Business Intelligence: Transforming Intelligence into Actions

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Abstract

Business Intelligence (BI) is a topic that has attracted attention from both researchers and practitioners. Despite BI's promising possibilities, few organizations are able to transform BI-insights into actions. Thus, the purpose of this study was to understand: *How organizations can transform BI insights into actions, and which capabilities impact this transformation.* In order to obtain this understanding, a case-study was conducted. We interviewed six consultants from leading consultancy firms, and a practitioner who uses BI on a daily basis. Prior to this, the authors reviewed previous BI literature which suggests that BI needs to be combined with capabilities for employees to utilize BI. Microfoundations was used as a theoretical framework to identify important capabilities and how they relate to BI. The findings distinguished specific capabilities that impacts the ability to utilize BI. Capabilities such as communication, sponsorship, culture, and clear strategies & goals, are important in order to better take advantage of BI. The conclusions are that hard skills (e.g. technical competencies), education and experience among the employees may not be as crucial as previously thought. This is because BI-systems are becoming more intuitive and easier to use.

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1. Background

Due to rapid advances in information technology (IT) that have occurred since the turn of the 21st century, organizations are better able to exploit data about internal operations and external the environment. As IT has advanced, in parallel with a more globalized and interconnected world, information has become more accessible and thereby more relevant to utilize in order to create or maintain a competitive position (Pyle & San José, 2015). However, due to the enormous amount of information that is available, organizations may become overwhelmed when processing this information. Consequently, organizations may find it difficult to turn this information into decisions and actions (Caesarius & Hohenthal, 2016, p.122; Van Knippenberg et al., 2015). Herbert Simon, the Nobel prize laureate and pioneer within information processing, put it simply: “…a wealth of information creates a poverty of attention…” (The Economist, 2017).

Choo (1996) argues that information can replace heuristics, helping organizations make more rational decisions. A rational decision means that actions are based on complete information, where the actor knows every feasible alternative for a specific action, as well as all probable outcomes of those alternatives (Buchanan & O’Connell, 2016). Hence, a rational manager would know all necessary information, be aware of all the risks, eradicate uncertainty, and know the probability of all the alternatives. In that sense, managers would be able to choose the best alternative for the course of action (Simon, 1955).

In practice, rational decisions are nearly impossible to achieve, as managers cannot obtain all relevant information they need due to cognitive constraints (Simon, 1955; Choo, 1996). Hypothetically, even if all relevant information was available, the human brain does not have the capacity to review it. To analyse even a fraction of the information would take too long time, which would not work in the fast-paced contexts managers operate in. Given these circumstances, managers tend to filter the information, where unsuitable information may be chosen instead of the relevant information (Bazerman & Moore, 2013, p. 61). Furthermore, Bazerman & Moore (2013, p. 60-80) state that managers are bounded in their rationality, not paying attention to what is important and relying on heuristics, or “gut feeling”. These authors also argue that heuristics may have advantages, but sometimes not. Consequently, evidence and fact-based decisions could play a secondary role to intuition. This may ultimately prevent managers from making the optimal choices, and instead perform non-value adding actions (McAfee & Brynjolfsson, 2012).

The fact that humans have cognitive biases which lead to bounded rationality have been well known for centuries, and scientists and practitioners have perpetually sought for new tools to reach higher rationality in their decision-making process to take better actions (Buchanan & O’Connell, 2016). Within the scientific field of Information Systems (IS), the area of decision support system (DSS) has attracted many researchers, which is an area aimed to investigate how IT can support and improve accuracy, speed and rationality of business actions (Arnott & Pervan, 2014). In 1989, Howard Dresner introduced the term Business Intelligence (BI), which he described as “a set of methods that support sophisticated analytical decision-making aimed at improving business performance” (Buchanan & O’Connell, 2016, p. 41). The present study will use the more modern and clear definition of BI provided by Fink et al. (2017, p. 39), who define BI as “systems that are based on the integration and analysis of organizational data resources toward improving decision-making”. BI is often used as an umbrella term for different analytical methods, applications and modules, which ultimately may reduce the effect of our cognitive limitations. However, as argued by Yeoh & Koronios
(2009), the present study will focus on the BI-software that organizations can use as a tool to extract information from various sources of data.

Recently, a review over the existing literature of BI was done by Trieu (2017). The purpose of this review was to discover what is known about BI, how well it is known, and what is needed to be discovered for businesses to increase their value from BI-systems. The review consisted of articles between 2000-2015. The study revealed that the majority of the studies have investigated BI’s ability to help organizations perform better. However, these articles have either been on a very theoretical level, providing propositions, or having a quantitative research design. The author states that these limitations create possible research issues. First, Trieu (2017) and Eidizadeh et al. (2017) argue that the theoretical papers lack sufficient empirical evidence about how organizations have practically used BI in order to make better decisions and implement actions. These authors also found that there is a gap in how organizations use BI with other capabilities and how this affects execution. Hence, more empirical evidence is needed to support existing claims. Secondly, Trieu (2017) suggests that the quantitative studies may show relationships between the usage of BI and actions taken by organizations. However, these studies do not explain how organizations transform BI insights into action.

Furthermore, Arnott & Pervan (2014) discovered that even though BI have gained popularity since 2003, the overall publishing in the DSS literature have declined. The authors also argue that the rigor of the DSS research designs have not significantly improved. Hence, the field of DSS could need further contributions. Trieu (2017) revealed that within the small body of empirical material, there is mixed evidence regarding how efficiently BI have been applied by organizations. Some case studies indicate that BI have been used to improve decision-making and resulted in value-increasing actions. Other cases indicate that BI only works if other capabilities can be integrated in the process. In addition, some studies revealed that BI-systems have only resulted in expensive investments without any significant contribution to the organization’s performance (Trieu, 2017). Iveroth (2011) states that one explanation as to why BI-systems only result in costs could be because organizations only focus on the technological aspects of an IT implementation. The author argues that organizations should simultaneously invest in the social aspects to ensure user adoption and appropriate behaviour. Işık et al. (2013) state that BI can provide both technological and organizational capabilities to organizations. For example, technological capabilities that BI provides can be accessible platforms, intuitive visualizations, and databases to stakeholders. The organizational capabilities are tools that facilitate an effective application of BI, such as flexibility and shared risks (Işık et al., 2013). In addition, more sophisticated BI-systems allow organizations to measure numerical- and qualitative data, such as words, phrases, images, or sound. Consequently, with the aid of BI, organizations have much more information available for analysis.

However, Trkman et al. (2010) argue that BI does not necessarily bring benefits to an organization per se. This is because the perceived outcome of BI is affected by people’s view of what valuable information is. Hence, reporting a benefit from BI is threatened by subjectivity and does not mean that an organization will improve their financial performance. This also implies that BI can be perceived as something beneficial for some employees, while others could see it a disadvantage (Trkman et al., 2010). Furthermore, Trkman et al. (2010) state that BI alone is not sufficient to generate benefits for organizations, it must be combined with other capabilities. This issue was also discussed back in 2003 by Carr (2003). Chae et al. (2005) discovered as early as 2005 that BI-systems alone did not facilitate flexibility, faster
transactions, or better connections between supply chain partners (both internally and externally). Thus, the authors argue that BI by itself does not allow organizations to effectively consolidate and share information to a desired extent. Forrester (2016) adds that organizations expect BI-systems to give “actionable insights” and enhance managers ability to make better decisions and create a competitive position. Yet, Forrester (2016) estimated that only 29% of organizations that use BI are able to convert analysed data into action. Thus, it is unclear if the information from BI actually results in organizations implementing more, and better, actions.
2. Problem formulation and research question

The BI literature has portrayed BI-systems as something positive and possibly beneficial for organizations. As argued by Işık et al. (2013), there is an extensive body of research addressing possibilities when using BI-systems. Despite this, Trieu’s (2017) literature review revealed that the empirical evidence shows various relationships between the usage of BI and organizational performance. Trieu also states that one of those fields that do not have sufficient research is how organizations practically take advantage of the information generated from BI-systems. Trieu (2017) further argue that future research should investigate how organizations can convert the information into actions. In addition, Trieu (2017) adds that understanding the underlying capabilities that supports, the transformation of knowledge to action, is crucial in order to explain which capabilities are necessary to take advantage of BI’s full potential.

The lack of knowledge is discussed further by Visinescu et al. (2017), who argue that the field of BI lacks sufficient empirical evidence to support developed concepts and theories. Eidizadeh et al. (2017) conducted a quantitative study and found that BI can facilitate and support grounded actions for organizations. However, they further argue that there is a need for more empirical findings that explain how BI relates to other capabilities and transformations to organizational actions. The literature review by Trieu (2017) concludes that there are concepts and ideas within the field of BI that have not yet been researched. Little is known about how BI is a practical help for organizations, and if BI needs to be integrated with other capabilities to function. Even though some authors (e.g. Trkman et al., 2010; Carr, 2003; Chae et al., 2005) argue that BI needs to be integrated with other capabilities in order to function, none of the authors specify which capabilities enhance BI utilization and which capabilities do not.

This research gap and lack of empirical studies makes this an important topic to investigate. Hence, this academic paper seeks to address the following research questions:

**How can organizations transform BI insights into actions?**

and

**Which capabilities impact this transformation?**

It is important and relevant (for both scholars and practitioners) to analyse how information generated in BI can result in actions, and what organizational capabilities are required for successful transformations. First, it is a field within DSS that has received little recognition and the study’s findings could add to the current body of knowledge. Second, the findings can potentially allow both scholars and practitioners to gain better understanding about how organizations can take advantage of BI-systems in order to enhance performance.
3. Literature review

3.1 Business Intelligence

BI as a concept have received widespread attention during recent years from both practitioners and academia. This buzzword has attracted a lot of organizations to invest in BI-systems (İşik et al., 2013; Ramakrishnan et al., 2012; Trieu, 2017; Arnott & Pervan, 2014). Choo (1996) argues that more accessible information will lead to increased knowledge and deeper understanding about which course of action is the most appropriate. Many scholars (e.g. İşik et al., 2013) agree that managers who use BI in their operations should achieve a higher degree of rationality in their decision-making process. In addition, there have been several debates about what performance in terms of BI really means. Some scholars indicate that it has to do with quality, while others talk about innovation and the level of customer experience (see Trieu, 2017). It is also common to explain the benefits of a BI-system in financial terms. For example, İşik et al. (2013, p. 14) state that “BI success may represent the attainment of benefits such as improved profitability, reduced costs, and improved efficiency”.

3.1.1 Benefits with Business Intelligence

BI has the potential to present historical and present information that can be used for analysis, query and reporting (Trieu, 2017). Kallinikos (2013) argues that assessing information through BI can help managers illustrate a comprehensive picture of many phenomena, enabling a more proactive approach toward various business scenarios. By collecting and analysing data by BI, managers can get new insights that were formerly unknown (Caesarius & Lindvall, 2011; Kallinikos, 2013). With the help of BI, Caesarius & Lindvall (2011) argue that organizations can extract available data and information and convert it into practical knowledge. In addition, Park et al. (2012) discovered that BI-tools outperform alternative models when it comes to analysing non-traditional data sources, such as social networks. The authors argue that BI-systems have better computational power and procedural efficiency. BI-systems were also able to give better data quality (more accurate consumer profiles) and could provide customer patterns, social circles, communication patterns and minimize biases (Park et al., 2012). Trieu (2017) also provides an example where BI was used to more accurately define customers by their inclination and preferences for certain products or services. The author states that BI can provide better guidelines for planning and implementing various marketing campaigns, making it easier to target customers with tailored offers.

Watson & Wixom (2007) discovered that BI-tools enable organizations to make rapid decisions about procurement contracts, discount strategies or to identify which promotions will most likely be accepted by various market segments. Furthermore, Elbashir et al. (2008) found that organizations could use BI to improve supply chain management and customer service. The authors state that BI allow managers to access more relevant and timely information about customers and product updates. BI is also able to make personalized recommendations to clients even when their preferences are dynamic, something most traditional models are not able to do (Sahoo et al., 2012). Since BI often collects internal data from data warehouses, it enables different parts of organizations to share the same source of information (Watson & Wixom, 2007). Many authors (e.g. Watson & Wixom, 2007; Ramakrishnan et al., 2012; Clavier & Brar, 2017) further argue that BI will allow everyone to
see the same numbers, charts of accounts etc., ensuring a “single version of the truth”. Watson & Wixom (2007) state that this is more important for large organizations who may have different currencies, systems of reporting and metrics. In addition, the same study also states that BI will prevent manipulation of input-data.

Lau et al. (2012) state that organizations who use BI may make better international merger and acquisition decisions. The authors argue that this is because without a BI-tool, managers tend to neglect sociocultural aspects as well as non-financial aspects when considering an international investment. Lau et al. (2012) argue that BI-tools can improve business decisions for organizations by taking advantage of vast volumes of data available online regarding social, political, and economical issues of nations or industries. The authors point out that gaining more insights into markets will arguably lead to wiser actions for organizations. In addition, Watson & Wixom (2007) state that the BI-tool will save a lot of time regarding data collection, formatting and presentation. The authors explain that BI allows for a more efficient information delivery that will release resources, which can result in headcount reduction or putting more resources into other value-creating projects. Lastly, implementing a BI-tool that consolidates information storage processes, can reduce IT-infrastructure costs by removing redundant processes and duplications (Watson & Wixom, 2007). Given the above, BI-systems have the potential to solve many organizational problems. As one can expect, BI will not generate these benefits instantaneously, nor will it presumably get successfully implemented without an organizational effort.

3.1.2 BI in relation to other Capabilities

One important aspect when evaluating the benefits of BI is the latency effects (Schryen, 2013). Trieu (2017) argues that this is because it often requires a period of time before the organization’s investment in BI yields a positive result. For example, Purvis et al. (2001) point out that it requires time to adapt to the new system, training employees, and develop expertise to the degree that information can be generated efficiently enough to improve business value. Pacino (2017) found in a study that was done in 2013 that only 4% of the respondents (organizations) had mature BI-systems. However, Pacino conducted a similar study in 2017 and found that 25% of the organizations now stated that they had mature BI-systems. Watson & Wixom (2007) argue that when the employees become more mature with the BI-tool, they will be able to answer questions like “Why has this happened?” or “What will happen?”. The authors state that this increases the level of benefits for the entire organization, and could potentially facilitate strategic decisions in market entries, launching product lines, etc.

Ramamurthy et al. (2008) found that an organization’s size, absorptive capacity, and scope together have an impact on the adoption of BI. Furthermore, the authors argue that large organizations are more likely to utilize BI’s full potential compared to small organizations due to deeply rooted capabilities and more resources. Another capability that is crucial for a successful BI-system is skilled employees, and skilled analytical staff (Heinrichs & Lim, 2003; Wang & Wang, 2008; Di Domenica et al., 2006; Clavier & Brar, 2017). Heinrichs & Lim (2003) argue that the human resource is the primary source for BI success since employees are the ones who have to analyse the data and must determine the most effective use of that information in order to deliver competitive advantages. Furthermore, Wang & Wang (2008) found that BI-tools can only be effective if employees are able to make sense of the information they generate through BI.
Watson & Wixom (2007) defines six key factors for BI success. The first is that senior management must drive the implementation and change within the organization, as well as believe that the BI-system will benefit the organization. They should create a clear vision for the BI-tool, including long- and short-term goals, making it easy for employees to follow up and execute. Furthermore, these authors state that when the BI project is governed from the top, necessary resources will be allocated, and an information-based decision culture will be enforced. This links to the second key factor, which is that the organization’s culture should promote the use of information and analytics (Watson & Wixom, 2007). In other words, decision-making based on gut feeling or intuition should be removed. The third key factor defined by the authors is that there must be a clear alignment between the business and BI-strategies with the employees’ knowledge of how BI will benefit the organization. The three remaining key factors described in the article are all linked to resources necessary for a smooth implementation of BI. Watson & Wixom (2007) state that there has to be an effective BI-governance. What the authors mean is that there has to be clear responsibilities and roles for the BI-system and the insights generated.

Deng & Chi (2012) investigated systematic problems in organizations using BI. Their study revealed that most issues organizations might face are not related to the BI-system itself, but how it interacts with other capabilities. The authors state that reporting can become an issue if the BI-system is not properly integrated and the correct reporting formats are constructed. In addition, the study shows that it is crucial that the managers and BI-staff are aligned so the managers can get the information they want. Pacino (2017) found that an organization’s biggest barrier in taking advantage of BI is lack of sufficient technological skills or staffing. In addition, the author argues that most organizations lack efficient key performance indicators (KPI) to measure their level of success. There is a common axiom of “garbage in - garbage out”, meaning that if the quality of the input-data is not sufficient enough, then the output will consequently be of low quality (Yeoh & Koronios, 2010; Watson & Wixom, 2007). Deng & Chi (2012) also argue that organizational issues like ‘workflow’, ‘role authorization’ and ‘users lack of knowledge’ can be problematic if they are not addressed. The workflow often gets disrupted by BI and a clear routine needs to be outlined (Deng & Chi, 2012). Furthermore, Watson & Wixom (2007) identified other capabilities that negatively affected the impact from BI. For example, the authors found that dominating politics around ownership of the information resulted in decreased level of usage from BI. The authors also argue that a low level of transparency can make the knowledge sharing within organizations minimal and little action is taken from the insights generated in BI. As described in the aforementioned argument, there are multiple opportunities that BI-systems can deliver to organizations. On the contrary, as one can hypothesize, there are numerous obstacles with the utilization of BI.

From the literature, one can argue that today’s BI-system functions properly. However, organizations need other capabilities that supports the BI-system in order to take advantage of the information and develop plans for actions. Despite this, the capabilities that are necessary for the usability of BI are not clearly defined. Based on the literature, one can argue that organizations who fail to execute on the information generated in BI do not do so because of the BI-system, but rather because they are not able to incorporate other necessary capabilities when transforming the information into action.
3.2 Microfoundations

In order to understand how an organization’s capabilities, relate to one another, (e.g. how BI is affected by other capabilities) Felin et al. (2012) developed the concept of microfoundations to categorize an organization’s capabilities.

Microfoundations are often used to theorize and understand organizational learning (Barney & Felin, 2013). Barney & Felin (2013) describe microfoundations as collective level constructs that focus on aggregating individual-level concepts, such as cognition or learning, to an organizational level. They (Barney & Felin, 2013, p. 145) explain microfoundations as “microfoundations... seeks to more carefully delve into the actual micro activities, behaviours, and processes of strategy and organization”. To put it simply, microfoundations aims to explain what underlying constructs, processes or frameworks relate to the origin of organizational capabilities (Barney & Felin, 2013). Hence, microfoundations explain what goes on inside the organization that leads to action, what processes exist that converts knowledge into execution, and how these different processes interact and work collectively (Barney & Felin, 2013).

According to Felin et al. (2012), there are four major microfoundations that can potentially explain differences in organizations’ actions and outcomes. These are: 1) Technology, 2) Human Capital, 3) Coordination & Integration, and 4) Structure (see Figure 1.). An important aspect regarding microfoundations is that describing the different components is not enough. Analysing the interactions, within and across components, is crucial since it is after the processes and structures are aggregated that actions become visualized (Felin et al., 2012). However, the present study will put more emphasis on the interactions between Technology and the other microfoundations.

![Figure 1: Visualization of the interactions between Microfoundations](image-url)
3.2.1 Technology

Felin et al. (2012) argue that technology is one of the organization’s microfoundations that explain actions and outcome. The authors further explain that Technology can include a lot of different systems and digital tools, that interact with the other microfoundations in order to realize organizational actions. In this study, Technology will refer to the BI-system, including the necessary hardware and software components as previously discussed. Therefore, as argued above, the microfoundation Technology in organizations have been proven to function properly. What is important is to investigate how BI (Technology) relates to the other microfoundations.

3.2.2 Human Capital

It is widely accepted that organizations who want well established BI practices need skilled and talented professionals (Yeoh & Koronios, 2010; Acebo et al., 2012; Clavier & Barar, 2017; Corrigan, 2015). Felin et al. (2012) argue that high level skills and abilities among employees will facilitate organizational capabilities and the ability to execute on them. In addition, the same study states that organizations with employees who have the ability to engage and interact with each other, integrating different elements (e.g. knowledge) efficiently, will have a positive impact on organizational execution.

Clavier & Brar (2017) define a set of skills that are necessary for BI employees to possess in order to transform BI information into action (see Figure 2.). These skills are categorized into two parts, hard and soft skills. The hard skills involve technical competencies that describe the ability to work in the BI-software, do the correct work and potentially use the system to its full extent (Clavier & Brar, 2017). Furthermore, Clavier & Brar (2017) argue that successful BI depends on the employees’ aptitude to handle the complexity of interpreting information and turning it into something practical for the organization. The authors further argue that the employees working with BI need an analytical mindset and the ability to relate the information to the organization’s vision and strategy. Yeoh & Koronios (2010) also argue that technical and business skills need to be combined. Furthermore, Clavier & Brar (2017) state that employees need to be able to solve complex business issues, capable of conceptualizing and articulating the information that BI generates. Finally, these authors also
point out that employees need to understand the “BI-language”, understanding various definitions and concepts in order to facilitate internal communication.

In addition to the hard skills, BI-employees also need to have certain soft skills that will enhance decisions that will lead to actions (Clavier & Brar, 2017). The authors argue that employees need to see BI information from an overall perspective in order to understand how it affects the organization, in addition to detect details that are of significance. Clavier & Brar (2017) state that BI-employees need to have the ability to form relationships and influence stakeholders, as well as understand the internal politics of the organization, in order to make them accept the information from BI. This will enable the BI-staff to execute on the information they receive. Finally, employees need to be able to work under uncertain conditions, where changes occur constantly, and new information is revealed continuously (Clavier & Brar, 2017).

Cannon & Whiterspon (2005) state that critical feedback is crucial in order to facilitate an efficient teaching process within an organization. Furthermore, the authors say that feedback is important when considering teaching or coaching since it is during this process that managers can see if employees truly understand and can apply new knowledge into actions. Pfeffer & Sutton (1999) argue that turning knowledge into action will be facilitated by continuously teaching employees, allowing them to test different approaches and experiment. Furthermore, the article shows that it is imperative for employees to be closely involved in the actual process in order to gain a deeper understanding and learning. Yeoh & Koronios (2010) found in their study that user-oriented management is crucial for BI usage. The authors argue that only by working with BI yourself will you be able to understand the information and make grounded actions. In other words, first-hand experience is critical.

Pfeffer & Sutton (1999) discuss that leaders for organizations who are able to act on their knowledge, are able to establish practices that produce reliable transformation of knowledge into action. The authors do not mean that those leaders are supposed to know everything or decide everything, they should rather create an atmosphere where many employees know things and execute on them. Furthermore, Yeoh & Koronios (2010) add that managers are in charge of creating a commitment among employees. A literature review by Shehzad et al. (2013) found five key factors that facilitates the integration of knowledge into an organization. One of the factors is Leadership and focuses on the fact that managers need to have a clear vision for what to do with the knowledge. Furthermore, Yew Wong (2005) adds that leaders need to have the ability to promote change in an effective manner and have the right tactics for knowledge integration. Finally, leaders should set examples through their actions, not just with what they say (Edmonds, 2016). However, when working on a BI project, good leaders may not always be enough. Sometimes the team may need a person with a high degree of control, and informal influence, to support their work. This person, who creates a sense of urgency and attention, is often called a sponsor (DeBroux & Reed, 2015).

According to Watson et al. (2016), it is crucial to have committed sponsorship in order to succeed with working with BI. Watson et al. (2016) further argue that it is beneficial if the sponsor is from the same business unit as the BI is being used and has a high-level role (preferably chief officer status). If those criteria are met, the sponsor will enable the business unit to get sufficient resources and influence them to act on the insights they receive from BI (Perez, 2015). DeBroux & Reed (2015) point out that good sponsors can create a top-down approach for information control, making it easier and faster to act, due to enforcement. Furthermore, the authors argue that this is more difficult if the project is driven from a down-
up approach. Watson et al. (2016) also point out that it is advantageous if the sponsor has informal influence as well. This will make the process more efficient, in addition to avoid political games. Finally, efficient sponsorship will allow for more flexibility, so that quicker adjustments can be made if change is required (Kulkarni et al., 2017). The literature review above can be summarized in Table 1.

### Table 1. Human Capital capabilities that may facilitate BI information into actions

<table>
<thead>
<tr>
<th>Human Capital capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skilled employees who are able to integrate BI insights in their work and communicate this information</td>
</tr>
<tr>
<td>Employees have the necessary hard skills (e.g. analytical mindset, technical competencies)</td>
</tr>
<tr>
<td>Employees have the necessary soft skills (e.g. ability to cope with change, uncertainty, see the bigger picture)</td>
</tr>
<tr>
<td>Employees who make the decisions are the ones who work directly with BI</td>
</tr>
<tr>
<td>Leaders who are able to create commitment amongst employees</td>
</tr>
<tr>
<td>Sponsorship from top level management</td>
</tr>
</tbody>
</table>

#### 3.2.3 Coordination & Integration

Felin et al. (2012) claim that there exists both formal and informal concepts of coordination within an organization. Formal coordination could, for instance, be rules, standards, or other operating procedures (Felin et al., 2012). Hasanali (2002) adds that an adoption of a system with clear processes and routines contributes to achieving satisfactory integration. Formal coordination is more tangible and easier to observe as it, for instance, could be KPI’s, budgets, cost centres, standardized tasks and verbal communication (Merchant & Stede, 2007). Since formal coordination is more tangible, Merchant & Stede (2007) also state that these are easier to change in accordance with new technologies like BI. Yeoh & Koronios (2010) found that formal coordination between users facilitates effective BI usage. Furthermore, Felin et al. (2012) state that experience, norms, or values are examples of informal coordination concepts. Coordination will, according to Felin et al. (2012), affect the efficiency of taking actions as well as impact the time it takes to execute. The same study argues that norms can influence cooperation, which will enhance taking action.

In addition, Srikanth & Puranam (2011) found a positive relationship between organizational actions and organizations who had a well-established coordination concept in the shape of modularization, communication, and tacit mechanisms. In addition, Hoopes & Postrel (1999) and Yeoh & Koronios (2010) revealed that organizations with clear formal procedures for coordination had it easier to integrate different elements within the organization, such as individuals, teams, or cross functional knowledge resources. These coordination activities facilitate cooperation within organizations (Felin et al., 2012). Pfeffer & Sutton (1999) argue that cooperation and collaboration within the organization means that there is a shared goal, created by a common effort where each employee’s success is linked with everyone else’s. The authors mean that this mindset will lead to ideas and resources being shared as well as everyone being rewarded for successful execution. This is supported by Naidoo & Sutherland (2016) who argue that internal collaboration will enhance problem solving, knowledge sharing and innovation.

There is a common phrase stating, “what gets measured gets done”. Hanley (2014) mentions that organizations should only adapt measurements to solutions that truly reflect business
impact. Wouters & Wilderom (2008) mean that organizations that are able to establish efficient performance measurement systems are more likely to link new knowledge to execution. Mathi (2004) states that organizations can put up practical milestones (e.g. creation of products, development of clients, increase in sales) to continuously follow the process of knowledge integration. Furthermore, the study by Pfeffer & Sutton (1999) found that very few organizations measure knowledge implementation. If organizations want to transform knowledge into action they should measure the knowledge-doing gap itself and do something about it (Pfeffer & Sutton, 1999).

Janz & Prasarnphanich (2003) state that more integration within the organization will allow employees to access more information, by learning from colleagues, working together, and sharing resources. The authors argue that more integration will result in effective communication and coordination channels for knowledge. Shehzad et al. (2013) found different key factors that facilitate the integration of knowledge into an organization. One of the factors, Culture, was studied by Hasanali (2002) & Mercadoa (2010). Both articles state that a culture that empowers knowledge sharing, where employees are encouraged to share intellectual information, and rewarded for such actions, will foster a successful integration of knowledge.

Another factor, Strategy, Systems & Infrastructure, enables an easy way to map all required elements of the integration process if these are clearly defined (Shehzad et al., 2013). In addition, Yew Wong (2005) argues that following a systematic approach will lower the level of difficulty in integrating knowledge. Shehzad et al. (2013) define one key factor as an Effective IT-Infrastructure. The same author argues that, in order to create a knowledge environment, IT systems should be in place to capture the knowledge assets of the organization. The literature review above is summarized in Table 2.

Table 2. Coordination & Integration capabilities that may facilitate BI information into actions

| Clear rules, standards and procedures so employees know what to do with the information from BI |
| Have KPI's that measure BI's impact on taking action |
| Have norms and values that promote action |
| Have coordinating activities that promote effective and transparent communication |
| Have an integration routine that gives employees a high degree of access to knowledge |

3.2.4 Structure

Felin et al. (2012) state that it is important to analyse organizational in order to understand the organization’s collective actions. Their study found that structures, both at the organizational level and within the organization, sets the conditions that can enable or constrain other microfoundations that impact the organization’s ability to take action. Many organizations focus on “how” others (e.g. competitors) are doing things (Pfeffer & Sutton, 1999). However, Pfeffer & Sutton (1999) argue that organizations should rather focus on “why” other actors do what they do. Hence, in order to better turn knowledge into action, organizations need to focus on their long-term culture, philosophy and general guidance for actions (Shim & Steers, 2012). Pfeffer & Sutton (1999) and Edmonds (2016) argue that organizations that have systems and day-to-day management that creates a culture that values building, transferring, and acting on knowledge, will be more likely to close the knowledge-
doing gap. Yeoh & Koronios (2010) add that clear visions and strategies are necessary to fully take advantage of BI. Edmonds (2016) argue that organizations should focus more on their internal values in order to understand why they act the way they do. Furthermore, the author suggests that building a culture around a few values, that are continually measured by managers, will increase employees’ understanding of why they should act and execute in a particular way.

Even the most well-planned actions can go wrong. Hence, organizations that strive to build a culture of action must have well-functioning processes when things go wrong (Pfeffer & Sutton, 1999). Pfeffer & Sutton (1999) argue that the majority of organizations treat failures and errors so harsh that employees end up doing nothing because they are afraid of failure. Mackenzie (2016) argues that mistakes should be seen as a necessary part of the improvement process, where mistakes are opportunities for growth, progression of learning, and improving employees. In addition, managers should never meet reasonable failures with anger since this cultivates a resistance to taking actions (Pfeffer & Sutton, 1999; Mackenzie, 2016). Bélanger et al. (2013) found that fear and pressure often make employees avoid taking action or trying something new if the consequences could be severe. The study also revealed that fear can make managers act inconsistently and irrationally. Hence, the authors argue that organizations should shape their culture where failure is not punished.

Pfeffer & Sutton (1999) highlighted the “ready, fire, aim” illustration that organizations should follow. The authors argue that organizations who “fire” and then “aim”, doing then planning, are better able to establish a culture that values action. The study claims that this approach also facilitates learning by doing. Thompson et al. (2013, p. 355-356) argue that in order to be able to execute, organizations need to put equal amount of attention to the operational aspects as to the planning and preparing aspects. The authors state that successful execution is about focusing on operations (getting things done). Pfeffer & Sutton (1999) state that elegant plans, long meetings etc. have a tendency to substitute implementation. The authors argue that managers often assume that a decision, with an underlying discussion and analysis, will automatically lead to action. The literature review above can be summarized in Table 3.

<table>
<thead>
<tr>
<th>Table 3. Structure capabilities that may facilitate BI information into actions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have a focus on why the organization do what they do</td>
</tr>
<tr>
<td>Have a clear vision and objectives for the use of BI</td>
</tr>
<tr>
<td>Action oriented culture where action is valued over planning and making decisions</td>
</tr>
<tr>
<td>Allow room for mistakes</td>
</tr>
</tbody>
</table>

To summarize, theory states that there are specific capabilities within each microfoundation (see Tables 1-3) that facilitate an organization’s ability to transform BI knowledge into actions. This is illustrated in Figure 1. The following section explains how the present study aims to analyse how the relationships between BI and the other microfoundations impact organizational actions and what capabilities are still relevant for today’s organizations. In addition, it aims to understand how insights from BI can be transformed to action.
4. Method

4.1 Research Approach & Design

This study has a deductive research approach, which according to Bryman & Bell (2013, p. 23) involves the use of previous literature and theory as base in order to understand and analyse empirical findings. Even though we have a deductive study, we wanted a degree of freedom in our design since we conducted in-depth interviews with both BI-experts and an everyday user (see below). In order to allow the interviewees to explore sub-themes within the topics that seemed relevant to scrutinize, we wanted the interviews to be flexible and dynamic.

4.2 Research Method & Strategy

Since the research question is about investigating a relationship and understanding “How”, a qualitative approach is preferred. This qualitative study has an interpretivist focus, described by Saunders et al. (2016, p. 392) as: “the understanding of the social world through an examination of the interpretation of that world by its participants”. The interpretative approach was favourable since we wanted individual respondents to elaborate on their view of BI in relation to organizational actions, where words are more important than quantitative numbers. In line with Bryman & Bell (2013, p. 404), this approach is preferred when focusing on understanding the respondents’ thoughts and statements, in order to give meaning to attributes of the environment. A qualitative study is arguably less strict when it comes to gathering and analysing data, but it gave us a higher flexibility. In that sense, it became more comprehensive to extract the respondent’s thoughts and perceptions in order to answer our research question. This would not be possible to do if we would have chosen a quantitative method.

Within the qualitative approach, there are several research strategies one can choose to collect data. In contrast to an experimental or survey strategy, the “case study research is often used when the boundaries between the phenomenon being studied and the context within which it is being studied are not always apparent” (Saunders et al., 2016, p. 185). As argued by Ghauri & Gronhaug (2005, p. 114), we also thought that a case study would be most suitable to understand the relationship between BI and actions, since it is hard to quantify and cannot be understood if one removes the social context. Orlikowski & Iacono (2001) further strengthen our choice with the argument that IT systems are designed, constructed and used by people in a social environment. The authors further state that ever-changing technologies, such as BI, never becomes static and are therefore always relevant to study in different times and contexts. Furthermore, as pointed out by Saunders et al., (2016, p. 186), a case study is preferred over a quantitative study because it focuses more on depth over breadth in empirical data.

Lastly, there is strong support for more qualitative studies within the field of DSS. Işık et al. (2013) state that although there is an extensive body of research addressing the possibilities with BI, very few articles study this empirically. Furthermore, Eidizadeh et al. (2017) argue that further qualitative studies are necessary in order to explain the relationship between BI and organizational actions. The same view is shared by Visinescu et al. (2017) & Trieu (2017) who argue that there is a lack of empirical data in the form of alternative research approaches, such as case studies, which further support the need for a qualitative case study.
4.3 Literature Review & Data Collection

Within the deductive approach, previous literature was used as a basis for analysing our data. In order to build our theoretical framework, concretize the problem and develop our research question, we scrutinized a large number of articles and textbooks within the fields of IS, DSS and organizational management. To gather previous literature, we used academic search engines such as: Google Scholar, Libris and Uppsala University’s online library. We used the following (in combination, but non-exhaustive) searchable keyword of: “Business Intelligence”, “Knowledge”, “Organizational action”, “Rational decision”, “Microfoundation”, “Capabilities”, “Literature review”, “Decision support systems”. In order to find more relevant literature, we used the reference list in some of the core articles to further expand our search.

In order to retrieve data and understand the research question, semi-structured interviews were chosen in order to discuss certain themes, with the ability to deepen the discussion in certain aspects related to BI. Saunders et al. (2016, p. 388-391) argue that semi-structured interviews allows researchers to investigate ambiguous questions and answers that are given by respondents. Furthermore, the authors (p. 391) state that it allows for a higher degree of flexibility when the interviewers can choose to add or exclude specific questions during the interview. With this in mind, we needed data from respondents that work (or have worked) with BI on a daily basis and that had a high level of expertise. This would allow us to get a detailed picture about the research topic. In addition, our aim was to find respondents who could be described as BI-experts, with years of experience within the field. Furthermore, the respondents needed to be able to provide a holistic perspective of BI, not only related to actions, but also how it relates to other microfoundations in the organization as well. The criteria the respondents needed to fulfil are listed below:

- At least 5-7 years of experience of BI or another related IT-system.
- Experience of BI in different industries and departments.
- Ability to provide a holistic view of how BI was used throughout an organization.
- Experience of working with BI within an organization for a longer period.
- Experience of working with BI and performing related actions on a daily basis.

In this study, the respondents consisted mostly of consultants. Consultants can be considered experts in implementing and advising organizations within BI (not vendors selling the system). All consultants worked at leading consultancy firms with clients from many different industries and having varying sizes. These consultants were chosen for several reasons. First, all of them had many years of experience within the field of BI and had seen the historical effects on system development. Second, the consultants have followed their clients over a period of time and have seen if significant latency affects have occurred, an issue discussed by Schryen (2013). Third, they have worked with many organizations over a broad set of industries, giving them deeper insights into organizational, industrial, and regional accomplishments as well as other issues. However, it is important to note that this affected our empirical findings since the consultants shared their general experiences from several industries. Therefore, the empirical findings were not able to specify how BI is perceived in specific industries with different conditions. The consultants did nonetheless obtain a holistic view of organizations when working with their clients. This means that they get inputs from all managerial levels and the employees who work directly with the system. However, consultants have some limitations and constraints. It is important to note that these BI-experts are consultants and are essentially sale representatives of BI-services, this may
impact their perspective about BI issues and objectivity. Furthermore, consultants do sometimes observe others working with BI. A consultant can, at best, describe his/her observations of the organizational members’ feelings. In these situations, we would not be able to capture or sense their emotions and feelings towards their situations related to BI. Even though the focus is on the respondents’ words and statements, feelings and emotions are crucial components for getting an analytical depth. Hence, in order to increase the trustworthiness of the consultant’s statements, our last interview was with a controller from a pharmaceutical company who works with BI on a daily basis. This allowed us to compare the statements of the consultants to the everyday user and detect anomalies. The controller was a suitable respondent because the person works with BI every day and links management’s strategies to actions lower down in the organization. This gives the controller a comprehensive and holistic perspective of BI.

In order to get our sample of consultants we contacted several experts within firms with the aforementioned criteria. After the initial contact we asked them to strategically select other candidates whom we could invite to participate. In that sense, we got in contact with respondents in an environment that is otherwise difficult to access. We have interviewed six consultants from four different leading consultancy firms. This allowed us to get information from a variety of firms. Table 4. lists the respondents in our study.

Table 4. Respondents

<table>
<thead>
<tr>
<th>#</th>
<th>Respondent (pseudonym)</th>
<th>Role</th>
<th>Seniority</th>
<th>Type of organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ben</td>
<td>Consultant</td>
<td>Manager</td>
<td>Leading Consultancy Firm</td>
</tr>
<tr>
<td>2</td>
<td>Jan</td>
<td>Consultant</td>
<td>Manager</td>
<td>Leading Consultancy Firm</td>
</tr>
<tr>
<td>3</td>
<td>Moa</td>
<td>Consultant</td>
<td>Senior Manager</td>
<td>Leading Consultancy Firm</td>
</tr>
<tr>
<td>4</td>
<td>Frej</td>
<td>Consultant</td>
<td>Senior Manager</td>
<td>Leading Consultancy Firm</td>
</tr>
<tr>
<td>5</td>
<td>Gabbi</td>
<td>Consultant</td>
<td>Senior Manager</td>
<td>Leading Consultancy Firm</td>
</tr>
<tr>
<td>6</td>
<td>Rob</td>
<td>Consultant</td>
<td>Senior Manager</td>
<td>Leading Consultancy Firm</td>
</tr>
<tr>
<td>7</td>
<td>Per</td>
<td>Controller</td>
<td>--</td>
<td>Pharmaceutical company</td>
</tr>
</tbody>
</table>

Getting access to consultants was difficult. From our experience, they were often on a busy time schedule and worked from different locations (client’s office). In addition, they have a high level of secrecy, meaning that there are strict rules of what consultants can disclose for people outside the organization. Furthermore, since BI affects business operations etc., there was a risk of revealing business secrets. Nevertheless, we discovered that the six consultants we interviewed were very consistent in their answers (and matched the statements of the everyday user). Thus, we decided that interviewing those six respondents were sufficient. However, more respondents could potentially improve the relevance of our empirical findings.

All respondents fulfilled the criteria we had (see above) except the last one “Working with BI and perform related actions on a daily basis”. However, four of the consultants had previous jobs at organizations working directly with BI. Hence, we argue that this criterion was partially fulfilled by the consultants. The last criterion was fulfilled by the everyday user. In summary, all of our criteria were successfully met. The interviews were either in Swedish or
English. It was up to the interviewee to decide which language he/she was more comfortable with. We argue that this allowed the respondent to discuss the topic without being affected by linguistic limitations and could develop their answers further. The interviews lasted between 45 and 75 minutes.

4.4 Operationalizing

An interview guide was developed based on Figure 1. in the theory section, along with the supporting Tables 1-3. By converting the model and tables into interview questions, it allowed for the whole theory section to be within the scope of the interviews. Table 5. presents how the theory was operationalized.

Table 5. Operationalizing interview questions

<table>
<thead>
<tr>
<th>Theoretical concepts</th>
<th>Operationalized question</th>
<th>Possible follow-up question</th>
</tr>
</thead>
<tbody>
<tr>
<td>BI (Technology)</td>
<td>[1] What is your professional background?</td>
<td>[1.1] What is your experience with working with BI?</td>
</tr>
<tr>
<td></td>
<td>[2] According to you, which department is it most common to work with BI?</td>
<td>[2.1] What department has the highest/lowest success rate? Why?</td>
</tr>
<tr>
<td></td>
<td>[3] What is the biggest problems you have encountered by working with BI?</td>
<td>[3.1] What technical aspect are essential vs &quot;nice to have&quot;?</td>
</tr>
<tr>
<td></td>
<td>[4] In what way does action differ from now prior to BI?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[5] How would you define BI?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[7] What kind of leadership is most suitable for promoting the usage of BI?</td>
<td>[6.2] Can everyone learn these skills, or does it require education or previous experience?</td>
</tr>
<tr>
<td></td>
<td>[8] How should leaders reflect upon making mistakes?</td>
<td>[7.1] Should the emphasis be on top executives or middle managers?</td>
</tr>
<tr>
<td></td>
<td>[9] What type of sponsorship is preferred in order to utilize BI?</td>
<td></td>
</tr>
<tr>
<td>Coordination &amp; Integration</td>
<td>[10] How should BI information be spread in the organization?</td>
<td>[10.1] Should it be free or controlled?</td>
</tr>
<tr>
<td></td>
<td>[12] How can organizations facilitate the BI workflow?</td>
<td>[11.1] Any specific rules or processes that needs to be established?</td>
</tr>
<tr>
<td></td>
<td>[13] How do you measure the usage of BI linked to actions?</td>
<td></td>
</tr>
<tr>
<td>Structure</td>
<td>[14] What types of organizational structures do you think is best to utilize BI?</td>
<td>[14.1] How important are roles and responsibilities?</td>
</tr>
<tr>
<td></td>
<td>[15] What type of social structures do you think is important?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[16] Is it only decision-makers that should work with BI, or could it be others as well?</td>
<td>[16.1] What mandate should the BI-user(s) have?</td>
</tr>
<tr>
<td></td>
<td>[17] How important are BI strategies &amp; goals?</td>
<td></td>
</tr>
</tbody>
</table>
leading questions. In some cases, additional questions were asked based on the discussion. The interview guide included possible follow up questions. These questions were asked if we felt that there needed to be more depth in the discussion or if the overall question was unclear. Prior to each interview, we asked the respondents to give as many “real life” examples/scenarios as possible to help us understand the dimension for actions. See Appendix 1 for the interview guide.

When developing the interview guide, we realized that some theoretical words in this study are not commonly used by practitioners. Therefore, we translated some theory into recognizable words (non-exhaustive). These are shown in Table 6. These words were also a post-interview guide to know which microfoundation different statements belonged to. However, sometimes it became difficult to categorize the statements since many of the words could be categorized in different microfoundations simultaneously. For instance, the respondents could state that culture, leadership and goals are important for organizations in order for the BI-system to function effectively. We used Table 6 to the best of our ability and asked clarifying questions to the respondents in order to avoid this issue.

Table 6. Operationalized words

<table>
<thead>
<tr>
<th>BI (Technology)</th>
<th>Human Capital</th>
<th>Coordination &amp; Integration</th>
<th>Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>System, model, module, computer, activity, findings, data, graph, excel, tool, gadget, statistics, analytics, methodology.</td>
<td>Experience, competence, technique, schooling, learning, skill, education, conceptualize, leadership, sponsorship, mindset, knowledge.</td>
<td>Procedure, process, rule, communication, language, flow, collaboration, sharing, standard, KPI, measure, performance.</td>
<td>Vision, philosophy, strategy, goal, culture, perception, planning, roles, responsibility, objective.</td>
</tr>
</tbody>
</table>

4.5 Data Analysis

According to Bryman & Bell (2013, p. 574), data that is collected through interviews often gets cumbersome and disorganized. Therefore, it is essential to have a logical data analysis which is: “the process of bringing order, structure, and interpretation to the mass of collected data” (Marshall & Rossman, 1999, p. 150). Our empirical data and analysis is structured according to Figure 3, which is a model adopted from the recommendations of Gioia et al. (2012). When all of our interviews were finalized, we had extensive field notes and transcripts. This allowed us to break down the respondents’ statements even further and analyse what was relevant. In order to find what was relevant, we used Table 6 to look for specific keywords that the respondents used. With this, we identified 2-4 sub-themes under each microfoundation that was frequently mentioned by the respondents (see Figure 3). These sub-themes were analysed and complemented with key quotes.
4.6 Trustworthiness & Authenticity

Within the interpretivist focus, where researchers interpret a social context, one can argue that researchers cannot find and explain the true social reality. The interpretative nature of qualitative studies will generate different versions of the truth depending on how researchers give meaning and interpret the social constructs. Hence, these types of studies should not apply concepts of validity and reliability since these concepts essentially have a quantitative character by assuming that one can find an absolute truth according to Bryman & Bell (2013, p. 402). Instead, we have adopted concepts of trustworthiness and authenticity.

In order for us to gain a high level of trustworthiness, which centres around describing the social reality in a credible and accepted way, we performed data validation with our respondents. Another attempt we have done to gain trustworthiness is to produce rich empirical data (see Section 5) to give the reader insights in the environment we examined. By doing this, other researchers can assess if our results can be transferred to another environment. Lastly, in order to gain authenticity, Bryman & Bell (2013, p. 405) argue that it is important to give a “fair picture” of the study. We have interviewed both consultants and employees to get different perspectives of BI and thereby incorporated different statements and opinions from various sources.

4.7 Ethical Considerations

Prior to the data collection, there were a number of ethical issues that had to be addressed. First, it was noted that participation was entirely voluntary. As such, all respondents were able to withdraw from the interview at any time, without needing to provide any warning or reason for doing so. Second, before the interview, respondents were informed that their answers would be completely anonymous, and neither the organization’s name or any demographics would be disclosed. Furthermore, it should be noted that if respondents did not want to answer a particular question, they had the opportunity to skip that question.
With regards to data storage, all information gathered was done so anonymously, with no personal or identifiable information required. The names mentioned in this study are pseudonyms. Furthermore, respondents were ensured that all data collected would not be shared with anybody, this has been upheld. All data was stored on a password protected cloud service at all times. This was done to avoid information from leaking if a computer got stolen, and also ensured secure access to the information by the researchers working from different computers.
5. Empirical Findings

5.1 BI (Technology)

5.1.1 Definition

All respondents had similar definitions of BI, which is that it collects and aggregates data from the inner and outer environment of an organization. All respondents stated that BI has traditionally focused on descriptive analytics, which involves collecting historical data, and generate aggregated KPIs and dashboards. BI is often used to accumulate data into reports of different financial information, that can be used to validate decisions have already been made. According to Jan, a prior BI-employee and currently a Manager, many organizations use BI to “support decisions that were already made with generated facts”. These reports are often used in the departments of marketing, sales, finance and operations. Although this is the traditional use of BI, it is still the most common way organizations work with BI. The Senior Manager named Rob said that BI is becoming more apparent in the Human Resource department (HR). He stated that many businesses have realized the potential of analytics of employees. What is hindering organizations to utilize BI in HR today is that many have outdated payslip/salary systems that are inflexible when it comes to generating new reports as demands on the business change.

Some organizations use BI in a way that puts less emphasis on the historical data and more on future scenarios, which involves predictive analytics. In other words, BI is used more as a tool to receive feedback from the operations, in combination with external data, to analyse and make future-oriented actions. Gabbi, a Senior Manager stated:

“The reports that you get informs you about different key metrics in the organization. In practice, that is often what it comes down to. But the more general definition is about the system of insights that you deliver to the organization so that you can act and change operations. So, it is much broader than the BI reports as such”

All the respondents mentioned BI as a technical tool consisting of modules, applications, methods etc. Everyone agreed that BI itself is easy to implement and maintain. However, merely installing a BI-system does not entail that an organization will successfully take advantage of BI. All respondents were in agreement regarding what success related to BI (on a high level) means. This can be summarized with Gabbi’s statement: “Success could be to significantly increase the revenue of the company because they are being more efficient than everybody and being forward thinking with the insights they get”.

5.1.2 Larger Phenomena

According to the Manager named Ben, many BI-developers have started to incorporate Machine Learning and Artificial Intelligence that involve both descriptive and predictive, but also prescriptive analytics. The BI-system can then not only answer “what” will happen, but also “when” and “why” it happens. Ben stated that not many organizations have come this far with BI. In addition, Ben pointed out that it is important to know that there is a grey area between BI and Business Analytics (BA). Most organizations know the difference and, despite this, all respondents agreed that an organization cannot have BA without BI. Hence, many organizations tend to mix the two concepts. No matter if BI incorporates descriptive,
predictive or prescriptive analytics, all respondents agreed that it helps managers to get a holistic perspective of the organization. Furthermore, Jan stated: “BI creates a harmonized and joint version of the truth”.

The two examples described below illustrate that actions made from BI insights enable organizations to go from being reactive to become proactive. In each case, this contributed to cost reduction, increased quality, and better-informed management.

Frej, a Senior Manager, once helped a public transport company improve their punctuality with BI. The client had long thought that delayed transports were due to the chauffeurs not following routines. The client already had data about the delays but wanted to use BI in order to better comprehend when and where the delays occurred. Frej and his team used existing data sources, including data from sensors on the vehicles. The BI-system generated insights about when the vehicles arrived at the stations, how long they stayed there, how fast they were driving, how many passengers entered etc. All of these insights were collected into a dashboard in order to obtain an overview of all delays in the specific region. By looking at the dashboard, the client found that most of the delays actually occurred at the workshop, when the vehicles underwent maintenance. Most of the vehicles were in the workshop for too long, meaning that the delays were not caused by the chauffeurs. The client further developed their BI to predict when various parts of the vehicle needed to be repaired. This allowed the client to identify and replace parts before the vehicle broke down.

Moa, a Senior Manager, was part of a team that helped an organization improve their deliveries with BI. The organization’s deliveries were often delayed, and the client thought that the problem was in manufacturing, i.e., the products took too long to produce. Moa and her team collected all information about the delivery, and lead time in BI. The generated dashboard showed that there were no problems with production. The delays arose because the delivery trucks needed to be certified before the finished goods could be shipped. This certification process was not initiated until the final product was completed, which created a lead time of two weeks. However, due to these insights, the client could be more proactive. By predicting when the products would be finished, they could apply for a certification in advance, thereby reducing the lead time significantly.

5.1.3 BI in relation to other Capabilities

It was obvious for all respondents that BI does not work effectively by itself. In order to take advantage of BI and reach a desired level of success (e.g. higher profits, lower cost or better maintenance management), organizations need to combine the BI-system with capabilities throughout the entire organization. Frej mentioned that established processes allow employees to make decisions based on the BI insights and communicate it to other employees and departments. According to him, the processes determine the actions, and this is usually a key differentiator for success. Frej stated:

“The purpose with BI is to support various decisions in operations, as well as at the strategic level. With this said, it is crucial then that the BI relates to decision-making processes that are already established in the organization.”

Hence, all respondents argued that the issues organizations face with BI is not the system itself, but the interaction it has with other organizational processes and capabilities the organizations have in order to efficiently utilize BI. In addition, it was clear for everyone that
technological aspects regarding BI were not crucial. What is of importance is to properly incorporate other capabilities into the BI process.

Another interesting topic pointed out by Moa, and supported by Jan, Frej, Gabbi and Rob, was how an organization’s size and age impacts the successful use of BI. Moa argued that it is more difficult for old and large organizations with many legacy systems, and deeply rooted routines, to integrate BI-systems. This is because of the historical and established routines that act as barricades for change in these organizations. According to Moa, employees often react with “this way has always worked, it is what we have always done”. This issue related to old and large organizations and is something Per, a controller at a pharmaceutical company, has experienced as well. Moa provided an example of this:

“Old, large, organizations could have a mix of 70 different systems that they have developed themselves. With these legacy systems, it becomes very difficult to integrate the BI-system. The technical work becomes more challenging. Then you also have the social aspect with an old culture that is often very resistant to change. And this journey is very hard to make. A lot of older organizations still believe that you can just buy the BI-software and have some BI-technicians install it and that it will automatically work. This is not true.”

However, start-ups do not have this history or established processes. Everyone except Ben mentioned that it is easier for small organizations (start-ups) to utilize BI. Jan further discussed that start-ups have the advantage of obtaining new, updated, technologies (software), without having to integrate them with old legacy systems.

5.2 Human Capital

5.2.1 Education & Skills

The most important skill to possess, in order to utilize BI’s full potential, is an analytical mindset. The employee should be able to scrutinize the information from BI and turn it into relevant insights. Rob stressed the importance of employees having business judgement and an understanding of the organization. Otherwise, he believed that the information from BI would not be turned into insights. Rob continued to explain that employees are not required to have any technical skills since many of today’s BI-systems are user friendly and intuitive. The interface and commands are easy to navigate and have been developed to be more user friendly. When the respondents were asked if employees required a specific educational background or distinct technical skills to work with BI, all agreed that this was not the case. All respondents said that an education (e.g. in engineering science) would most likely be a signal that the person would be analytical, but the education per se is not a prerequisite for effectively using BI. Gabbi added that the analytical skills include a general knowledge about data and how it affects the outcome. Otherwise, all respondents said that almost everyone should be able to work with BI. The respondents stated that the right education could have been important with older versions of BI-systems, but not anymore.

Using BI effectively is more about having soft skills, such as being able to communicate insights, being flexible towards change, and having a curious mindset. On a higher level, Gabbi puts more emphasis on the fact that it is not only the individuals who work directly with BI who need to be analytical. The whole organization, or at least relevant employees and
departments, should become more “data savvy” so that insights can be communicated and interpreted correctly by everyone.

5.2.2 Leadership

The right type of leadership is of great importance when it comes to creating a data driven culture and effective use of BI. Per stated:

“Leaders are very important in order to create commitment among employees and clearly show them why they need BI and how it will improve their daily work and the business”

Rob argued for a visionary leadership that can facilitate the transition of a culture around data. However, in reality, organizations are still failing to realize this. Moa stated that there must be strong leadership within organizations and that the leadership must communicate the need for change. She adds that “We cannot work like we did in 1920, it’s soon 2020 and we need to change our mindset”. According to Frej, the initial commitment has to come from top management, spreading down to the lower levels of the organization. Yet, in reality, the realization of change often “comes from the developers in the basement” as Frej expressed it. It is not until the leaders become devoted that the organizations have the possibility to make use of BI. Gabbi strengthened this with the statement:

“If you have a manager that believes in the value of data and analytics... Then everybody within his/her team is likely to move in that direction.”

Jan had first-hand experience of how leadership can lead to success or failure when utilizing BI. From his point of view, information generated from BI needs to be communicated and shared from a department out to the organization. Having access to information is a way to have control and power. Hence, to share this information could result in less control and power. This requires a completely new mindset from leaders and often gets a lot of resistance. Jan explained: “One should know that there is a shift of power when information gets more accessible outside the department”.

5.2.3 Sponsorship

BI will not be used in an organization unless it receives sufficient sponsorship from top level management. They are the main influencers. It is mostly about signalling commitment and that the BI journey should be taken seriously by employees. All respondents agreed on this point and Ben, Jan and Per found this to be the most critical barrier for utilization of BI. Furthermore, Frej stated:

“As everything else, it [BI] needs to start from top management. It does not work if a team of developers start to work with BI in the basement, then nothing will happen. In other words, it [BI] must permeate all parts of the organization, and this only work if it starts from the top”

Gabbi added:

“You have to have strong commitment and strong signalling from top management saying that this is the way to run the business basically. This [BI] is not just a side activity that we do to be enlightened about how the operations are going, no this is a strategic function of the organization”
Hence, very little will happen unless someone with power and influence supports the development of BI and makes sure that it is integrated in the organization and that employees apply BI in their daily tasks (where possible). Jan illustrated this with his own experience from working with BI:

“*When I was working within the business controller department for X, the employees of the department thought that the support from a BI system could really help to extend the analysis made in the accounting department. However, the CFO did not support this decision and the team, and I quickly understood that it would be futile to try and integrate BI in the accounting department. However, we also found opportunities for BI in the sales and marketing department. The CEO supported this decision and the BI system was integrated. As you see, the organization suddenly had two departments, one with BI and one without. And this was only because of different interests of top management.**”

Success with utilizing BI requires that top management is clear with what they demand from the organization. They need to state what they expect from the BI and what path they want the organization to take. Due to the importance of sponsorship, many organizations have started to adopt a governance model for data gathering, and BI usage.

5.3 Coordination & Integration

5.3.1 Data Quality

All respondents discussed the problem with data quality issues. Moa, Gabbi and Rob argued that this was the most critical barrier to take advantage of BI. However, all respondents pointed out that it is not the BI-software that causes the information to be poor. It is the social processes and other routines that hinders the right data to be put into the BI-system. The respondents said that quality issues will result in “garbage in - garbage out”, meaning that if the right data is not put in, or if there is not sufficient data in the BI-system, the information generated will have poor quality. In other words, the data is not telling you what you need to know. Gabbi explained data quality issues with an example:

“A sales manager receives insights from BI, telling him/her that sales are decreasing, but does not inform why it is happening. This is one of the problems with lack of sufficient data quality. This could have been solved if the BI expanded its scope to other data sources”

Gabbi mentioned one example where data quality issues could arise, and that is when the data that is put in to the system is created in isolation. Organizations often use analysts who develop the BI-system and decides what data to put in. However, this is often done without discussing it with people who will actually use the information from BI. Gabbi provided an example:

“The sales manager wants the BI to produce a scorecard for all customers. However, since the BI was developed in isolation, the sales manager does not know what the scorecard is based on, and what assumptions have been made. This results in that the sales manager has very little context around the insights from the scorecard and then it becomes very difficult to act upon that information”
Another issue is that BI consolidates data from various sources, trying to create “one version of the truth”. However, the problem with organizations is that these sources can differ significantly, and the information is spread throughout the organization, making it hard to collect. In addition, a lot of inputs are interpreted differently. Defining different concepts, and having the same definitions, is something organizations struggle with today. All respondents have experienced that a lot of data quality issues arise because definitions are interpreted differently. Hence, it is crucial that everyone interprets definitions the same way if the organization wants to be able to fully utilize BI. Frej illustrated the issue with definitions:

“I used to work for X, there we discussed what a customer really was. One manager said that a customer is a person/company who buys a product or a service from us. In other words, there is a financial transaction. At the same time, there were persons/companies who used certain services for free and we could use the data collected from those persons/companies. There was a big dispute whether these were also our customers. This made it very difficult for the BI-system to make analysis about customers since the assumptions about what a customer was not well defined.”

All respondents agreed that achieving a data quality of 100% is nearly impossible. However, the respondents pointed out that 100% data quality is not something an organization should try to achieve because it is often time consuming and takes too many resources. Gabbi pointed out that organizations should not focus on getting perfect data. Instead, organization should focus on transparency, letting employees know how correct the data really is. Most organizations do not know if the data is good enough. This lack of transparency is very common today. Jan stated:

“80% is good enough. I have seen organizations spend an incredible amount of time and resources, trying to achieve the last 20%. There was one scenario where an organization worked for 3-4 years, building a complete information model. Then when they were almost done, the organization’s demand for BI had changed which meant that they had to restart building the model from scratch again”

Old legacy systems can also cause data quality issues. Often, BI is not able to transfer the data from told legacy systems in an easy and efficient way. The consequence is that a lot of data will not be used by the BI-system, making it hard to get rid of the legacy systems. Later, when organizations compare the information from BI to their own systems, it is like comparing “apples and pears”. You cannot use the information because it does not make sense.

5.3.2 Communication

For BI to be profitable and reach a high potential, it needs to be linked between departments. Not just the output that the system produces, but also the input-data needs to be combined from different departments. Not until then can managers get valuable and holistic analyses. Once insights from the BI-system are generated, they need to be communicated to the rest of the organization. The organization has to be cross functional according to Moa. Jan stated that BI will be a catalyst for internal efficiency if departments break the traditional information silos. However, this is problematic in many organizations according to Moa, since “There is often a feeling of we and them”, which is sub-optimising the whole organization.
The world is becoming more interlinked through data and so are organizations. Frej stated that “If sales do not communicate how many new customers or orders they have received to the product development, there will be no effect”. In the light of BI, the technology would not be optimally aligned with other capabilities, according to Frej. Gabbi also argued that a lot of business cases for BI only gain success if you gather information from many departments, meaning that a cross functional collaboration is crucial. Gabbi added that organizations who wish to mitigate the risk of misalignment should frequently involve the end users, the people who are going to act on the insights obtained from BI. This will ensure that the information hits the right target. This will also result in end users becoming more confident that the insights that they get are correct.

An interesting thought pointed out by Ben is that he believes it will become more difficult to communicate the information throughout the organization in the future. Firstly, it takes a lot of time to communicate the right information to the right person in the organization, mainly because it can be difficult to know who the right person is. Secondly, Ben believed there will be more compliances regarding customer data etc. that will hinder transparency within the organization. Finally, future organizations will have their secrets in the shape of information models and analyses. Hence, the organization will not be able to communicate this information (company secrets) as transparently as they used to.

5.3.3 Governance

In order to effectively work with BI, and make sure that the organization takes advantage of the insights generated, the BI-system needs to be governed. It is crucial that someone is responsible for the BI-system, otherwise no one will update the data sources, maintain the system or make sure the information generated gets communicated. Everyone except Rob suggested that a good way to govern information and data is to appoint a top-level manager to be in charge of this. Organizations are progressively doing this today, by hiring CIOs (Chief Information Officer) or CDOs (Chief Data Officer). Gabbi further suggested that organizations who appoint a CIO or a CDO send a strong signal for commitment to those lower in the organization. Frej stressed that these roles need a high strategic focus, as well as being part of the chief officer team.

While every respondent argued for a distribution of the information between departments, they also stressed the importance of having ownership of the data. This has to do with data quality issues. If someone is responsible, then one can expect problems that arise to be solved. It becomes more complicated if you have many parties involved. For instance, connected devices produce a high amount of data. Then the producing company, telecom operator, and IT-platform provider need to establish who owns the data. According to Gabbi, everyone wants to have ownership of the data, since it gives power and control. “People understand that data is the new oil” she added. Once again it becomes important to establish a data driven culture where data becomes a natural input to solve problems.

5.4 Structure

5.4.1 Data Driven Culture

Another fundamental pillar for effectively executing on BI insights, is to have a data driven culture. All respondents stressed this. Without a culture that supports information generation
and promotes action based on information, organizations will never be able to take advantage of BI. This includes avoiding the usage of heuristics and rule of thumb, and instead making decisions based on facts. It also means that employees are able to test multiple scenarios based on various information, as well as do multiple analyses with different assumptions.

However, all respondents agreed that achieving a data driven culture is challenging. It often takes many years to make all employees rely on information. In addition, a data driven culture promotes everyday usage of information and employees should be curious to get new information. Employees should not be afraid of uncertainty, but instead try to use information to discover things they do not know. The data driven culture should also come with an acceptance of failure. There will always be trial and error, and employees will fail. The respondents said that failing should be seen as a requirement and a test. New information should be seen as an innovative process where employees want to test their way forward. As Jan mentioned:

“There will always be more failures than successes, because otherwise you will never learn. Once you have matured with your BI routines, then you will start to avoid failures. But you will always fail sometimes!”

Finally, a data driven culture is also about seeing data as an asset, not just something that exists within the organization. There is already a lot of information within the organizations, but not everyone chooses to handle this information the same way they handle their products or services. Hence, in order to execute on BI insights, employees must see the information as a valuable asset.

5.4.2 Strategy & Goals

Among the seven respondents, the six consultants realized that countless organizations have decided to implement and use BI without knowing why they are doing it. According to Moa, BI has been, and still is, a “hot buzzword” which causes managers to invest without due consideration. It is common to look at competitors and imitate their investments. Moa said:

“Even organizations look upon their neighbours and see what they do. If their neighbour does one thing [BI], then many organizations think they should get that thing [BI] as well”

This is an issue since BI will not be aligned with the organization's overall strategy and vision. Consequently, organizations will at best produce mediocre results. All respondents mentioned the importance of having strategy and goals that are linked to data. Hence, an organization should know in advance what they want to get out of BI. Moreover, it is an advantage if the organization can start with a critical business issue and isolate that issue when deciding to implement BI or not. After the issue is targeted, the organization can start to incrementally add more data sources and expand the scope of BI. As Gabbi expressed it: “Data is everywhere”. Thus, it becomes important to have a clear strategy what data sources the organization should focus on. She mentioned that it is important not to incorporate all the data that is available since that would become overwhelming and not add any value. “Don’t tackle the monster all at once” she added. Instead, one should align data that is of strategic importance. Ben said that organizations need to have a clear strategy regarding BI and what it should be used for. For instance, it could be to use insights from BI to better meet customers’ expectations. Without a clear strategy, Moa said that “People will just generate reports without knowing what to do with them”.
How well the BI-strategy gets executed in the organization is, according to Per, Gabbi, Jan and Ben, dependent on how well the BI-strategy is linked to other strategies. Those organizations that are able to do this often have the right type of strategy linked to other organizational capabilities. It requires a high organizational capacity to align all strategies in order to minimize all the “miss-steps” as Ben said. While it is important to have a strategy from the beginning, it is equally important to make sure that the strategy is being executed. Rob stated that organizations need to have related goals that are realistic for the employees to achieve. Goals are important since they steer employees in the right direction and embed an appropriate behaviour that is long lasting. From his perspective as a consultant, he has realized that many organizations fail to create the right type of behaviour related to BI. This was touched upon by Jan, Moa and Frej as well. They said that organizations think that the technology itself will induce the right type of behaviour.

Having a user adoption strategy involves measuring the right type of behaviour once the BI has “Gone live”. Rob gave examples of how one can measure the user adoption of BI. For instance, one BI KPI could be how many individuals have logged in to the new BI-system. This could help managers prevent users from going back to legacy systems (e.g. excel). Another KPI could be to measure how many reports have been generated from the BI-system. In addition, Rob stressed the need to measure the actions taken from the generated reports. He argued: “Many tend to only extract the reports and think this is enough proof that the system is successful”. Furthermore, he adds that it is harder to measure some types of actions. Specially if it is qualitative in its nature (e.g. innovation). In these cases, he recommends that organizations have a qualitative approach and conduct interviews with BI-workers in order to understand if the right type of actions have been taken.

5.5 Most Critical Barriers for utilizing BI

Of all the issues discussed by the respondents on the selected microfoundations, the respondents were asked to select the most critical barrier(s) for taking advantage of BI, as seen in table 7.

Table 7. Most Critical Barriers for efficiently utilizing BI

<table>
<thead>
<tr>
<th>Name</th>
<th>Critical Barrier:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ben</td>
<td>Culture and Sponsorship</td>
</tr>
<tr>
<td>Jan</td>
<td>Sponsorship</td>
</tr>
<tr>
<td>Moa</td>
<td>Data quality issues</td>
</tr>
<tr>
<td>Frej</td>
<td>Culture</td>
</tr>
<tr>
<td>Gabbi</td>
<td>Data quality issues</td>
</tr>
<tr>
<td>Rob</td>
<td>Data quality issues</td>
</tr>
<tr>
<td>Per</td>
<td>Sponsorship</td>
</tr>
</tbody>
</table>

As seen in Table 7, the most critical barriers are concentrated to sponsorship, data quality issues, and culture.
6. Analysis & Discussion

6.1 BI (Technology)

6.1.1 Definition

Based on the respondents’ statements, BI has many different, yet similar, definitions. This is not surprising since BI is an umbrella term consisting of applications, analytical methods and modules, as argued by Fink et al. (2017). In other words, one can argue that BI can be a mix of the aforementioned components and still be classified as a BI-system. The respondents focused both on the technical and social aspects of BI. The technical parts focused on reports that can be gathered from internal and external historical data, which aligns with Trieu’s (2017) concluding remarks. The social aspects discussed were already highlighted by the research of Choo (1996) and Işık et al. (2013), who argue that managers will reach a higher rationality in operations and improve decision-making.

As a consequence of the different definitions of BI, it was of no surprise that all the respondents gave different contentions regarding what performance related to BI involves. For instance, Frej mentioned a higher quality in operations, which confirms the deviation performance implications as mentioned by Trieu (2017). Due to these different opinions of performance, one can also suggest that Trkman et al. (2010) were correct when they discussed that employees will ultimately have different perspectives on which valuable outputs will be produced by BI. All respondents confirmed Işık et al.’s (2013) argument that successful utilization of BI will produce results of improved profitability, improved efficiency, or both.

Moreover, the empirical findings illustrate two cases where BI insights allowed organizations to go from being reactive to being more proactive. The same phenomena were discussed by Park et al. (2012), and Trieu (2017). Hence, the present study could arguably strengthen the assumption that BI insights can help organizations to better predict what will happen to them and their business. This will enable organizations to better prepare themselves and minimize negative, and maximize positive, outcomes.

6.1.2 BI in relation to other Capabilities

The empirical findings of the present study indicate that there is no relationship between implementation of BI and organizational success. The findings of this study corroborate Trkman et al.’s (2010) research, stating that BI - as a tool in itself - does not result in profitability. It is highly dependent on how well the technical capabilities, such as data quality, intertwine with the social dimensions (e.g. communication and governance structure). In other words, many authors (e.g. Carr, 2003; Trkman et al., 2010; Chae et al., 2005) are supposedly correct regarding their argument that BI has to be combined with other organizational capabilities in order to be successful.

While many organizations face issues related to data quality, it became clear that this was most likely due to social aspects. The same problem was encountered by Iveroth (2011). The empirical findings suggest that managers tend to focus largely on implementing the technical components of BI and expect drastic change. Hence, they do not consider the social aspects, such as assumptions, routines and behaviours. Purvis et al. (2001) revealed that the social
aspects are supposedly harder for managers to grasp and therefore easier to neglect. Ramamurthy et al. (2008) argued that larger organizations will be able to utilize BI better than smaller ones. The findings of this study contradict this. In fact, the respondents stated the opposite. They said that older organizations often have legacy systems and deeply rooted routines that act as barriers for using BI. Hence, we propose that more research is needed to critically review the findings of Ramamurthy et al. (2008). However, the findings of the present work point out that larger organizations have other benefits compared to smaller ones, which revolves around data. Larger organizations leave more “trails of data” since there are generally more employees in every department. The more data available, the better insights managers can get, and hence understand, larger phenomena, as argued by the respondents. This was also stated by Kallinikos (2013).

6.2 Human Capital

6.2.1 Education & Skills

Current theory argues that skilled, educated and talented professionals are crucial in order to utilize BI-systems (see Yeoh & Koronios, 2010; Acebo et al., 2012; Corrigan, 2015; Felin et al., 2012). However, the empirical findings suggest that technically talented staff is not as crucial as previously thought. A strong argument for this, provided by the respondents, is the fact that today’s BI-systems are user friendly and intuitive. This means that all employees should be able to use the system without great difficulties, and that they do not need to speak the “BI-language”. One can therefore assume that earlier BI-systems were not as developed, and that this is why there was more emphasis on technically talented staff. Despite this, an analytical mindset and soft skills are still relevant according to the respondents. In addition, the respondents argued that the primary source for BI success is efficient coordination & integration and organizational structure. However, this contradicts the findings of Heinrichs & Lim (2003), Wang & Wang (2008), and Di Domenica et al. (2006) who all argue that human skills and experience are the primary sources for success with utilizing BI. Once again, one can presume that education was important when the BI-system was less user friendly. However, this may not be the prevailing case. Thus, we argue that the understanding of what is required regarding human skills, related to BI, should be revised.

Furthermore, Clavier & Brar (2017) defined a set of hard and soft skills that are necessary for BI-employees to possess in order to transform BI information into action. The respondents stated that organizations should put more emphasis on soft skills, such as putting the BI information into different business contexts to understand how it affects the organization. Hence, even though the hard skills described by Clavier & Brar (2017) might impact the ability to transform BI information to actions, the empirical findings from the present study suggest that organizations should put less emphasis on the hard skills compared to the soft skills.

Another interesting result is that Pacino (2017) found that an organization’s biggest barrier in taking advantage of BI is lack of sufficient technological skills or staffing. However, the empirical findings of this study suggest otherwise. The respondents argued that the most critical barriers for taking advantage of BI has little to do with skills or employees. Instead, the most critical barriers are sponsorship, data quality, and culture. Yeoh & Koronios (2010) found in their study that user-oriented management is crucial for utilizing BI. This was partially supported by the empirical findings from the present study. In addition, the
respondents argued that user-oriented management becomes less crucial if the organization has a well-established communication process. Then it is not crucial for the end users to work directly with the BI-system.

6.2.2 Leadership

That leadership is important for transferring knowledge into action is nothing new. Pfeffer & Sutton argued for this as early as 1999 and is still supported by research today (e.g. Edmonds, 2016). This study strengthens their arguments, i.e., that it is the leaders (management) who create the ability to build processes that efficiently convert BI-insights into action. In addition, the respondents emphasised the importance of leaders creating a commitment among the employees, showing them why BI is beneficial and how they can take advantage of BI. This was argued for as early as 2010 by Yeoh & Koronios (2010). Furthermore, the respondents pointed out that leaders need to have a clear vision of what to do with insights from BI and have a long-term perspective. This was discussed back in 2004 by Mathi (2004). Thus, one can assume that it is still relevant today. In addition, Yew Wong (2005) mentioned the importance of leaders being able to promote change in an effective manner and have the right tactics for integrating knowledge into the activities of the organization. These factors were also supported by the empirical findings obtained here. Hence, we suggest that the knowledge regarding the importance of leadership, related to transforming BI information into action, is still relevant.

6.2.3 Sponsorship

The empirical findings obtained here revealed that sponsorship is one of the most critical factors to efficiently utilize BI. As described above, differences in sponsorship can result in only some of the organization’s departments using BI. Hence, the empirical findings support the argument by Watson & Wixom (2007) who define the first key for BI success as commitment from senior management. Furthermore, the respondents agreed that BI success will usually only occur if there is an interest from top-level management. As the respondents described it, the willingness to work with BI has to start from the top. It will not work if only the developers try to force BI on the business units. This is in line with the arguments by DeBroux & Reed (2015) who also describe the importance of a top-down approach. Both the literature (Watson et al., 2016; Perez, 2015) and the empirical findings suggest that sponsors should preferably have a Chief Officer position. Furthermore, these sponsors are arguably better positioned to facilitate change in utilizing BI when necessary.

In addition to creating commitment among employees, Watson et al. (2016) shed light on the importance of informal influence. The authors explain that this is a facilitator for pushing BI-projects forward. The empirical findings of the present study strengthen this assumption and suggest that influencing others is very important to make sure that BI is integrated in the organization and that employees apply BI in their daily tasks. Arguably, the empirical findings obtained here put more emphasis on the importance of sponsorship compared to previous literature, illustrating that sponsorship is something critical in order to efficiently utilize BI.

6.3 Coordination & Integration

The importance of coordinating and integrating BI into the organization was obvious for all respondents. The empirical findings suggest that BI cannot be seen as an additional tool to the
organization. It needs to be a part of every process and the information needs to be handled as any other asset. The importance of this microfoundation was discussed by Merchant & Stede (2007), Felin et al. (2012), etc. The existing literature claims that various coordination and integration activities can facilitate effective utilization of BI, increase actions and reduce the time it takes to implement the action (e.g. see Yeoh & Koronios, 2010 or Felin et al., 2012). These arguments are supported by this study.

### 6.3.1 Data Quality

All respondents discussed the issue of data quality. They even used the same axiom as many other researchers (e.g. Yeoh & Koronios, 2010 and Watson & Wixom, 2007) “garbage in - garbage out”. The respondents defined this in the same way as is done in the literature. Basically, if the information you put into the BI-system is not good, then the quality of the insights you get will be poor. However, authors like Yeoh & Koronios, (2010) and Watson & Wixom (2007) suggest that this is due to inexperience or lack of knowledge of the employees. The present study suggests otherwise. The empirical findings imply that data quality issues do not arise because of a shortfall in the human capital microfoundation. Instead, this study suggests that the fault lies in poorly managed processes and routines for coordination and integration. More specifically, data quality issues could arguably occur due to systems created in isolation, lack of communication or concepts and definitions interpreted differently. Hence, we suggest that researchers should possibly include more capabilities when investigating data quality issues in relation to BI.

### 6.3.2 Communication

One of the most relevant and discussed topics discussed by the respondents under coordination & integration, was communication. There was a mutual agreement that communication can facilitate BI insights getting transferred throughout the organization, but that it can also hinder the utilization of BI if the communication is poor. This can be compared to the findings of Janz & Prasarnphanich (2003), Srikanth & Purunam (2011) and Yeoh & Koronios (2010) who found that good communication will lead to higher integration within the organization, in the form of knowledge sharing and gaining more sources of information. In addition, the empirical findings highlight the importance of communicating across departments since the insights from BI could affect several departments. This cooperation is something Felin et al. (2012) stress as well. The respondents also mentioned that effective communication will result in one version of the truth. Hence, the information will be transferred correctly, allowing everyone to see the same numbers, identical dashboards, use same definitions etc. This is also discussed by Ramakrishnan et al. (2012) and Clavier & Brar (2017). These authors also suggest that efficient communication can help organizations evade data quality issues. Hence, the benefits of communication have been written about in many articles and are found to still be relevant in this study. Thus, one can assume that this argument is still valid for organizations.

Another interesting aspect discussed by the respondents was the need for cross functional teams. Felin et al. (2012) discussed this as early as 2012 where cross functional teams can integrate different elements and knowledge resources. This was reflected in the present empirical findings. The consequences of poor communication discussed by Watson & Wixom (2007) and Deng & Chi (2012) were also brought up by the respondents. Hence, we suggest that the argument that communication with low transparency can result in less actions from BI insights, is still valid.
6.3.3 Governance
Results from the present study indicate that little gets done with BI unless the organization has a working BI governance. Results from several authors validate this finding (e.g. see Watson & Wixom, 2007; Yew Wong, 2005 or Deng & Chi, 2012). More specifically, Watson & Wixom (2007) state that BI projects that are correctly managed will be allocated the necessary resources and provided with a clear vision (making it easy to know who is responsible for what). This was also discussed by the respondents, thus, supporting the arguments by Watson & Wixom (2007).

In addition, the empirical findings of the present work and results in literature agree with what it means to have an efficient BI governance. In line with Deng & Chi (2012), the respondents stressed that specific roles and responsibilities need to be made clear. Furthermore, the empirical findings obtained here also suggest that internal ownership of the information needs to be clearly defined to avoid political games. Hence, the present study suggests that BI governance is at least as important as it was previously. In addition, the empirical findings shed light on the importance of internal ownership of the information, something that lacks attention in current BI governance literature.

6.4 Structure
Current literature is consistent regarding the importance of structures at the organizational level and within the organization. For example, Felin et al. (2012) write in their article that organizational structures provide the pillars for an organization’s collective actions and set the conditions that can enable or constrain other microfoundations that impact the organization’s taking action. The empirical findings obtained here revealed that structures are highly relevant when investigating how organizations utilize BI. Hence, one can argue that the type of structures that an organization has will impact the transformation of BI insights into actions. However, as is discussed in existing literature, it was difficult for the respondents to define what type of structures suits organizations best. This was because it is difficult to conceptualize structures, as well as finding “one size fits all”. This issue is also found in current literature (e.g. Foss, 2003 and Felin et al., 2012). Despite this, the present study reveals that organizations should not neglect the importance of social structures, such as norms, philosophies and culture. More specifically, this study suggests that all organizations could arguably improve their utilization of BI if they create a data driven culture, something that is not properly discussed in the existing literature.

6.4.1 Data driven culture
A common axiom within business is that “culture eats strategy for breakfast”, which may sound like a cliché. However, clichés often tend to be true, and this axiom said it correct regarding culture linked to BI. In a broader sense, the empirical findings obtained here suggest that the culture needs to be focused around data. In other words, employees must base their decision on data, instead of their “gut feeling”. In addition, the organization must promote the use of information and analytics. This requires a higher level of transparency between departments and a greater level of communication compared to traditional organizations with information silos and an overall mentality of “we and them”. As the findings imply, a data driven culture revolves around a higher emphasis on knowledge transfer. This was also discussed by Hasanali (2002), Watson & Wixom (2007), and Mercadoa (2010). Not surprisingly, many organizations have a long way to go to establish a
data driven culture. On the other hand, this is arguably the most difficult change since it requires a change in paradigm or institutional logic (how employees think and behave). In line with Pfeffer & Sutton (1999) and what has been previously mentioned, many organizations tend to copy competitors. Organizations implement BI without really knowing “why” they should use BI. As the findings suggest, BI will not work sufficiently unless many of the other microfoundational aspects are fulfilled which can also be incorporated within the abstract term of “culture”.

Being able to make mistakes is not something that many organizations write, for instance, in a policy. Letting employees make mistakes should be “ingrained within the walls” and seen as something positive when employees begin to use BI. The empirical findings obtained here consider mistakes a necessity since they allow employees to “learn by doing” and reflect on one's actions. This supports Mackenzie's (2016) claim that mistakes are crucial for the improvement process. The findings reveal that BI-users initially take fewer actions even though insights are provided to the user. This could arguably be a consequence of people being too afraid of making mistakes since using BI involves a new way of working. In this sense, fear that is self-induced by the employee’s perception, or forced from the organization’s culture, will reduce taking risks. This is arguably problematic since innovation and creating a competitive edge involves a lot of risks (e.g. Bélanger et al., 2013; Mackenzie, 2016).

6.4.2 Strategy & Goals

If you do not know why you work with BI, nothing will happen with the insights you generate. This was a recurrent statement from all respondents. Hence, the empirical findings indicate that it is crucial to know what you want to do with the BI insights and why. In other words, organizations need to have a BI-strategy and objectives they want to achieve, before generating BI insights. The importance of knowing why you do things was discussed as early as 1999 by Pfeffer & Sutton (1999). These authors discussed that this was crucial in order to convert knowledge into action. Consequently, we suggest that this could arguably still be relevant for today’s organizations.

Furthermore, this study suggests that one explanation why some organizations are not utilizing BI efficiently, is due to the absence of a strategy and vague objectives. This supports the claims of Yeoh & Koronios (2010) that, in order to fully take advantage of BI, organizations need clear and specific objectives. The empirical findings of the present study revealed that organizations who use KPIs when transforming BI insights into action have a better possibility of utilizing BI's full potential. For example, KPIs could measure progress, the number of reports being generated by the BI-system, and the number of insights being transformed into actions. It is important to start measuring the actions related to BI once the scope has been established. Otherwise organization face the risk of users going back to the old way of working if the user adoption is not prioritized (as discussed by Iveroth, 2011). Following up employee behaviours will be a strong influencing factor for creating a data driven culture. Of course, In the beginning one can expect resistance from employees due to uncertainty. However, when the right behaviours get reinforced, they will become permanent or “taken for granted”. Hence, one can assume that a clear strategy, with concrete goals, will facilitate a “data savvy” culture.
7. Conclusion

At present, BI-systems are very popular topics on organizations agendas, and many have implemented BI. Even though the system is easy to implement, and the BI-system itself functions well, not many organizations are able to efficiently utilize the full capacity that BI offers. The aim of this study was to investigate how organizations can transform BI insights into actions and which capabilities impact this transformation. This study found that organizations who use the full capacity offered by BI, will be able to be more proactive in their actions.

However, in order to use insights offered by BI efficiently, organizations need certain capabilities. Current BI-experts have highlighted specific capabilities, under each microfoundation, that are important for organizations. More specifically, the BI-experts interviewed in this study argue that lack of sponsorship, poor data quality, and not having a data driven culture, are the most critical barriers that can hinder utilization of BI. In addition, the findings suggest that organizations should focus on leadership and having efficient communication channels, making sure that all employees use the same concepts and definitions. Furthermore, organizations should aim to have a BI governance, in order to make sure that the information gets transferred and used by the right people at all levels in the organization. This includes allocation of responsibilities and defining roles. Moreover, BI-experts state that organizations who have a data driven culture, as well as a clear strategy and well-defined objectives for utilizing BI, will arguably have an increased probability of converting BI information into actions. This is because organizations will be fundamentally prepared, and the employees will know why they use BI and how to act on insights gained from BI. This is summarised in Figure 4.

![Figure 4: Summary of findings](image)

However, it is important to note that these experts have generalized their experiences from all industries where they have worked. Hence, these suggestions may differ depending on the organization’s circumstances. Furthermore, BI-experts argue that the notion of education and hard skills could be less important than previously thought. This is because BI is becoming easier and more intuitive to use, making specific education, knowledge about BI, or technical
expertise less relevant. However, it is important to note that these BI-experts are consultants and are essentially sales representatives of BI-services, which may impact their perspective and objectivity about implementing and using BI. Nevertheless, these findings contradict previous literature, where many researchers argued that technological skills and expertise were the most important capabilities of all microfoundations.

It is also important to note that this study was done with a targeted methodology, providing a narrow sample of respondents. Hence, we are aware of the limitations of these findings and the arguments made. Therefore, the empirical findings should not be generalized, and should be used with caution. Nevertheless, this study has indicated that certain existing theories might be outdated, although the limitations if the present study does not allow us to conclude that this is definitely the case. Despite this, the focus of this study was to shed light on possible explanations on why organizations are, or are not, able to turn BI insights into action. Hence, the aim was never to find a causal relationship, rather provide a basis for further research within each specific microfoundation.

This study’s academic contributions include the insight that BI should arguably be combined with other capabilities, and the findings provide suggestions about which capabilities are most relevant. In addition, the findings provide an indication on what bodies of literature may need to be revised, and they have highlighted that further studies are needed. The practical contributions of this study include the fact that practitioners can consider the findings of this study when working with these types of questions in their organizations. For example, the findings provide practitioners with recommendations on which capabilities they should focus on.

7.1 Future research

Due to the qualitative nature of this study, we have highlighted certain topics within the microfoundations that ultimately result in various actions in organizations. With that said, future research could focus more specifically on a chosen capability in order to get an in-depth analysis. For instance, an ethnography would be a suitable methodological strategy since researchers could observe the microfoundational capabilities “in action”, and over a longer period of time. This could be done through a multiple case study within a specific industry, or a single organization where the employees are observed.

More specifically, we argue that it would be interesting to investigate the relationship between employee education/expertise and utilization of BI, with today’s technology. This is because the findings obtained here contradict previous literature, since they conclude that technological skills and expertise might not be of as important as they were. It would therefore be relevant to investigate which skills that, in contrast to technological skills, have become more crucial to create a competitive advantage with BI. Another topic that is of interest is to analyse how the BI governance and the ownership of the data more specifically affects execution.
References


Appendix 1. Interview guide (English version)

- What is your professional background?
- What is your experience with working with BI?
- According to you, what department is it most common to work with BI?
  - Possible follow up questions:
    - What department has the highest success rate? Why?
    - What department has the lowest success rate? Why?
- What are the biggest problems you (your clients) have encountered when working with BI?
  - Possible follow up topics:
    - What technical aspect are essential vs “nice to have”?
- In what way does action differ from now prior to BI?
- How would you define BI?
- What type of skills and competencies does BI-workers need to fully use the system?
  - Possible follow up questions:
    - What soft and hard skills is important?
    - Can everyone learn these skills, or does it require education or previous experience?
- What kind of leadership is most suitable for promoting the usage of BI?
  - Possible follow up questions:
    - Should the emphasis be on top executives or middle managers?
- How should leaders reflect upon making mistakes?
- What type of sponsorship is preferred in order to utilize BI?
- How should BI information be spread in the organization?
  - Possible follow up questions:
    - Should it be free or controlled?
    - What differs successful/unsuccessful organizations apart?
- How should information between departments flow?
  - Possible follow up questions:
    - Any specific rules or processes that needs to be established?
- How can organizations facilitate the BI workflow?
- How do you measure the usage of BI linked to actions?
- What types of organizational structures do you think is best to utilize BI?
  - Possible follow up questions:
    - How important is roles and responsibilities?
- What type of social structures do you think is important?
- Is it only decision-makers that should work with BI, or could it be others as well?
  - Possible follow up questions:
    - What mandate should the BI-user(s) have?
- How important are BI strategies & goals?
Appendix 2. Intervjuguide (Swedish version)

- Beskriv din professionella bakgrund
  - Vad är din erfarenhet med att arbeta med BI?
- Enligt dig, vilken avdelning arbete vanligast med BI?
  - Möjliga följdfrågor:
    ▪ Vilken avdelningen har högst sannolikhet att lyckas? Varför?
    ▪ Vilken avdelningen har lägst sannolikhet att lyckas? Varför?
- Vilka är de största problemen du (dina klienter) har stött på när du/de har arbetat med BI?
  - Möjliga följdfrågor:
    ▪ Vilken tekniska aspekter är nödvändiga vs. önskvärda?
- Hur skiljer sig agerande nu jämfört med innan BI?
- Hur skulle du definiera BI?

- Vilka typer av färdigheter och kompetenser behöver en anställd som jobbar med BI för att fullständigt utnyttja systemet?
  - Möjliga följdfrågor:
    ▪ Vilka härd och mjuka färdigheter är viktiga?
    ▪ Kan vem som helst lära sig dessa färdigheter eller krävs det speciellt utbildning eller erfarenhet?
- Vilken typ av ledarskap är mest lämplig för att främja användandet av BI?
  - Möjliga följdfrågor:
    ▪ Ska fokus vara på högsta ledningen eller mellanchefer?
- Hur ska ledare agera när misstag görs?
- Vilken typ av sponsorskap är att föredra för att utnyttja BI?

- Hur ska information från BI spridas genom organisationen?
  - Möjliga följdfrågor:
    ▪ Ska det vara fritt eller kontrollerat?
    ▪ Vad skiljer framgångsrika organisationer från icke framgångsrika?
- Hur ska informationsflödet mellan avdelningar vara?
  - Möjliga följdfrågor:
    ▪ Några specifika regler eller processer som måste etableras?
- Hur kan organisationer underlätta arbetsflödet för BI?
- Hur mäter man användning av BI länkat till ageranden?

- Vilka typer av organisationsstrukturer anser du är bäst för att utnyttja BI?
  - Möjliga följdfrågor:
    ▪ Hur viktigt är roller och ansvarsområden?
- Vilka typer av sociala strukturer anser du är viktiga?
- Är det bara beslutsfattare som ska arbeta med BI eller kan det vara andra också?
  - Möjliga följdfrågor:
    ▪ Vilket mandat bör BI-användare ha?
- Hur viktigt är BI relaterade strategier och mål?