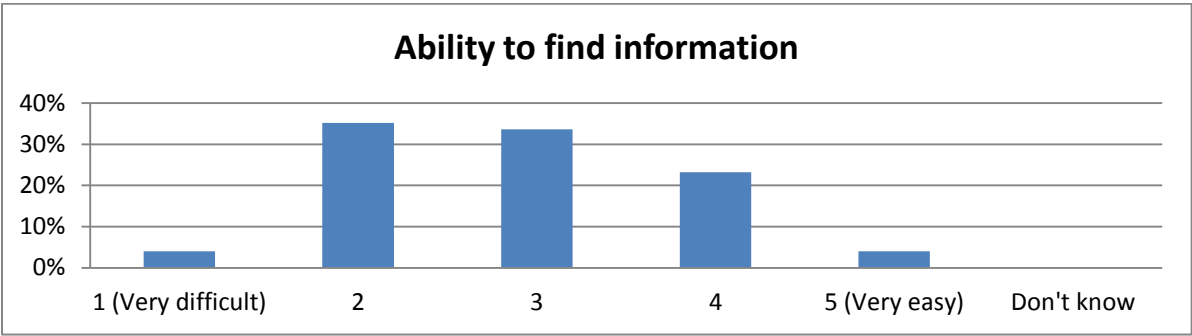


Figure 7. Responses to survey question no. 5: “How difficult is it for users to find the information they are looking for within your organization today?”

As figure shows, a big proportion of the respondents (39%) believe that users within their organization find it difficult or very difficult to find the information they are looking for whilst almost the same amount of people (34%) think it is neither hard, nor easy to find information. A slightly smaller part of the respondents (27%) believe that their information is either easy or very easy to find.

In the section *The Business perspective on search*, a question about whether or not the companies had an existing search strategy was asked. Responses are shown in figure 8



Figure 8. Responses to survey question no. 11: “Does your organization have a strategy for search?”

Approximately 40% of the respondents answered that they do in fact have a strategy of some kind. 8% responded that they have a business-focused strategy and 12% stated that they have an IT-focused strategy. Moreover, 19% of the respondents answered that they have a combined business and IT-strategy. In contrast however, a majority of the responses declared that they do not have a strategy for search (54%) whereas a smaller proportion (7%) answered that they simply do not know.

Figure 9 below presents who makes the final decision regarding search investments.

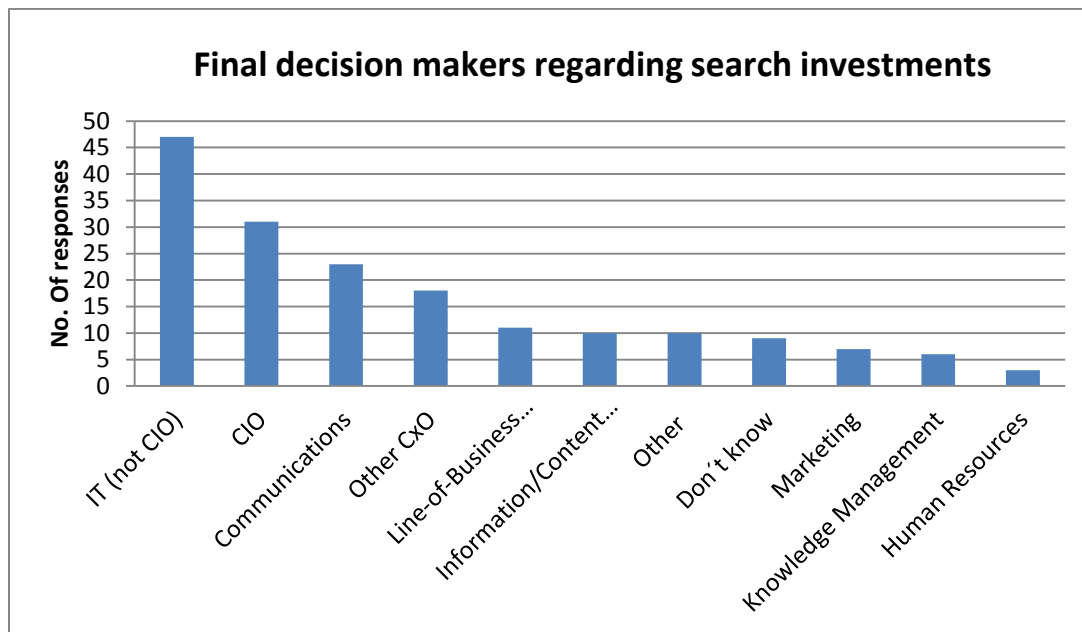


Figure 9. Responses to survey question no. 15 “ Who makes the final decision regarding search investments in your organization? ” Multiple answers were allowed

The most common decision maker regarding search investments is “IT (not CIO)”, which refers to the IT department within the organization. The second most frequent answer is “CIO” and after that there is a big variety between the answers. Ten out of 169 answered “other” where they, among others, specified rolls such as finance, group management and political decision.

Figure 10 illustrates the response distribution of the roles involved in the organizations' search programme

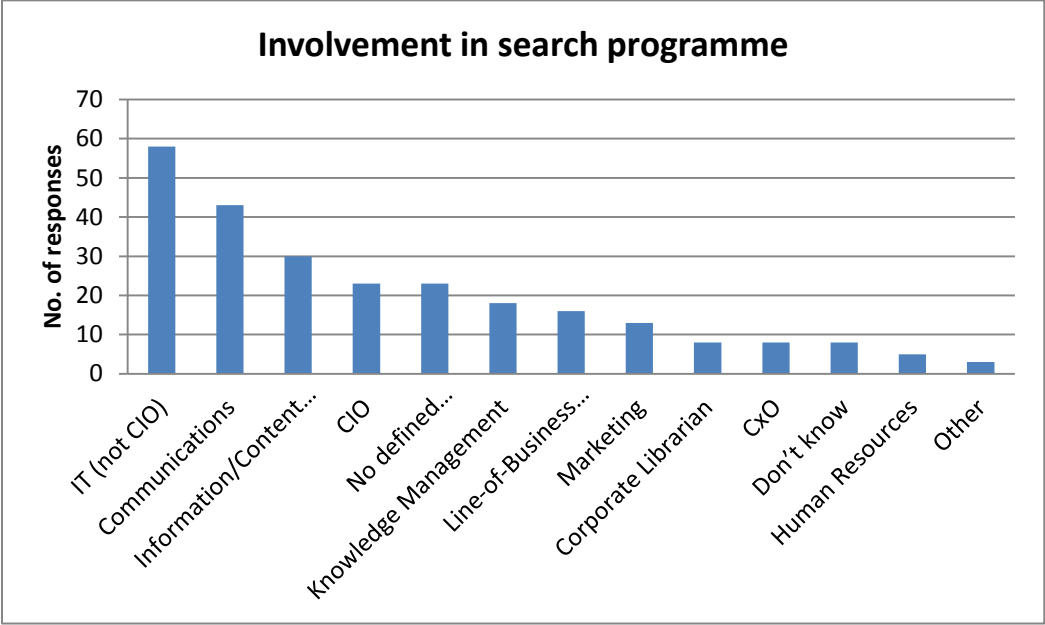


Figure 10. Responses to survey question no. 14: “Who is involved in the governance/steering of your organization’s search programme?”. Multiple answers were allowed.

A total of 256 answers from 117 organizations were collected as multiple answers were allowed. Closer to 60 of them declared that their organization has an employee from the IT-department involved. The second most appearing role was a person from the communications-department with over 40 frequencies. Thirty respondents declared that they involve someone from the information/content management-department in their search programme. Furthermore, a CIO was involved 23 times and this is the main variable that will be used testing H3a.



Lastly, in the questionnaire section *The information perspective on search*, the respondents were asked to estimate the expected change in information volume in the nearest future.

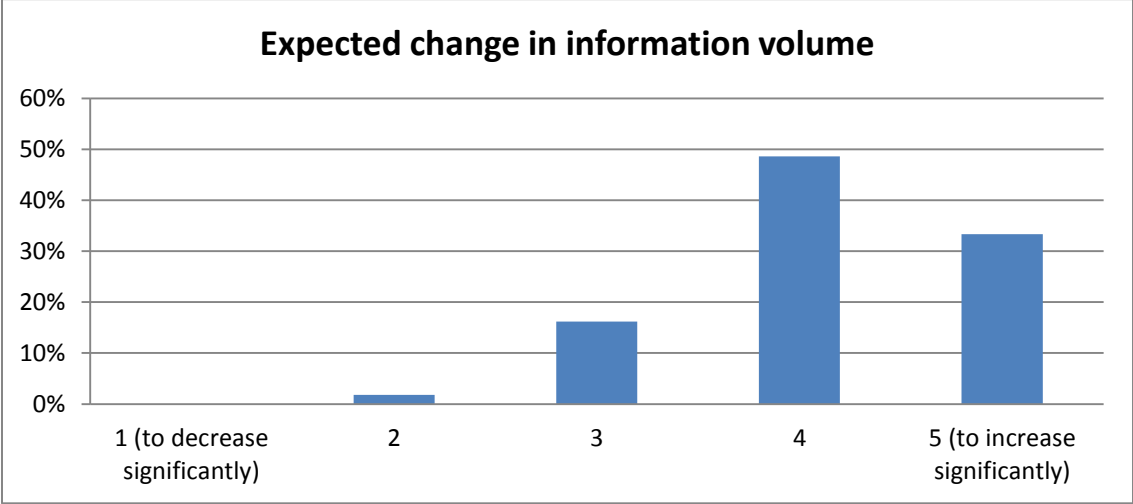


Figure 11. Responses to survey question no. 20: “How do you expect the amount of searchable unstructured content to change over the next three years?”

As illustrated in figure 11, slightly more than eight out of ten of the respondents believe that their information volume will increase or increase significantly over the next three years. About 16% or one out of six believe that there will be no change whatsoever whilst only 2% think that their information volume will decrease. None of the people responding to this survey believe that their information volume will decrease significantly.

## 5. Analytical results

This section intends to present results obtained when we tested our stated hypotheses presented in section 2.2 “The incentive for investing in information technology”. Four various kind of tests were conducted given that we had hypotheses of different character.

Along with the relevant graphs, we have chosen to include some of the output in order for the reader to get a better understanding of the numbers in their context.

*H1a: An organization's size has an influence regarding to which extent information can be found”*

We conducted an ANOVA-test for comparing sample means for more than two samples since we had a number of different categories regarding organizations’ sizes. The results are presented in table 1.

### ANOVA results

#### Summary

<i>No. of employees</i>	<i>No.</i>	<i>Sum</i>	<i>Mean</i>	<i>Variance</i>
1-250	31	100	3,225806452	0,913978495
251-1000	10	35	3,5	0,5
1001-5000	31	85	2,741935484	0,997849462
5001-10000	13	33	2,538461538	1,102564103
10001-50000	26	68	2,615384615	0,646153846
50001-or more	14	39	2,785714286	0,642857143

### ANOVA

<i>Source of variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p-value</i>	<i>F-crit</i>
Between groups	11,603403	5	2,32068061	2,772795467	0,0209162	2,290499
Within groups	99,596597	119	0,836946193			
Total	111,2	124				

Table 1: Results of the ANOVA-test comparing different organization sizes and their means of perceived difficulty finding information.

In this test, we used responses from question no. 5 along with organization size and compared the different means in perceived level (on a scale of 1 to 5) of finding the right information

within the organization. Companies with a number of employees ranging from 1-250 had a sample mean value of 3.22 (rounded to two decimals) and number of observations was 31 with a standard deviation of 0.96. The next category, organizations in the range of 251-1000 employees had a sample mean value of 3.5. Number of observations here was 10 with a standard deviation of 0.71. In the third group, organizations employing 1001-5000 had a sample mean value of 2.74 and a standard deviation of 0.99. The fourth category, organizations with 5001-10 000 employed people had a sample mean value of 2.54, 13 observations and a standard deviation of 1.05. Here we can distinguish a tendency saying that with the number of employees exceeds 1000 people, the mean of perceived ability to find information starts to decrease. The fifth group includes organizations with 10 001-50 000 employees. Here, a sample mean value of 2.62 was obtained, 26 observations were collected and it showed a standard deviation of 0.81. Lastly, the sixth group with bigger companies employing 50 001 people or more had a sample mean value of 2.78, 14 observations and a standard deviation of 0.82.

To summarise, in this test ( $\chi^2=2.77$ ,  $df = 124$ ,  $p=0.02$ ) and therefore we have statistically significant evidence on the 95%-level that our results are not a coincidence, and conclude that an organization's size most likely has an impact on how findable they perceive information to be.

*H1b: An organization's size has an influence regarding to which extent the employees are satisfied with their search applications.*

For testing H1b a similar approach was used conducting an ANOVA test, but in this case we are testing if there is a correlation between question no. seven "In general, how satisfied are users with the existing search application(s) within your organization?" and the size of the organizations. The result is presented in Table 2.

Summary

<i>No. of employees</i>	<i>No.</i>	<i>Sum</i>	<i>Mean</i>	<i>Variance</i>
1-250	29	97	3,344827586	0,591133
251-1000	10	30	3	0,666667
1001-5000	31	81	2,612903226	0,845161
5001-10000	12	28	2,333333333	1,333333
10001-50000	26	66	2,538461538	0,738462
50000 or more	14	35	2,5	1,038462

ANOVA

<i>Source of variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p-value</i>	<i>F-crit</i>
Between groups	15,57179	5	3,11435788	3,82151	0,003058	2,29251
Within groups	94,53477	116	0,814954896			
Total	110,1066	121				

Table 2- Results of ANOVA- test of H1b

The results of our test indicate that size has an impact on the extent to which the users are satisfied with their search application(s). We can distinguish a tendency saying that when an organization exceeds a number of 1000 people the mean of the level of satisfaction is decreasing significantly.

To summarize, in this test we obtained ( $x^2=3.82$ ,  $df=121$ ,  $p=0.003$ ) and therefore we have statistical significant evidence on the 99%-level that our results are not a coincidence, and conclude that the size most likely has an impact on the users' perceived satisfaction level regarding their existing search application(s).

*H2a: "Outlined strategies regarding search has an influence on the extent to which the organization seen as a unit is satisfied with how they perform search."*

Figure 12.illustrates the different means between the level of satisfaction depending on the responders had a strategy or not. As seen in figure 12 the level of satisfaction is a bit higher when the organization has an established strategy for search. To investigate if the differences are statistically significant or not, a z-test was conducted.

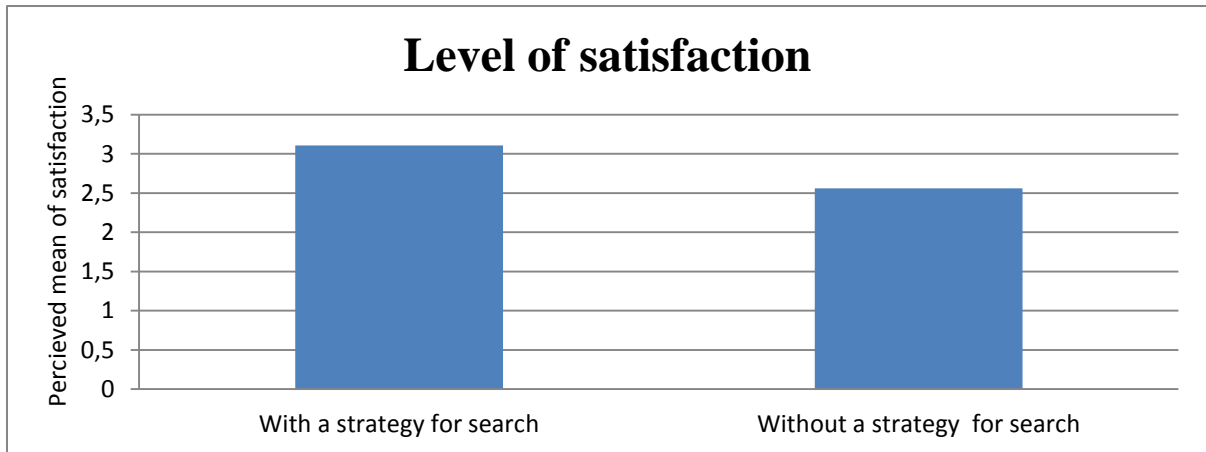


Figure 12. Sample mean satisfaction level when sorted by companies having a strategy for search and companies in the absence of a strategy.

For organizations that declared that they lack any kind of strategy for search, we found a sample mean satisfaction level value of 2.56 (rounded to two decimals) where the number of observations (n) was 46 and a standard deviation of 1.08. For organizations with a strategy for search, the same test showed a sample mean value of 3.11, n = 62 and a standard deviation of 0.88. In this test ( $\chi^2=2.79$ ,  $df=106$ ,  $p=0.005$ ) and hence we have found statistically significant evidence at the 99% level to conclude that our results is not due to a coincidence. Therefore, we have reasonable grounds for H2a to state that outlined strategies regarding search most likely has an impact on the extent to which the organization seen as a unit's perceived satisfaction-level with their search applications. As shown in figure 11, strategies within these organizations ranged from a business-oriented strategy to a combined IT-and business strategy.

	<i>With strategy</i>	<i>Without strategy</i>
Mean	3,108695652	2,564516129
Known variance	1,172062905	0,774457959
Observations	46	62
Hypothesized mean	0	
z	2,792652072	
P(Z<=z) one tailed	0,002613894	
z-critical one tail	1,644853627	
P(Z<=z) two- tailed	0,005227789	
z-critical two-tailed	1,959963985	

Table 3. Results of Z- test

As seen in table 3, the critical z-value two tailed is 1.95 and we obtained a z-value of 2.79 which resulted in  $p=0.005$ .

*H2b: There is a linear correlation between an organization's satisfaction level in terms of how they perform search and their perceived ability to find information sought within the organization.*

When we performed our Pearson's  $r$  Correlation –test to obtain a correlation coefficient, the following output was produced. The obtained coefficient ( $r$ ) is 0.7792 which indicates a strong positive linear relationship. In other words, when the perceived findability level of information increases, so does the perceived level of satisfaction among the responding organizations.

	<i>Satisfaction</i>	<i>Findability</i>
Satisfaction	1	
Findability	0,77929705	1

Table 4, result of Pearson's  $r$  correlation test

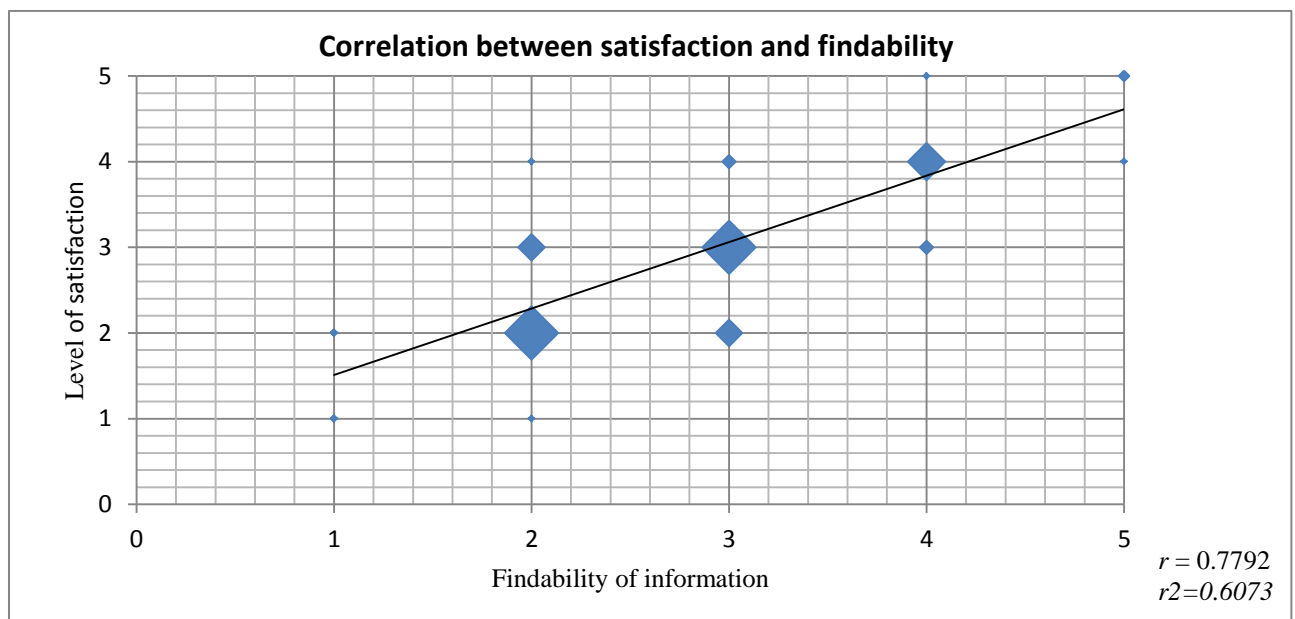


Figure 13 Scatter plot of Pearson's  $r$  correlation test with distribution of no. of responses. Diamond sizes illustrate proportion of answers.

In order to investigate if this correlation were statistical significant or not we tested the  $r$  value in a t-test. We obtained  $t = 13.6227$  and  $p = <0.0001$  which resulted in statistical significance at the 99%- level. Further, the obtained  $R^2$ -value (0.6073) indicates that 60% of the variance in perceived findability-level explains 60% of the variance in satisfaction-level. Hence, 40% of the variance is derived due to other circumstances.

*H3a: There is a relationship between the involvement of a CIO in an organization's search programme and the existence of an established search strategy*

As table shows, in the column “*CIO involved*”, observed values of 15 exceeds expected values of 9.3 and we have more CIOs involved when a strategy exists than what would be expected if there was to be no difference between the involvement or non-involvement of a CIO. Moreover, next row in the column shows an observed value of 7 where the expected value would be 12.7. We have less CIOs involved when a strategy does not exist than what would be expected if there was to be no impact from the involvement of a CIO regarding having a strategy.

	CIO involved	CIO not involved	Total	
With strategy	15	32	47	0,42342342
Without strategy	7	57	64	0,57657658
Total	22	89	111	
With strategy	9,315315315	37,68468468		
Without strategy	12,68468468	51,31531532		p=0,00616

Table 5. Results from the chi-square test regarding H3a

When inserting those numbers into formula 1 presented above our result ( $\chi^2=6.66558$ ,  $df=1$ ,  $p=0.00616$ ). This means that we have found statistically significant evidence at the 99% level that our results are not due to coincidence. Therefore, we conclude that the involvement of a CIO in the organizations' governance of search programme is most likely related to if they have a strategy or not.

H3b: *There is a relationship between a CIO as the final decision-maker regarding IT-investments and the presence of a search strategy.*

When investigating H3b, if the role of a CIO as a final decision maker regarding search investment is related to if the organization has a strategy or not a chi-square test was conducted. Our results was (chi<sup>2</sup>= 3.45, df=1, p=0.06) which indicates that there is relationship between the two variables but not on a statistical significant level. Thus, we do not have enough evidence to suggest that this relationship exists since it might be due to coincidence.

	CIO as decision maker	CIO not as decision maker	Total	
With strategy	17	30	47	0,423423
Without strategy	13	51	64	0,576577
Total	30	81	111	
With strategy	12,7027027	34,2972973		
Without strategy	17,2972973	46,7027027		p=0.06

Table 6. Results from the chi-square test regarding H3b



## 6. Discussion

In this section we discuss the overall results of our study. These are built upon the statistical variables satisfaction regarding search applications, organization size, owner of the search programme, level of ability to find information and strategies and the final decision-maker regarding investments. We intend to explain the underlying patterns as to why we have obtained these results. In addition, we aim to give our own view over how findings from these six hypotheses might be interconnected and how they have an influence on each other.

We wanted to investigate whether or not the organizational size has an influence on a responsible employee's opinion of the perceived overall organizational findability level of information. Our findings show that there is a relationship between organization size and the perceived ability to find information. The study covers smaller-scale organizations (ranging from 1-250 people) to larger enterprises (50 000 or more) and as Beath et. al. (2012) conclude, organizations that grow in terms of size also grow when it comes to their amount of information available. Our results here are subject to an expansion of this theory since we can conclude that not only does the information available increase with organizational size, it is also perceived to be more difficult to find given a certain organizational size. From this study, it is not possible to distinguish a strict correlation where we can say that the difficulty-level of finding information increases when the organization gets bigger. However, we can see that mean sample levels regarding satisfaction for organizations employing 1-250 people and 251-1000 people exceed 3.0 and we can also see a slight downturn when the company size increases. There seems to be a turning point at 1000 employees. However, when the company is as big as 50 0001 employees or more, the sample mean value is higher (2.79 rounded to two decimals) than organizations with e.g. 5001 – 10000 employees (results show a mean of 2.54).

We also investigated whether or not the organizational size has an influence on the extent to which the employees are satisfied regarding their search applications. Once again, our findings show that there is a connection between size of the company and the employees' perceived satisfaction regarding their ability to work with their own search applications. Even this time there seems to be a turning point at 1000 employees since organizations employing less people than that have a significantly greater (3.34) perceived mean satisfaction level than for instance companies with 5001-10000 employees (2.33). Kuhlthau (1991) clearly outlines the importance of having IT tools that are searchable. In addition, Miller and Monge (1986)

state that access to the information sought is crucial to increase productivity within the organization. They also argue that productivity leads to satisfaction. Our findings show a greater mean satisfaction level at organizations employing less than 1000 people than that of larger enterprises. Beath et. al. (2012) declared that there is a substantial increase every year in digital information volume in organizations. The difference in satisfaction level that our results show might be a consequence of search application(s) inability to be efficient enough when information volume increases. This is also strengthened by our Pearson's  $r$  Correlation-test that proves that level of satisfaction relates to the findability level.

Our results indicate that an outlined strategy regarding search has an influence on the perceived level of satisfaction for the organizations search application(s). We believe that this correlation can be due to the fact that an established strategy regarding search indicates that the organization concerned has reflected over their management of search which has a positive impact. This goes in line with Drnevich and Corson (2013) who argue that the main goal of the establishment of a strategy is to reduce costs and increase productivity to achieve business goals. As Miller and Monge (1986) concluded, the access to information is crucial to increase productivity within an organization. They also conclude that a feeling of participation occurs when being productive, a feeling that often leads to satisfaction (Miller & Monge, 1986). We consider this to be one reason why we can see a higher level of perceived satisfaction when a search strategy is realized.

The fact that our Pearson's  $r$  Correlation-test showed a linear relationship between perceived satisfaction level and the perceived level of findability could perhaps have been predicted prior to our study. Yet, a similar study has not been conducted before and our results show a stronger linear correlation between these two variables than expected which is a contribution to this field of research. We have explained that some of the literature (Miller & Monge 1986; Ostroff, 1992) claim a relationship between the employees' satisfaction level and productivity. Our results indicate that findability-level might be a product of productivity because if you find the information sought quickly and efficiently (high findability), you become more productive. As established, being more productive at work leads to greater satisfaction and our results imply that this is transmittable to when conducting IT-related search tasks as well.

Also, we investigated whether or not the involvement of a CIO in a company's search programme had resulted in an existing strategy and results indicate that there in fact is a

relationship between those two variables. Edmunds & Morris (2000) argue that the information specialist would become more involved in an organization's overall strategy in the beginning of the 21<sup>st</sup> century. Here, we can draw parallels between an information specialist and a CIO as our findings indicate that the role of a CIO actually has influence regarding strategy matters. Our results indicate rather than clarify that a CIO's involvement in the search programme at a company leads to a realized strategy regarding search.

Size seems to have an influence on the findability of information within the organization and therefore, which confirm Beath et al (2012) and Fanning (2009) findings, that the bigger the organization the more information it handles. In addition, as seen in figure 11, eight of ten of our respondents predict that their digital information volume will increase or increase significantly over the next three years. We are not saying that the more information the organization handles is directly connected with how hard or easy it is to find and extract business value from it. Although, given our findings, we assume that with adequate strategies and the role of a CIO who takes responsibility managing search, the information can be made more findable despite large volumes. That said, we nevertheless suggest that these factors are even more important as the amount of searchable information within the organization increases.

Further, we tested whether or not the presence of a search strategy is related to if a CIO is final decision maker regarding search investments. Our results fail to show an established relationship between these two variables but still indicate a moderate connection which should be noted even if it is not statistically significant. Since we did not find a correlation between these two variables, we considered if there might be a correlation between whether or not a search strategy is related to another role (e.g. CFO, CEO Etc., referred to as CxO) as decision maker regarding investments.

We did not find a clear relationship in H3b, between when a CIO is the final decision-maker regarding IT-investment and if there is an outlined search strategy. We suggest that the reason might be that there is often more than one decision-maker involved, often several at the same time (Figure 10). In opposition to involvement in the search programme, other CxOs seem to have a bigger influence in matters of decision making regarding search investments. This is strengthened when comparing figure 9 and figure 10 where CxOs appear more than twice as many times in final decision-making regarding search investments than when it comes to involvement in an organization's search programme.

## 7. Conclusions

In the section below, our main conclusion is outlined.

Hypotheses	Results
H1a: An organization's size has an influence regarding to which extent information can be found.	Support with p=0.02
H1b: An organizations' size has an influence regarding to which extent the employees are satisfied with their search applications.	Strong support with p=0.003
H2a: Outlined strategies regarding search has an influence on the extent to which the organization seen as a unit is satisfied with how they perform search.	Strong support with p=0.005
H2b: There is a linear correlation between an organization's satisfaction level in terms of how they perform search and their perceived ability to find information sought within the organization.	Strong support with r =0.78 and p= <0.0001
H3a: There is a relationship between the involvement of a CIO in an organization's search programme and the existence of an established search strategy	Strong support with p=0.006
H3b: There is a relationship between a CIO as the final decision-maker regarding IT-investments and the presence of a search strategy	No support with p=0.06

Table 7, presentation of statistical results from our hypotheses testing

Our contribution to the research area is as follows. When organizations grow, so does the amount of information it needs to handle. Our study shows that bigger organizations thus have a harder time to find the information sought, perhaps because of the larger volume. From our findings we can also see that it is a general perception in the organizations studied that the digital information volume will continue to increase. We suggest ways to handle this problem, where one can be the involvement of a CIO in the organizations search program can generate positive benefits. Our results show on a statistical significant level that when a CIO is involved in an organizations search programme it tends to have an outlined strategy regarding search more often. According to our tests, the outlined strategy has a statistical significant positive influence of the perceived level of satisfaction of the organizations search application(s). Finally, we see that satisfaction is strongly linked to the findability of information sought within the organization which supports previous research saying that this is due to increased productivity. Our conclusion is that the involvement of a CIO and formulated strategies concerning search probably leads to more satisfied employees and increased productivity which can help an organization to gain business value.

### **7.1 The studies relevance and generalizability**

This study and report is written in collaboration with a company active in the business of search. Although, we have continuously set our sight to write a report which is not biased in any direction despite that a company is involved. We believe that our result is general and applicable for the larger population. Our main argument for that is that the questionnaire has been sent to organizations from a wide range of sizes, various industries and from many different countries. We believe that our conclusion can generate benefits for organizations in matters of search and increase the satisfaction level among the employees.

### **7.2 Suggestions for further research**

The aim of this study was to investigate the presence of a correlation and not the cause of correlation which would have been hard since we did not whether or not a correlation existed. It would be interesting to cross-match some of these variables that we have used in the study in supplementary ways. We have studied literature from wide spread fields of research and compiled different theories to apply them on information search with the organization in focus. Perhaps further research should study employee's ability to create and store information in various-sized companies and how satisfied/dissatisfied they might be with their ability to do that, as this tends to be an area comprehensive enough to be discussed in a thesis of its own. Furthermore, maybe future research could investigate how productivity may be affected by our results. To do this, perhaps taking a qualitative approach.

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## Appendix

	<b>Part 1 - Your role and your organization</b> Questions marked with an asterisk (*) are mandatory.
1	<b>How many employees are there in your organization?</b> 1-50, 51-250, 251-1000, 1001-5000, 5001-10 000, 10 001-50 000, 50 001 or more, Don't know
2	<b>In what industry is your organization (mainly) active?</b> Construction/Engineering, Education, Entertainment, Federal Government, Financial, Health Care, Insurance, Legal, Local Government, Manufacturing, Non-Governmental (GNO), Non-Profit, Pharmaceutical, IT, Professional Services, Publishing, Retail, Telecommunication & Media, Transportation/Distribution, Utilities/Energy, Other (please specify), Don't know
3	<b>Which of the following alternatives best describe your role within the organization?</b> CEO, CIO, Head of IT, IT staff, IT consultant or project manager, Communications department, Marketing department, Line-of-business Executive/Department Head or Process Owner, Business Consultant, Search Programme manager, Enterprise architect, Information Management, Records/Document Management, Other (please specify), Don't know.
4	<b>Where are your headquarters located?</b> Africa, North America, South America, Asia, Europe, Oceania, Don't know
	<b>Part 2 – The User perspective on search</b>
	<b>Intro User</b> The user perspective focuses on understanding and involving end users, making sure the search solution is tailored to fit their specific needs and requirements.
5	<b>How difficult is it for users to find the information they are looking for within your organization today?</b> Please answer on a scale between 1 (very easy) and 5 (very difficult) 1, 2, 3, 4, 5, Don't know.
6	<b>How many different search applications are there in your organization?</b> 0, 1-3, 4-6, 7-9, 10 or more, Don't know
7	<b>In general, how satisfied are users with the existing search application(s) within your organization?</b> Please answer on a scale between 1 (very dissatisfied) and 5 (very satisfied) 1, 2, 3, 4, 5, Don't know.
8	<b>What currently are the main the obstacles for users to finding the information they are looking for?</b> <b>Please specify all that apply.</b> Poor search functionality, Relevant content sources are not searchable, The whole search process takes too long , Inconsistency in content tagging, Lack of appropriate tags, Not all Information is available electronically, Poor navigation functionality, Don't know where to look, Information changes constantly, Access restrictions to the systems needed, Don't know what to look for, Search skills are lacking, Multiple search applications mean it is not easy to know which one to use, Information is outdated, Other (please specify), Don't know.
9	<b>Is there a process for users to provide feedback or suggestions for improving the search application(s) and/or search results?</b> Yes, Not yet but planned, No, Don't know.
	<b>Part 3 – The Business perspective on search</b>
	<b>Intro Business</b> The business perspective focuses on understanding how search-driven solutions are best used to support organizational goals and strategies and how agreed business impacts can be measured.
10	<b>In your organization, how important is it to improve the ability to find the right</b>

	<b>information (for employees, customers as well as other stakeholders)?</b> Answer on a scale between 1 (Not at all important) to 5 (Very important).
	1, 2, 3, 4, 5, Don't know.
11	<b>Does your organization have a strategy for search?</b>
	Yes – a business-focused strategy, Yes – an IT-focused strategy, Yes – both a business and an IT-focused strategy, Not yet but planned, No
12	<b>What are the main drivers for employing search-driven solutions in your organization?</b>
	Please respond to each statement using a scale between 1 (not important) and 5 (very important).
	Easier finding of relevant people/experts; Increased collaboration; The integration of isolated repositories; Greater eDiscovery/Compliance effectiveness; Greater re-use of content (information/knowledge); Increased knowledge sharing; Increased e-commerce sales; Improved customer service; A more personalized web experience (via intranet or internet); Improved decision support. Other (please specify), Don't know.
	1, 2, 3, 4, 5, Don't know. Other (please specify)
13	<b>Are Key Performance Indicators (KPI) currently used to measure the effects of your search investments?</b>
	Yes, Not yet but planned, No, Don't know.
	<b><u>Part 4 – The Organizational perspective on search</u></b>
	<b><u>Intro Organization</u></b>
	The organizational perspective focuses on establishing an organizational framework within which to manage, maintain, analyse and refine the search solution, making sure it brings value to the organization over time.
14	<b>Who is involved in the governance/steering of your organization's search programme?</b>
	<b>Please specify all that apply.</b>
	CIO, IT (not CIO), Communications, Marketing, Human Resources, Knowledge Management, Information/Content management, Line-of-Business Management, Corporate Librarian, Other CxO, Other (please specify), No owner appointed, Don't know.
15	<b>Who makes the final decision regarding search investments in your organization?</b>
	<b>Please specify all that apply.</b>
	CIO, IT (not CIO), Communications, Marketing, Human Resources, Knowledge Management, Information/Content management, Line-of-Business Management, Corporate Librarian, Other CxO, Other (please specify), Don't know.
16	<b>How many employees or full time equivalents (FTEs) administer, develop and/or implement search solutions within your organization?</b>
	1 (or less), 1-2, 2-5, 5-10, 10-20, 21 or more, Don't know.
17	<b>What is your annual search budget in 2014?</b>
	There is no budget, €1 - €50,000 (\$1-\$68,000) €50,001 - €100,000 (\$68,001-\$137,000), €100,001 - €250,000 (\$137,001-\$342,000), €250,001 - €500,000 (\$342,001-\$685,000), €500,001 - €1,000,000 (\$685,001-\$1,370,000), €1,000,001 or more (\$1,370,000 or more), Don't know.
18	<b>How do you expect the search budget to change during the next three years?</b>
	Please answer on a scale between 1 (To decrease significantly) and 5 (To increase significantly). Selecting 3 would indicate no expected change.
	1, 2, 3 (No change), 4, 5, Don't know.
	<b><u>Part 5 - The Information perspective on search</u></b>
	<b><u>Intro Information</u></b>

	The information perspective focuses on information quality and ensuring that published information has structure in order that it can be found effectively and efficiently.
19	<b>What proportion of unstructured content is searchable in your organization today (i.e. including text documents, spreadsheets and pictures)?</b> Please answer on a scale between 1 (Almost none of it) and 5 (Almost all of it).
	1, 2, 3, 4, 5, Don't know.
20	<b>How do you expect the amount of searchable unstructured content to change over the next three years?</b> Please answer on a scale between 1 (To decrease significantly) and 5 (To increase significantly). Selecting 3 would indicate no expected change.
	1, 2, 3 (No change), 4, 5, Don't know.
21	<b>Do you have a taxonomy (a way to describe, organize and classify content) in your organization?</b>
	Yes, No, Don't know.
22	<b>Do you have a content/information lifecycle management process in place?</b>
	Yes, Yes - partly, Not yet but planned, No, Don't know.
23	<b>Have you created a standard to determine what metadata (data describing content/information) should be added to content in your organization?</b>
	Yes; Yes, in some systems; No; Don't know.
	<b><u>Part 6 – The Technology perspective on search</u></b>
	<b><u>Intro Technology</u></b> The technology perspective focuses on establishing the necessary search platform architecture and ensuring that the technology is used to its full potential.
24	<b>Is it currently possible to search across multiple content repositories (systems/databases) with a single query?</b>
	Yes, internal and external repositories; Yes, only internal repositories; No; Don't know.
25	<b>Which of the following can you use for search in your organization today? Please specify all that apply</b>
	A separate enterprise search application, Search via an Information Gateway/Portal, An Intranet search, An external web site search, Desktop search, Public search engines, e.g., Google/Yahoo/Bing, Multiple search, There are no search applications in place, Other (please specify), Don't know.
26	<b>Do your search application(s) security settings match the information policy within your organization (i.e. can search results differ between users depending on their access rights)?</b>
	Yes, No, Don't know.
27	<b>In general, how satisfied are users with the following features of the existing search applications within your organization?</b> Please answer on a scale between 1 (Very dissatisfied) and 5 (Very satisfied)
	User interface, Speed (response time), Relevance of search results, Navigation (use of facets/filters), Metadata usage, Taxonomy usage.
28	<b>Is search currently implemented as a service to enable multiple search applications (e.g. Intranet and public website) using the same technical search solution/platform?</b>
	Yes, No, Don't know
29	<b>Is your organization planning to replace the existing technical search solution/platform within the next two years?</b>
	Yes, No, Don't know.
30	<b>Is the technical search solution/platform currently used to personalize information to the users (e.g. to create a personalized intranet or external web experience)?</b>
	Yes, No, Don't know.
	<b><u>Part 7 - About the survey</u></b>
	In order to further develop the survey format and focus we would appreciate your feedback on the following.
31	<b>How was the length of this survey?</b>

	Please answer on a scale between 1 (too short) to 5 (too long)
	1, 2, 3, 4, 5, Don't know.
32	<b>How was the difficulty of this survey?</b> Please answer on a scale between 1 (very easy) to 5 (very hard)
	1, 2, 3, 4, 5, Don't know.
33	<b>Would you like to respond to this survey annually?</b>
	Yes, No, Don't know.
34	<b>How likely are you to recommend someone else to respond to this survey?</b> Please answer on a scale between 1 (not at all likely) to 5 (very likely).
	1, 2, 3, 4, 5, Don't know.