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The Intelligent Business

- *an Assessment of Business Intelligence Practices in Large Swedish Organizations*

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Abstract

Title	The Intelligent Business – *an Assessment of Business Intelligence Practices in Large Swedish Organizations*
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Authors	Sebastian Johansson & Mikael Nilsson
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Key words	Business Intelligence, Best Practices, Assessment Framework, Decision Support, Analytics
Purpose	The purpose of this master thesis is to develop a new assessment framework, based on the best Business Intelligence (BI) practices proposed by academia, and use this framework for assessing BI practices in large Swedish organizations. Through this assessment, potential areas of improvement regarding the BI practices in large Swedish organizations should be identified and analyzed.
Method	In order to fulfill the purpose of this thesis, a review of BI literature was performed and semi-structured interviews were conducted at a number of large Swedish organizations. Concurrently, a new assessment framework was constructed, and applied in assessing the BI practices of the organizations studied. The overall research approach was of qualitative nature and included both deductive and inductive elements.
Empirical foundation	BI practices were examined through semi-structured interviews at 10 large Swedish organizations.
Conclusions	The compiled best BI practices proposed by academia resulted in the new Business Intelligence Assessment Framework (BIAF). In brief, the framework included a prioritizing of 13 focus areas, grouped under five categories, which were considered most important for successful BI practices by researchers. The BI practices in large Swedish organizations were mapped using semi-structured interviews, then assessed through the BIAF, and lastly illustrated by BIAF Radar Charts. The findings suggested that large Swedish organizations to a high degree differ in their BI practices, and that they generally are just barely fairly aligned with academia's best practices. The greatest discrepancies were found in areas regarding internal and external information sources, as well as the demonstration of BI value and benefits. Improvements were suggested regarding integration of more external information, as well as demonstration of more tangible BI benefits. Other areas, in which the discrepancies were large and improvements needed, were the use of unstructured data, data and information quality criteria, as well as continuous BI review and improvement.

Sammanfattning

Titel The Intelligent Business – *an Assessment of Business Intelligence Practices in Large Swedish Organizations*

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Nyckelord Business Intelligence, rekommenderade arbetssätt, ramverk för bedömning, beslutsstöd, Analytics

Syfte Syftet med denna mastersuppsats är att utveckla ett nytt ramverk för bedömning, baserat på forskares rekommenderade arbetssätt med Business Intelligence (BI), och använda detta ramverk för att bedöma arbetssätt med BI i stora svenska organisationer. Genom denna bedömning, kommer potentiella förbättringsområden för arbete med BI i organisationerna identifieras och analyseras.

Metod För att uppfylla uppsatsens syfte så genomfördes både en genomgång av BI-litteratur samt semistrukturerade intervjuer vid ett antal stora svenska organisationer. Samtidigt konstruerades ett nytt bedömningsramverk, som vidare användes vid bedömning av organisationernas arbetssätt med BI. Den övergripande forsknings-ansatsen var av kvalitativ natur, och inbegrep både deduktiva och induktiva element.

Empiri Arbetssätten med BI undersöktes genom semistrukturerade intervjuer vid 10 stora svenska organisationer.

Slutsatser De sammanställda rekommendationerna från forskare avseende arbetssätt med BI resulterade i det nya bedömningsramverket Business Intelligence Assessment Framework (BIAF). I korthet så inbegrep ramverket en prioritering av 13 fokusområden, grupperade under fem kategorier, vilka var ansedda av forskare att vara viktigast för ett lyckat arbetssätt med BI. Organisationernas arbetssätt med BI kartlades med hjälp av semistrukturerade intervjuer, de bedömdes genom BIAF, och de illustrerades sedan genom spindeldiagram kallade BIAF Radar Charts. Studiens resultat indikerar att större svenska organisationer i stor utsträckning skiljer sig åt i deras arbetssätt med BI, samt att de generellt sett är knappt mediokert koordinerade med forskares rekommenderade arbetssätt med BI. De största diskrepanserna mellan forskarnas rekommendationer och organisationernas arbetssätt berörde områden gällande interna och externa informationskällor, samt påvisande av värde och fördelar med BI. Förbättringar föreslogs avseende integrering av mer extern information, samt påvisande av fler påtagliga och finansiella fördelar med BI. Övriga områden, inom vilka diskrepanserna var stora och förbättringar behövdes, var användandet av ostrukturerad data och kvalitetskriterier för data och information, samt kontinuerligt arbete med granskning och förbättring av BI.

Acknowledgements

The authors would like to thank the people involved in the realization of this master thesis. The supervisor of this thesis, Håkan Pihl, provided valuable input that enabled the work to proceed whenever it stagnated. Staffan Arnbom and Peter Hultman from Ernst & Young were very helpful along the way, both by providing good industry knowledge and contact information to informant prospects, as well as in giving useful advice when needed. Lastly, we would like to thank all of the organizations and informants that participated in the interviews that laid the empirical foundation for this master thesis.

Given the fact that we had limited knowledge of BI from start, mapping academic literature on the subject, as well as investigating BI practices at large Swedish organizations, have been truly enlightening. Our hope is that this thesis represents one further step to uncover the essence of successful BI practices.

Sebastian Johansson Mikael Nilsson

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1 Introduction

In this chapter, the background, purpose, and research questions for this master thesis are presented, as well as definitions of central terms and delimitations made.

1.1 Background

In recent years, there has been a massive explosion of the amount of data available to organizations. The emergence and development of Information Technology and the Internet have been great contributors to the dramatically facilitated access to data. In addition, the costs of acquiring data have been drastically lowered by the aforementioned technological breakthroughs (Chaudhuri, Dayal, & Narasayya, 2011).

However, a potential issue resulting from the above can be an abundance of data, from which it can be hard to extract any relevant information (Loshin, 2003). As globalization makes competition tougher, pressure increases on managers of modern corporations to make more decisions in an ever-diminishing time frame (Langley & Coyle, 2008). This daunting challenge has given rise to the need for efficient decision-support mechanisms, which are able to sort out the relevant information from the vast data accessible. It is in this context the term "Business Intelligence" (BI) has been created to cover some, or all, parts of the process of converting data into relevant decision-supporting information (Rasmussen, Goldy & Solli, 2002). However, researchers have not been able to settle on a universal definition of Business Intelligence, resulting in various scholars promoting different definitions (Pirttimäki, 2007; Popovic, Turk & Jaklic, 2010). In chapter 3, there will be a more thorough description of BI in terms of its origins, definitions, and components.

Even if BI has been given increased attention in recent years, the process of extracting useful information from the data at hand is not new, and throughout the years, several different methods and concepts have been developed to approach this process (Williams & Williams, 2007). Nevertheless, with the new powerful systems used by major organizations today, BI has come to take a somewhat more data-centric approach (Chen, Chiang & Storey, 2012).

When reviewing academic literature on BI, the authors of this thesis found that there were limitations in the research previously conducted. This will be further explored in chapter 3, but the main issues identified included a lack of academic focus, as well as shortcomings of existing BI assessment models. The lack of academic focus involved a shortage of BI research and theoretical frameworks, as well as the fact that many publications on BI served commercial purposes. The shortcomings of BI assessment models comprised one-sided and narrow scopes, limited documentation without well-defined assessment criteria, and a weighing problem resulting in skewed BI assessments. Overall, these limitations appeared to

make existing BI research a fragmented field. In the same sense as researchers define BI differently, organizations practicing BI do it in different fashions (Williams & Williams, 2007). Thus, with the intention of coping with the field's fragmentation, a need was recognized for a new integrated theoretical framework in order to reduce the lack of academic focus of BI, as well as more accurately assess organizations' BI practices.

Based on a compilation of common best BI practices proposed by various researchers, the aim was to create a framework that could be used to assess how organizations practice BI. The approach entailed a broad focus without delving into superfluous technical details, and it encompassed the entire process from data acquisition to decision making, rather than a narrow scrutiny of a certain subarea. This way, the authors intended to make a comparison between BI practices in large Swedish organizations, and the best practices promoted by academia.

The authors found the comparison interesting from the perspective of determining to what degree academia and organizations are aligned on the subject of successful BI practices. Through this comparison, areas of incongruence could be identified, and the authors meant to further scrutinize the implications of these in terms of them being areas of improvement for the large Swedish organizations.

1.2 Purpose

The purpose of this master thesis is to develop a new assessment framework, based on the best BI practices proposed by academia, and use this framework for assessing BI practices in large Swedish organizations. Through this assessment, potential areas of improvement regarding the BI practices in large Swedish organizations should be identified and analyzed.

1.3 Research Questions

In order to fulfill the purpose of this master thesis, the following research questions should be answered:

1. What are the best practices regarding BI promoted by academia?
2. How is BI practiced in large Swedish organizations?
3. Are there any discrepancies between the above that could be seen as potential areas of improvement regarding BI practices in large Swedish organizations?

1.4 Definitions

In chapter 3, there are descriptions of BI origins, definitions, and components. However, in this section, there is a brief introduction to some central terms relating to BI.

In BI literature, it is common to distinguish between "data", "information", and "knowledge" (Pirttimäki, 2007). Thus, before presenting the chosen definition of BI for this thesis, it is relevant to present these key terms by using the definitions provided by Loshin (2003).

Data: "is a collection of raw value elements or facts used for calculating, reasoning, or measuring. Data may be collected, stored, or processed but not put into a context from which any meaning can be inferred." (Loshin, 2003, p. 6)

Information: "is the result of collecting and organizing data in way that establishes relationships between data items, which thereby provides context and meaning." (Loshin, 2003, p. 7)

Knowledge: "is the concept of understanding information based on recognized patterns in a way that provides insight to information." (Loshin, 2003, p. 7)

See figure 1.1 below for a graphical depiction of the relationships between data, information, and knowledge.

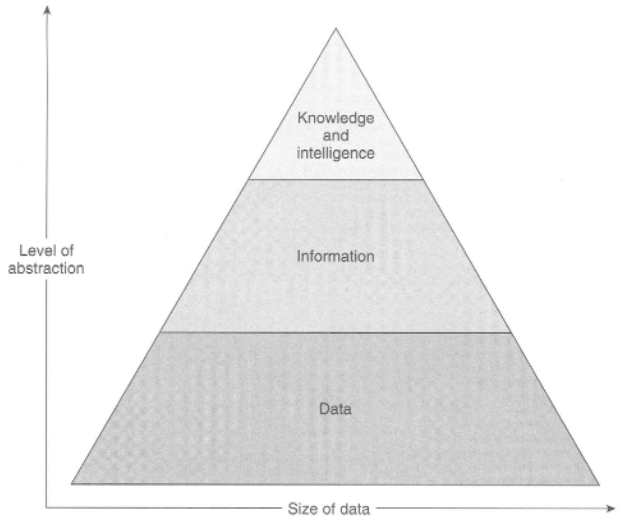


Figure 1.1 "A pyramid of abstraction" (Loshin, 2003, p. 4).

As previously stated, there is no well-recognized definition of BI in academia. However, there is one definition provided by The Data Warehousing Institute in their Faculty Newsletter of Fall 2002, and quoted by Loshin (2003), which was adhered to in this study:

> *Business Intelligence (BI)*: "The processes, technologies, and tools needed to turn data into information, information into knowledge, and knowledge into plans that drive profitable business action. Business intelligence encompasses data warehousing, business analytic tools, and content/knowledge management." (Loshin, 2003, p. 6)

The definition was chosen based on its broad scope, which corresponds to the overall approach of this study that is further developed in section 1.5. In addition, it is, as Loshin (2003) states, "a great working definition" (p. 6) since it highlights the important process of turning data into action, and views BI as more than just tools.

Another term often used interchangeably with BI is “Big Data Analytics” (Chen et al., 2012).

1.5 Delimitations

The aim of this thesis was not to scrutinize any subarea in thorough detail, but instead get an overall view on how BI is approached and used in the different organizations. Consequently, there are no technical comparisons of the different systems used by the organizations. Even if this thesis to some extent involved technical elements, given the technical nature of BI, there was also a focus on managerial and organizational aspects when assessing the organizations’ BI practices. This was partly due to the authors’ limited knowledge regarding technical specifications of BI systems, and partly due to the aim of incorporating both technical and non-technical aspects in the assessment, as further discussed in chapter 4.

Moreover, this thesis did not focus on the implications of the organizations’ varying industries. Even though the authors acknowledge the industries’ importance for the organizations’ BI practices, the intention was to identify rather industry-neutral parameters in the practice of BI.

In addition, this thesis was written in collaboration with the consultancy firm Ernst & Young, and the research objects chosen were a number of their key clients from varying industries. One could have chosen another selection of research objects that were more alike; however, given the broad focus of this thesis, as well as the industry-neutral parameters used, the ambition was to minimize the importance of the different industries. Also, the generalizability of the thesis’ conclusions could have been greater with more research objects; nevertheless, the qualitative research approach applied resulted in a limitation of the number of organizations studied.

As for a discussion regarding the parameters chosen to be included in the assessment framework, this can be found in section 4.1.1 “BIAF Areas”.

1.6 Disposition

Chapter 1 includes a background to why the authors have chosen BI as a subject, followed by its purpose and research questions. Lastly, definitions of central terms and delimitations made are presented.

Chapter 2 describes the research approach used to answer the research questions. A methodology discussion is included, in which limitations are presented and the quality of the study is assessed.

Chapter 3 provides an overview of BI, including BI origins, definitions, and components. In addition, limitations in existing BI research are discussed to further motivate the need for a new theoretical assessment framework within BI.

Chapter 4 presents and motivates the Business Intelligence Assessment Framework (BIAF); the new theoretical assessment framework constructed and proposed by the authors of this thesis.

Chapter 5 describes the empirical findings from the interviews made, namely the BI practices applied within the organizations.

Chapter 6 includes an analysis of the empirical findings, using the BIAF described in chapter 4. In addition, potential improvements regarding BI practices at the organizations studied are discussed.

Chapter 7 presents the conclusions and limitations of the thesis. Also, suggestions for future research are provided.

A graphical illustration of the disposition is provided in figure 1.2:

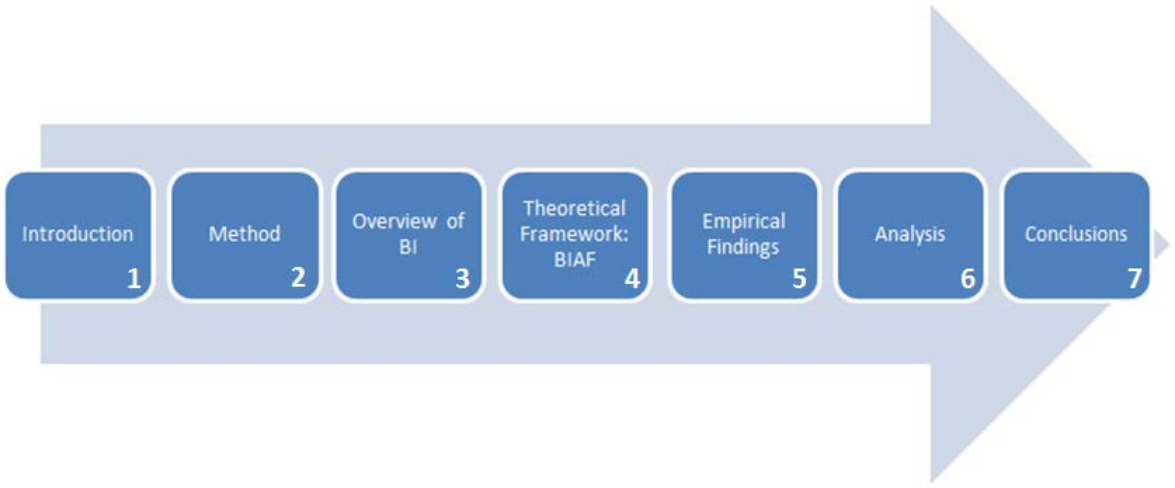


Figure 1.2 Disposition of Master Thesis.

2 Method

In this chapter, the research approach chosen to answer the research questions is described and motivated, as well as assessed through a methodology discussion.

2.1 Research Approach

The research approach chosen could be seen as consisting of three main parts, as seen in figure 2.1, which are integrated and linked to the research questions. In order to answer the first research question, a review of BI literature was performed in which common factors for BI success according to researchers were identified. With the purpose of answering the second research question, interviews were conducted with selected informants at a number of large Swedish organizations. Lastly, the third research question was addressed by constructing a new assessment framework, using elements from both the literature review and some of the initial interviews, and applied the framework in assessing the BI practices of the organizations studied. Each of these methods is further described separately below.

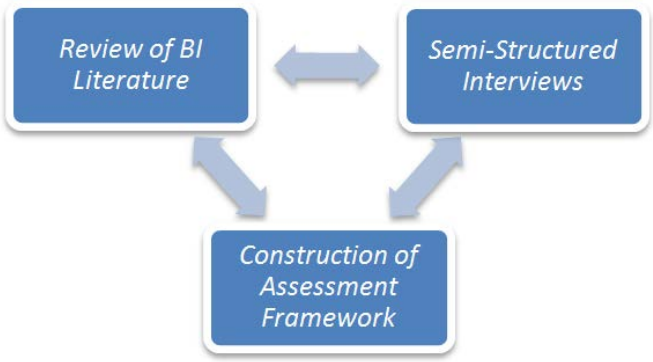


Figure 2.1 Main Parts of the Research Approach.

2.1.1 Review of BI Literature

When searching for academic literature on BI, the primary tool used was the Lund University search system LUBsearch[1]. In addition, some sources were retrieved by using Internet search engines, as well as the lending of BI literature at the Lund University Economics and Management Library.

From this literature, both descriptions of BI as a phenomenon as well as proposed best BI practices were extracted. The material describing BI was used to provide a background to BI, its definitions, and components, which subsequently resulted in chapter 3; “Overview of BI”.

[1] http://www.lub.lu.se/en/search/lubsearch.html

The literature promoting best practices within BI was compiled, in order to identify the most frequently mentioned success factors for BI, independent of industry. In this compilation, the best practices proposed were categorized based on the areas discussed. As the aim was to retrieve best practices regarding both technical and non-technical aspects of BI, a variety of success factors were included in the compilation.

2.1.2 Semi-Structured Interviews

In order to examine the BI practices of large Swedish organizations, qualitative interviews were concluded to serve the purpose the best. This is so since, as Bryman and Bell (2007) describe, the qualitative approach mainly entails semi- and unstructured interviews, which are more flexible to their nature than quantitative research methods. Since the intention was to uncover the organizations' BI practices on an overall level, the flexibility in the structure of the interviews was of essence due to the possibility of asking follow-up questions to clarify the informants' answers. However, since there were some specific themes to discuss, namely the areas compiled from the literature review, the semi-structured interview, as described by Bryman and Bell (2007), was considered a more suitable format than the purely unstructured one.

Jacobsen (2002) discusses research design from two dimensions, where one concerns whether it is intensive or extensive. The intensity of a research design denotes its depth, i.e. how many variables to account for, while the extensity denotes its scope, i.e. how many research objects to include. Even though it would be ideal to have great intensity and extensity, it is hard to accomplish given the fact that it would demand considerable resources (Jacobsen, 2002). Therefore, many researchers tend to choose either an intensive or extensive focus for their research design. Since the aim of this thesis was to describe a certain phenomenon in depth, i.e. organizations' BI practices, rather than strive for great generalizability, this study was more intensive than extensive to its nature. Jacobsen (2002) describes a certain type of intensive research approach as "small-N study", which, to a high degree, has characteristics corresponding to the research design of this study. The small-N study often contains between five and ten research objects, enabling the researchers to study each object in depth. This type of study is suitable when striving for a detailed description of a phenomenon across different contexts and places, as this study was.

The other dimension of research design discussed by Jacobsen (2002) is whether it is descriptive or exploratory. While a descriptive study aims to describe a situation or phenomenon, the exploratory design aims to causally explain why a certain situation or phenomenon occurs. Since the primary interest of this study was to describe how, and not why, organizations practice BI, the chosen research design could be classified as descriptive.

2.1.2.1 Interview Guide

When conducting semi-structured interviews, interview guides could be constructed containing certain themes the interviewers would like to discuss. The interviewee then has quite the freedom in giving the responses, and the interviewers have the option of asking follow-up questions that were not decided upon beforehand (Bryman & Bell, 2007). This flexibility and adaptability of the semi-structured interview as a format, was concluded to be appropriate for this study in order to provide an understanding of how the large Swedish organizations practiced BI.

The interview guide used for this study contained themes based on the areas extracted from the compilation of BI literature. However, there were possibilities to deviate from the pre-planned structure, and clarifying follow-up questions were asked. In addition to the themes, there were general questions, where the informant had the opportunity to describe the organization's overall BI practices.

Five of the initial interviews were used to construct the new assessment framework discussed in section 2.1.3. Thus, these initial interviews were used to revise the original interview guide, to further focus the remaining interviews on the areas chosen in the assessment framework. The original interview guide can be found in appendix 1, while the revised interview guide can be found in appendix 2.

2.1.2.2 Interview Setting

The five initial interviews that were used to construct the new framework were conducted in person. The reason for doing so was that in-person interviews have the advantage of allowing the interviewers to engage in observation, thus enabling them to respond to visual signs produced by the interviewee (Bryman & Bell, 2007). During several of these interviews, the interviewee used visual aids in explaining certain concepts or structures, which was why in-person interviews were preferred at that stage.

However, after the five initial interviews, a better understanding of the areas of focus was gained, resulting in telephone interviews with the informants from the remaining five organizations. The main reason for this was the reduced devotion of time and resources required, as described by Bryman and Bell (2007). In addition, Bryman and Bell (2007) state that one advantage of telephone over in-person interviews was the fact that the interviewee is not as easily affected by the interviewers, thus possibly resulting in more truthful answers.

2.1.2.3 Selection of Organizations

The research objects chosen for this study were large Swedish organizations from different industries, since the aim was to investigate how BI was practiced across industries in settings where many people, divisions and projects came together. Even though there are international standards for classifying companies traded on stock markets, this study included both privately owned companies and organizations in the public sector. Thus, traditional frameworks were not applicable, and instead the selection criteria for what deemed an organization as "large" and "Swedish" were set to a minimum number of employees of 2 000, a turnover/appropriation budget of at least 20 billion SEK, and with headquarters in Sweden.

Apart from being large and Sweden-based, the selection of organizations included them being prioritized key clients of Ernst & Young, as well as being potential or actual users of a BI platform. A further description of the organizations chosen can be found in appendix 3.

2.1.2.4 Informants

The semi-structured interviews were conducted with one informant from each organization, chosen jointly by the authors and Ernst & Young. The reason for involving Ernst & Young in this selection was their pre-existing knowledge of the organizations in question, which enabled them to identify relevant informants who they believed would be able to answer the questions the best. However, there were certain criteria set by the authors that all informants had to fulfill in order to qualify for the study. The informants should have:

- had some experience of BI
- been able to affect the BI practice within the organization
- been able to have an overall view of the BI practice within the organization

A further description if the informants interviewed can be found in appendix 3.

2.1.2.5 Interview Presentation

The semi-structured interviews were not transcribed, and the reason for this was two-fold. Firstly, the study did not aim to capture certain contextual aspects such as interview environment, mood, or emotions etc. Therefore, a transcription describing this was considered redundant. Secondly, given the time limit, transcriptions of all the interviews would have been too resource- and time-consuming. Instead, encapsulations of the interviews were produced, containing the most interesting aspects for this study. This could also be seen as a step to reduce the amount of irrelevant data that qualitative interviews often produce (Bryman & Bell, 2007). These encapsulations comprised approximately 1 500 words each, and due to their aggregated magnitude they were not included as appendices, but can be provided by the authors on request.

2.1.3 Construction of Assessment Framework

As previously described in section 1.1, and further elaborated upon in sections 3.4 and 4.1, a need was identified for a new theoretical framework within BI. In the construction of the framework, presented in its final form in chapter 4, both the literature review and the five initial interviews were used.

Based on the compilation of best BI practices from the literature review, an interview guide was constructed. Using the interview guide, five initial semi-structured interviews were conducted in order to examine what areas that were focused on the most by the organizations interviewed. From the findings of these interviews, certain areas more frequently discussed were chosen in order to be the focus of the new assessment framework. Thus, a selection from the initial compilation of best practices was used for further scrutiny, resulting in the framework presented in chapter 4. Lastly, the interview guide was revised, and used to conduct the remaining five interviews.

A graphical illustration of this process is provided by figure 2.2:

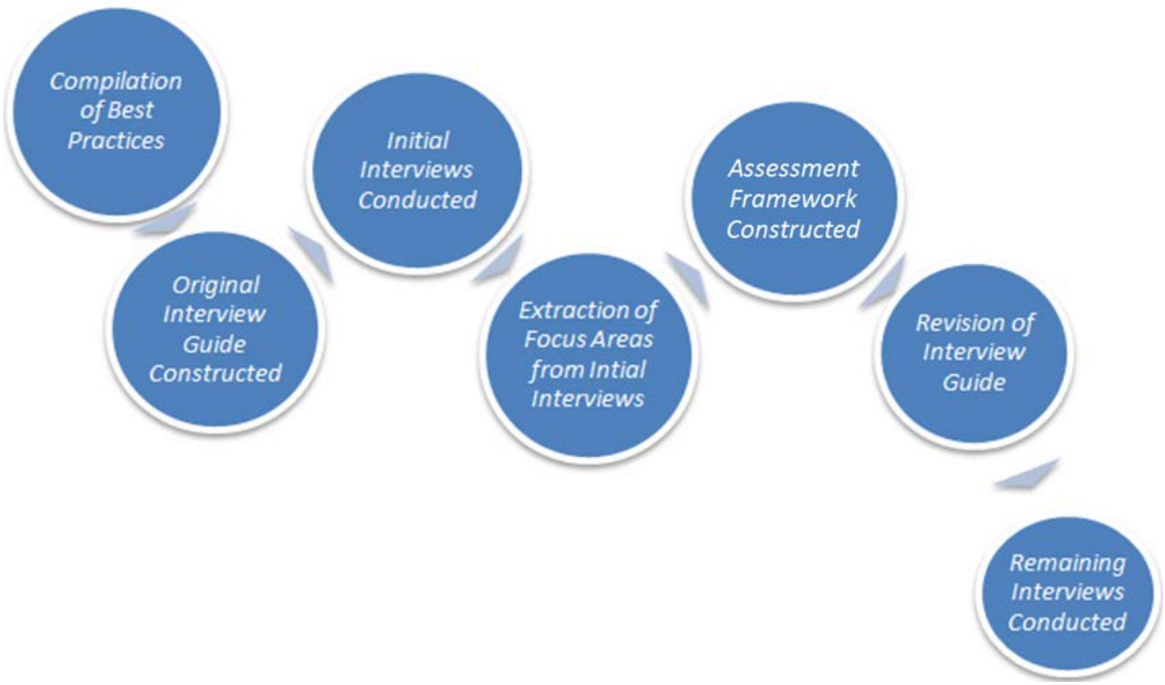


Figure 2.2 Construction of Assessment Framework.

The approach used can neither be classified as fully deductive nor inductive, applying the definitions of Bryman and Bell (2007) and Jacobsen (2002). Instead, the process contains both deductive and inductive elements. The procedure of compiling best practices from academia, constructing the original interview guide, and then conducting the initial interviews could be regarded as a deductive approach, where theory precedes the observations made (Bryman & Bell, 2007). As could using of the new framework for revising the interview guide, and then conducting the remaining interviews. However, the procedure of using the initial interviews in

order to find focus areas, which then are used as a foundation for the construction of a new framework, could be regarded as observations preceding the theory constructed, thus representing an inductive approach (Bryman & Bell, 2007).

2.2 Analysis of Empirical Findings

The analysis of the empirical findings from the semi-structured interviews was performed by using the new assessment framework constructed, as presented in chapter 4. The BI practices of the organizations studied were assessed using the framework's levels, which is further described in section 4.1.2. The result from the assessment was then analyzed, with a focus on what could be regarded as areas of potential improvement for the organizations in their BI practices.

2.3 Methodology Discussion

2.3.1 Review of BI Literature

Due to different definitions used and various labels on decision-support concepts, as well as a limited time-frame, the authors acknowledged that it was challenging to compile all research revolving BI. Therefore, a selection had to be made based on the authors' appraisals of the literature's relevance and appropriateness to the topic.

2.3.2 Semi-Structured Interviews

When using a qualitative research approach, it could be rather troublesome to claim that the conclusions are generalizable to a certain population (Bryman & Bell, 2007). The conclusions made will mainly relate to the specific Swedish organizations in question, and the specific views presented by the selected informants. Also, the selections of the organizations and informants have been influenced by the authors' considerations and informant availability, rather than being selected through a probability procedure.

As the interviews were only conducted with one informant at each organization, the view of that informant becomes prevailing, even though the informant may have a biased and limited view of the organization's BI practices. Moreover, this potentially biased view could have resulted in an idealization of the BI practices presented to us by the informants. Yet, the experiences from most interviews were surprisingly frank interviewees providing self-critical reflections and description of their BI practices. Nonetheless, in order to get a more holistic view of each organization, interviews could have been conducted with several informants at various levels and divisions. Still, it is the view of the authors that the interviews have provided an understanding of how the BI is practiced in the organizations studied. As for the

generalizability of qualitative research, the authors agree with Bryman and Bell (2007) in that it is the quality of the theoretical inferences that are subject for generalizability for a study like this.

2.3.3 Construction of Assessment Framework

One could criticize the process of constructing the new framework from the basis of being incoherent due to the usage of both deductive and inductive elements. However, the authors considered it to be necessary to start reviewing the research made on BI, as well as examining what was focused upon by organizations, before constructing the new framework. The framework was aimed at focusing on the most critical success factors of BI, and therefore it was considered appropriate to take account for both the perspective of academia as well as of the organizations. A further discussion of the selection of focus areas, as well of the assessment levels, can be found in chapter 4.

2.3.4 Analysis of Empirical Findings

Due to the limited selection and qualitative approach used, any extensive statistical analysis on the material was not made. Instead, the constructed assessment framework was used to identify discrepancies between the best practices promoted by academia and the BI practices of the organizations. As the framework is new, the authors acknowledge that further testing is needed to appraise its comprehensiveness.

2.3.5 Overall Quality

2.3.5.1 Validity

Bryman & Bell (2007) discuss validity in qualitative methods from two perspectives; internal and external validity. The internal validity involves the degree of correspondence between the researchers' observations and the theories and terms they use. The external validity involves the results' generalizability. Given the fact that the interview guides used were substantially influenced by the literature review, and later the framework constructed, the answers produced resulted in a high internal validity according to the authors of this thesis. As Bryman and Bell (2007) discuss, the external validity is an issue for the qualitative approach due to its focus on specific contexts and limited research objects. Nevertheless, by focusing on industry-neutral parameters, the study's generalizability was considered to increase. In addition, the fact that 10 organizations were studied, a higher degree of external validity was reached than if a more limited selection of research objects would have been used.

2.3.5.2 Reliability

Reliability also has internal and external dimensions according to Bryman and Bell (2007). Internal reliability refers to the members in a research team agreeing upon how to interpret their observations. External reliability refers to what extent the study can be repeated. In this study, the research team consisted of two persons, who jointly conducted a majority of the interviews. Coherent interpretations of the observations made were achieved through frequent dialogues and clarifications. Bryman and Bell (2007) points out the problematic situation for the qualitative approach of reaching a high external reliability given each study's uniqueness in setting etc. Nevertheless, by shifting focus from contextual matters like environment, mood and emotions, this study was considered to have a relatively high degree of external reliability.

3 Overview of BI

In this chapter, an oversight to BI is provided through descriptions of BI origins, definitions, and components, as well as identified limitations in existing BI research.

3.1 BI Origins

As a research field, BI was first mentioned by IBM researcher Hans Peter Luhn in 1958. During the 1960s, 1970s, and until the middle of the 1980s, BI evolved as a part of the field for decision-support systems (DSS). As the late 1980s emerged, BI received renewed attention as various decision models, concepts, and systems were created. In 1989, the Gartner Group proposed using BI as an umbrella term to include a wide range of concepts and methods, all aimed at improving decision support (Cebotarean, 2011). Following the powerful systems used by major organizations today, BI as a concept has taken a data-centric approach to decision support (Chen et al., 2012).

3.2 BI Definitions

Several researchers conclude that there is no agreed-upon definition of BI (Pirrtimäki, 2007; Popovic et al., 2010). Some researchers have used a narrow definition of certain systems' functioning and management, where others have taken a more broad approach and incorporated all procedures and processes from data acquisition to decision making (O'Brien & Kok, 2006; Williams & Williams, 2007).

Instead of presenting various attempts of defining BI, the definition chosen for this thesis, as well as of Loshin (2003), was presented in section 1.4, and it is believed to be a good working definition.

3.3 BI Components

When discussing BI architecture or BI environment, several researchers tend to view BI as a process in which data is extracted from internal and external sources, stored and processed, and then presented as information through various applications (Chaudhuri et al., 2011; Ranjan, 2008). One schematic illustration of this sequence is presented in figure 3.1:

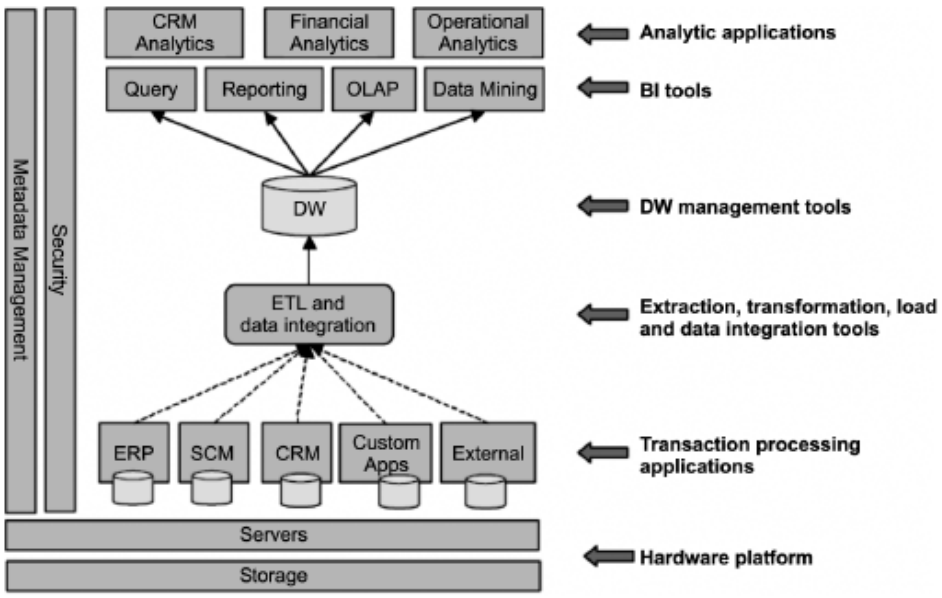


Figure 3.1 Typical BI Environment (Ranjan, 2008, p. 466, reproduced from IDC.com).

As can be seen in figure 3.1, there are several components and processes involved, and the most frequent ones discussed by researchers are briefly highlighted below.

3.3.1 Data Sources

There can be both internal and external sources of data to a company's BI solution. Examples of internal sources can be operational databases, including ERP or CRM systems. External sources can be data bought from market research companies, or data found on the Internet. These different sources can be structured differently, but they all can be incorporated into a BI platform (Ranjan, 2008).

3.3.2 Extract-Transform-Load (ETL)

Chaudhuri et al. (2011) describe the ETL functions as an array of tools used for extracting data, discover and correcting errors, and then loading it all into a platform called the data warehouse. This process is crucial when it comes to preparing data, and allowing for it to be analyzed through providing structure to the content, especially since it is common for data to vary in format (Chaudhuri et al., 2011).

3.3.3 Data Warehouses (DW)

Romney and Steinbart (2009) state that once data has been collected, it is loaded into large servers called data warehouses (DW), where it is stored and linked together with all historical data the organization has collected, enabling various BI programs to perform analyses

(Romney & Steinbart, 2009). A variant of DWs are *data marts*, the main difference being that a data mart is created for a predetermined need for a specific type of data (Ranjan, 2008).

3.3.4 Data Mining

One BI tool frequently mentioned is data mining, which involves discovering knowledge from large amounts of data (Turban, Sharda & Delen, 2011). Romney and Steinbart (2009) state that data mining involves statistical data analysis in order to discover non-hypothesized relationships.

3.3.5 Online Analytic Processing (OLAP)

Another common BI tool for analyzing data is Online Analytic Processing (OLAP). Unlike data mining, OLAP uses queries in which the user guides the investigation of hypothesized relationships in the data (Romney & Steinbart, 2009). According to Ranjan (2008), OLAP produces multidimensional views of business data.

3.3.6 Metadata

Metadata, or sometimes referred to as master data, is seen by several researchers as data about data, providing structure and meaning to data, hence affecting the effectiveness of data usage (Turban et al., 2011). Khatri and Brown (2010) state that metadata involves making data interpretable for the users through establishing its content.

3.4 Limitations in Existing BI Research

3.4.1 Lack of Academic Focus

Throughout the literature review, many publications on BI were found that had commercial connections, such as consultancy firms or BI system vendors. Thus, these publications have often focused on describing and promoting certain BI techniques, applications, or systems, instead of conducting unbiased research on BI. This view is also shared by Pirttimäki (2007), who states that “the content of the existing publications often serves commercial purposes more than academic interests” (p. 9). Even though publications on intelligence research increased in number during the 1990s, there continues to be a shortage of academic research and theoretical frameworks in this area (Pirttimäki, 2007). In addition, the intelligence research that has been done has mostly involved surveys, and a heavy focus has been on the perspective of large American corporations. Thus, Pirttimäki (2007) argues, intelligence research can be considered yet to be in a developing phase.

Ganesh, Miree and Prescott (2003) argue that, due to much intelligence work having been done by consultants and other practitioners, there is a lack of scientific rigor that "decreases the validity of empirical generalizations and makes replication virtually impossible" (p. 3). Ganesh et al. (2003) continue by stating that, in addition to using systematic methodologies and start building theoretical processes of intelligence activities, it is time to focus research on specific themes in order to make intelligence research move forward.

3.4.2 Shortcomings of BI Assessment Models

In order to assess BI work in organizations, various BI assessment models have been encountered throughout the literature review. As previously discussed, many of these are influenced by commercial interests, and several are constructed by vendors of BI systems. The most common model format for assessing the overall BI in an organization is maturity models, and Rajterič (2010) states that maturity models can be useful to quickly identify areas of BI in need of improvement. Even though BI maturity models often differ in focus, most have the common characteristics of using some sort of criteria for assessing how mature an organization's BI work is, and through this assessment assign an overall maturity level/score to the organization. Thereby, the organization is considered to receive a quick and overall view of how their BI work corresponds to this scale, and identify what to improve in order to become more mature within BI. Rajterič (2010) and Chuah and Wong (2011) have summarized several maturity models, and identified several shortcomings of them that were also noted throughout the literature review of this thesis.

The most common shortcoming identified is the narrow scope of several maturity models (Chuah & Wong, 2011; Rajterič, 2010). Rajterič (2010) state that since BI as a concept is very broad, it can be hard to develop a model that covers both technological and non-technological perspectives. Consequently, numerous BI maturity models only focus on one specific area, and exclude either the technical perspective or the business performance perspective. Thereby, an organization wanting a more accurate view of their BI maturity needs to use several maturity models in order to get a more holistic perspective on its situation (Chuah & Wong, 2011; Rajterič, 2010). Popovic et al. (2010) propose a conceptual model to assess business value of BI systems, in which they combine the use of maturity models with assessments of other areas. However, the authors of this thesis consider the proposed model to be inadequately described and documented, and in in need of extensive development in order to be used for BI assessment.

Another shortcoming encountered is the limited documentation of many maturity models. It is not uncommon for maturity models to be covered on only one or two pages, resulting in very brief descriptions of the various maturity levels. Subsequently, these maturity models often lack well-defined criteria on how to assess which level corresponds to a certain organization's BI work. This makes results from different models hard to compare, especially when not all models are freely available (Chuah & Wong, 2011; Rajterič, 2010).

Lastly, an obvious shortcoming noted by the authors of this thesis, but not discussed in the articles reviewed, was a weighing problem. Although focusing on a specific BI domain, almost all maturity models use maturity levels in which requisites from several areas need to be fulfilled (Rajterič, 2010). The identified problem arises when assigning an overall maturity level to an organization that fulfills the requirements of a high maturity level within one area, but only reaches a low level in another area. Thus, weighing these areas against each other is clearly needed, leading to issues of subjective valuation of areas' relative importance. Consequently, the final overall maturity level assigned does not provide a realistic picture of the organization's BI, since it is based on a weighing of requirements fulfilled from various maturity levels. Thereby, the usefulness of the maturity model decreases since it does not provide that quick identification of areas needing improvement by only looking at the maturity level assigned.

4 Theoretical Framework

In this chapter, the Business Intelligence Assessment Framework (BIAF) constructed is introduced and thoroughly described.

4.1 Introduction to the Business Intelligence Assessment Framework (BIAF)

In chapter 3, the main limitations in existing BI research discussed were a lack of academic focus, and shortcomings of BI assessment models. The lack of academic focus involved a shortage of BI research and theoretical frameworks, as well as the fact that many publications on BI served commercial purposes. The shortcomings of BI assessment models comprised one-sided and narrow scopes, limited documentation without well-defined assessment criteria, and a weighing problem resulting in a skewed BI assessment.

This chapter was devoted to a new theoretical assessment framework that would overcome the above limitations of existing BI research. The proposed framework aims to have a broad and integrated scope, addressing both technical and non-technical areas. The areas covered are extensively described by summarizing what researchers have discussed on the subject, and there are five discrete levels for assessing an organization's BI within each area. This framework was labeled the Business Intelligence Assessment Framework (BIAF), and was used in chapter 6 in order to analyze and assess the research objects' BI practices.

4.1.1 BIAF Areas

The areas included in the BIAF were chosen on the basis of being frequently mentioned by various researchers as having great impact on BI success, and represents both technical and non-technical aspects in order to enable a holistic and integrated assessment. In the BIAF, there are 13 areas (labeled A-M), grouped under five categories, and these are listed in figure 4.1:

- **Data & Information Quality**
  - A. Organization of Data & Information Quality Work
  - B. Data & Information Quality Criteria and Frameworks
  - C. Data Structure
- **Information Sources**
  - D. Internal & External Information Sources
  - E. Unstructured & Semantic Data
- **Reporting & Performance Analytics**
  - F. Performance Measurement
  - G. Reporting Needs
  - H. Business Intelligence Review & Improvement
- **Information Strategy & Alignment**
  - I. Strategy Alignment
  - J. Top-Management Support & Sponsorship
  - K. Value & Benefits of Business Intelligence
- **Information Management & Decision Making**
  - L. Information Management Culture
  - M. Bases for Decision Making

Figure 4.1 Areas for BI Best Practices.

However, as Rajterič (2010) highlights, it can be very hard to construct an all-encompassing model given the fact that BI as a concept is very broad. Thereby, it is acknowledged that there could be areas that were not included in the BIAF that could be of high importance for the BI success in a specific context or industry. Nevertheless, the BIAF was intended to be an industry-neutral framework, only including areas that generally could be regarded as success factors of BI in any given industry.

4.1.2 BIAF Assessment Levels

As described in chapter 3, many BI maturity models lack defined criteria for assessing an organization's BI. In order to overcome this shortcoming, the BIAF includes five discrete assessment levels for each area. The various levels were constructed after considering what researchers have discussed as appropriate and less appropriate given the specific areas. Each level was represented by a score of 1-5, were 5 was considered the most appropriate approach, and 1 the least appropriate approach given the specific area. Using the BIAF, research objects could be analyzed in the light of these levels, and assigned a score that best represents their work with BI in the specific areas.

However, these levels were not defined by using numeric intervals, but instead they contain estimates that could be considered to include subjective semantics. Although this could be seen as a weakness for the BIAF, it was a conscious choice in order to maintain the framework's industry neutrality. By allowing for some extent of subjective judgment in assigning area scores, the user of the BIAF is able to take the specific industry context in consideration without having to adapt the framework itself. If not, the BIAF assessment level definitions would need to be altered for every context in which it is applied, in order to reflect what practices are considered appropriate and less appropriate given the specific industry.

In order to overcome the weighing problem in BI maturity models, the BIAF has a different approach for illustrating the assessment made. Instead of grouping the various area scores under aggregate category scores, each area score should be illustrated in order to clearly identify specific areas for improvement. Thus, once a research object has been assigned a score for every area, the BI assessment should be illustrated using a radar chart as presented in figure 4.2.

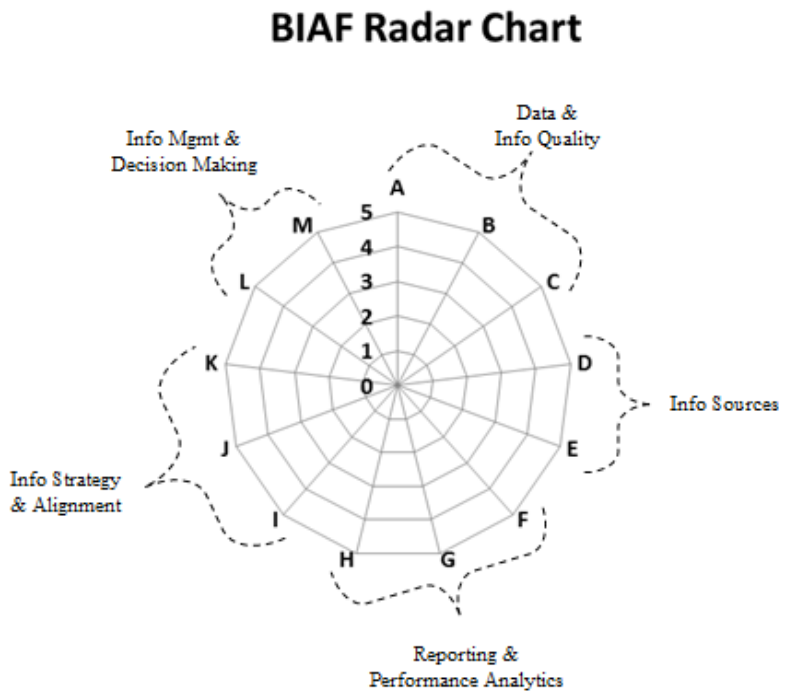


Figure 4.2 BIAF Radar Chart.

4.2 The Business Intelligence Assessment Framework (BIAF)

In this section, the BIAF is presented. Each category with the respective areas will be described in detail, including the assessment levels for each area.

4.2.1 Data & Information Quality

Data and information quality is a crucial aspect in succeeding with BI (Loshin, 2003). Throughout the literature review, this topic has been frequently addressed from various perspectives. It is common in literature to distinguish between data and information (Pirttimäki, 2007), and Eppler (2003) states that information quality problems are different from data quality problems, especially in terms of how to solve them. Nevertheless, the literature review has shown that some authors discuss quality of data and information interchangeably (e.g. Khatri & Brown, 2010), and others see a clear connection between high information quality and high data quality (Loshin, 2003). Given this interrelation between data and information quality, both quality aspects are included in this section.

Three areas that are considered to have great impact on the data and information quality of BI in organizations are presented separately below.

4.2.1.1 Organization of Data & Information Quality Work (A)

One aspect relating to data and information quality regards determining where in the organization the responsibility of ensuring high data and information quality lies (Borking, Danielson, Ekenberg, Idefeldt & Larsson, 2009; Khatri & Brown, 2010; Otto, Huner & Osterle, 2012). Several authors view BI as a refinement process, where data is turned into information, and information into knowledge (Loshin, 2003; Pirttimäki, 2007). Borking et al. (2009) stress that for every step data is refined in the organization, there needs to be a clear structure with clear divisions of responsibility.

According to Khatri and Brown (2010), data governance refers to "who holds the decision rights and is held accountable for an organization's decision-making about its *data assets*" (p. 149). In their framework, they divide data governance into different domains, and they list potential roles or "locus of accountability" for each data governance domain. One domain is labeled "data quality", which includes setting standards for data quality, establishing means for communicating business uses of data, and defining how to assess data quality. According to the authors, decisions in this domain could be the responsibility of a data quality manager/analyst/trainer, data owner, or subject matter expert.

In addition, the framework of Khatri and Brown (2010) contains a data governance domain labeled "metadata", by some authors called "master data" (e.g. Otto et al., 2012). As many other authors on the subject, Khatri and Brown (2010) defines metadata as "data about data" (p. 150), and they state that this domain is about making data interpretable for the users through establishing the content of data. Metadata will help in the acquisition and analyzing of data, and, according to the authors, decisions in this domain could be the responsibility of an enterprise data architect or modeler, data modeling engineer, data architect, or enterprise architecture committee. For each of the data governance domains, the authors conclude that the assignment of the locus of accountability can differ in terms of degree of organizational centralization.

Otto et al. (2012) differentiate between Data Quality Management (DQM) and Master Data Quality Management (MDQM). According to the authors, DQM "aims at carrying out preventive initiatives in order to be able to ensure data quality by means of an iterative process including steps to define, measure, analyze and improve data quality as well as to design appropriate framework conditions for DQM" (p. 398). MDQM concerns ensuring high quality of master data, which in turn is defined as specifying "the essential business entities a company's business activities are based on" (Otto et al., 2012, p. 398).

Due to regulations and other legal requirements that organizations have to comply with, MDQM has received more attention lately. This is so, since there has become an increasing demand for standardized reporting across organizations and a more holistic view of the company environment (Otto et al., 2012). They believe that solely implementing a software system is not sufficient for ensuring maintenance and improvement of master data quality; instead there should be focus on the organizational aspect. The organizational view can be

used for assigning roles and responsibilities in the DQM and MDQM work. In the authors' case studies, the participants had various functions in their respective organizations. Several of the participants were part of work groups responsible for data quality, where some examples were Master Data Management, Enterprise Architecture Management Solutions, and Business Data Excellence.

In conclusion, it is clear from the above theories that, in order to ensure data and information quality, companies should consider organizational aspects. Ensuring data and information quality can be seen from both data quality management and metadata or master data quality management perspectives. Irrespective of the perspective, it is essential that there is a clear organizational assignment of the task of assessing and ensuring high data and information quality. The responsibility or locus of accountability for data and information quality can lie with one or several persons in an organization, or even in an entire work group.

The assessment levels for "Organization of Data & Information Quality Work" were set to be the following:

1. No person or work group is formally or informally responsible for data and information quality work
2. No person or work group is formally responsible for data and information quality work, but informally it is managed sporadically
3. A few persons, or a work group, are formally responsible for data and information quality work, but there is no clear structure or locus of accountability
4. A few persons, or a work group, are formally responsible for data and information quality work, and there is a clear structure and locus of accountability, but it is not applied across the entire organization
5. A few persons, or a work group, are formally responsible for data and information quality work, and there is a clear structure and locus of accountability, and it is applied across the entire organization

4.2.1.2 Data & Information Quality Criteria and Frameworks (B)

An area frequently covered by researchers relating to data and information quality has been quality criteria (Pirttimäki, 2007). As previously presented, even though most researchers distinguish between data and information, data quality and information quality are often interconnected. Therefore, different authors' views on what criteria or dimensions to use when assessing both data quality and information quality will be presented.

According to Borking et al. (2009), the requirements on the data from BI systems are that it should be accessible, sufficient, accurate, and consistent over time (p.11). In addition, the authors state that the traceability is important to enable follow-ups. Khatri and Brown (2010) state that data quality has several dimensions; accuracy, timeliness, completeness, and credibility (p. 150). Here, accuracy represents the correctness of the data, timeliness means

that data is up-to-date, completeness represents no missing values and adequate depth and breadth, and credibility suggests trustworthiness of the data source and content.

Batini, Maurino, Cappiello & Francalanci (2009) made an extensive literature review of data quality dimensions, and concluded that the most commonly used dimensions involved accuracy, completeness, consistency, and timeliness (pp. 6-9). These dimensions concur with the ones Loshin (2003) identified as the most common data quality dimensions (p. 129). Loshin (2003) defines accuracy as the agreement with a source of correct information, completeness indicates if all expected information is covered, consistency deals with different data sets being consistent with others, and timeliness represents time expectation for information accessibility. In connection to timeliness, Loshin (2003) includes another dimension labeled "currency", which denotes the degree of up-to-date the information is. Loshin (2003) claims that the most appropriate approach to data quality is to define expectations about the data, which could be used to measure and improve the organization's data quality.

According to Pagels-Fick (1999), executives prefer BI information that is relevant, concise and well-formulated, comes with a preliminary impact analysis, and is delivered in an appropriate format (p. 158). Pirttimäki (2007) summarizes and consolidates the works from various researchers, and concludes that requirements for business information to fulfill are validity, reliability, containing all of the essentials, and timing (pp. 55-56). Validity refers to information being correct and comprehensive, while reliability indicates organized information that is comparable to existing information. As for the timing requirement, it denotes that "the information should be gathered, analyzed, and utilized in a timely manner" (Pirttimäki, 2007, p. 56).

Eppler (2003) states that an information quality framework should offer a set of criteria that is concise and systematic, which can be used to analyze information quality and solve information quality problems. He then constructs an entire Information Quality Framework, which results in 16 information quality criteria, as seen in table 4.1.

Table 4.1 Information Quality Criteria (Eppler, 2003, p. 76)

Information Quality Level	Information Quality Criteria	Opposite
Community Level (Relevance)	Comprehensiveness	Incompleteness
	Accuracy	Inaccuracy
	Clarity	Obscurity
	Applicability	Uselessness
Product Level (Soundness)	Conciseness	Prolixity
	Consistency	Inconsistency
	Correctness	Falsity
	Currency	Obsolescence
Process Level	Convenience	Inconvenience
	Timeliness	Lateness
	Traceability	Indeterminacy
	Interactivity	Rigidity
Infrastructure Level	Accessibility	Inaccessibility
	Security	Exposure
	Maintainability	Neglect
	Speed	Slowness

When discussing data quality, Eppler (2003) states that data "that are of high quality are an accurate, complete, and current representation of real-life transactions or states that are accessible in a reliable, timely, convenient and secure manner" (p. 350).

In conclusion, even though data and information quality sometimes are viewed as distinct from each other, they are interrelated, and quality in one affects the other. From reviewing literature on BI, it is clear that using data and information criteria and frameworks are common tools for assessing and improving an organization's data and information quality. There are several different criteria and definitions proposed by researchers on the subject, and from the literature review, the following six dimensions were found most frequently used in addressing both data and information quality:

- Accessibility
- Accuracy
- Completeness
- Consistency
- Timeliness
- Traceability

Although some definitions of the above criteria may differ between researchers, the main characteristics are the same, thus further definitions are not provided.

The assessment levels for "Data & Information Quality Criteria and Frameworks" were set to be the following:

1. No usage of data and information quality criteria or frameworks
2. Usage of data and information quality criteria that only relates to one of the identified dimensions
3. Usage of data and information quality criteria that relates to 2-3 of the identified dimensions
4. Usage of data and information quality criteria that relates 4-5 of the identified dimensions
5. Usage of data and information quality criteria, or a complete framework, that relates all of the identified dimensions

4.2.1.3 Data Structure (C)

Another aspect often mentioned along with data and information quality is data structure or architecture (Borking et al., 2009; Khatri & Brown, 2010; Loshin, 2003). Khatri and Brown (2010) state that in order to make data interpretable, you need to be able to track and use the information effectively, which is accomplished through standardization of metadata. According to Borking et al. (2009), there is a risk that you might not earn the organization's trust in the BI system if data is not traceable and consistent. They claim that the construction of a well-functioning data layer has to be made in levels, where each level contributes in the refinement process from data to information (Borking et al., 2009).

Borking et al. (2009) state that one frequent reason for BI endeavors to fail concerns a lack of overall data architecture. If underlying systems experience low data quality, it often takes much more time and resources to correct than most believe, since one has to reach out to the

entire organization where information is created. In the process of achieving high data quality, time has to be allocated, and requirements for data and its management need to be set (Borking et al., 2009).

Another common problem, identified by Borking et al. (2009), is that BI systems often retrieve information from different sources and from various levels in the data layer. As a result, a problematic disorder emerges that is hard to untangle and maintain. Instead, for every step data is refined in the organization, there initially needs to be a clear structure with clear divisions of responsibility (Borking et al., 2009).

According to Loshin (2003), a flexible and extensible data architecture is an essential success factor for an organization's BI. Since the environment in which organizations operate is dynamic to a high degree, the BI architecture is required to be flexible. When a data model is set and has gone operational, there is a risk that it becomes static, even though what is being modeled is not. Hence, the business applications used should be reflected by the data architecture applied (Loshin, 2003).

Moreover, Loshin (2003) claims that one of the most crucial aspects in order to succeed with a BI program is the management of metadata. This is so, since metadata seizes the data structure and consequently the meaning of the data input. In addition, metadata enables validation and verification of the results from analyses, by offering traceability of the information processed (Loshin, 2003).

In conclusion, data structure is considered critical for ensuring high data and information quality, and subsequently a successful BI endeavor. Whether the structure is labeled metadata or data architecture, being able to make data traceable, consistent, and effective to use are of outmost importance in interpreting data and ensuring high data and information quality. From the literary review, the traceability of the data structure tends to be especially important in order to validate and verify the results from BI analyses. In addition, the data structure needs to allow for flexibility to adapt to the dynamic environment. If the data structure is lacking traceability or flexibility, the result might be low quality in the data and information of the underlying systems. The disorder that follows is likely to be difficult and time-consuming to correct, and it might ultimately impact the trust people have in the BI system as such.

The assessment levels for "Data Structure" were set to be the following:

1. No pronounced data structure
2. An insufficient overall data structure resulting in lack of trust for BI
3. A decent data structure, but lacks both proper flexibility and traceability
4. A data structure that has good traceability but lacks proper flexibility
5. A data structure that both has good flexibility and traceability

4.2.2 Information Sources

In BI literature, it is common to discuss different sources of information (Pirttimäki, 2007; Popovic et al., 2010). As previously presented, several researchers distinguish between data and information (Loshin, 2003; Pirttimäki, 2007). However, when discussing BI input, some authors refer to information (Pagels-Fick, 1999; Pirttimäki, 2007; Popovic et al., 2010), while other authors refer to different types of data (Arinei & Berta, 2012; HFMA, 2012). Loshin (2003) defines information as "the result of collecting and organizing data in way that establishes relationships between data items, which thereby provides context and meaning" (p. 7). Thereby, data and information are closely related, and both types of information as well as types of data will be discussed.

Two areas that are related to information sources and often discussed by researchers are presented separately below.

4.2.2.1 Internal & External Information Sources (D)

According to Pagels-Fick (1999), a person involved with BI has to search in both internal and external material in the quest for information. Therefore, BI as a process involves compilation of both internal and external information (Pagels-Fick, 1999). Pirttimäki (2007) views information that is gathered from inside the company as internal information sources, while information that is gathered from outside the company is viewed as external information sources.

According to Pirttimäki (2007), competitive advantage can be acquired through the combination of internal and external information with decision makers' previous knowledge. Thus, improved strategic decision making can be accomplished through utilizing both internal and external information sources. In addition, in order to increase a company's adaptability and to gain a complete view of its situation, there should be an integration of internal and external information (Pirttimäki, 2007).

Popovic et al. (2010) state that there are several information gaps in business practices regarding BI. Some of these gaps are consequences of insufficient external information to support decision making, data owners not wanting to share information, as well as incompatibility between systems.

In conclusion, several researchers emphasize the importance of including both internal and external information when working with BI. By only focusing on one type of source, you risk not making the best strategic decisions possible. Therefore, an organization should find an appropriate balance in using both internal and external information sources. In addition, the internal and external information needs to be integrated in order to obtain a holistic picture of your organization's situation to make good strategic decisions.

The assessment levels for "Internal & External Information Sources" were set to be the following:

1. Usage of only internal information and no external information
2. Usage of internal information and a limited portion of external information, and with limited integration
3. Usage of internal information and a limited portion of external information, but with a high level of integration
4. Usage of an adequate balance between internal and external information, but with limited integration
5. Usage of an adequate balance between internal and external information, and with a high level of integration

4.2.2.2 Unstructured & Semantic Data (E)

Several authors distinguish between three types of data; structured, unstructured, and semi-structured (Batini et al., 2009). Batini et al. (2009) define structured data as "aggregations or generalizations of items described by elementary attributes defined within a domain" (p. 9). Unstructured data, on the other hand, is defined as "a generic sequence of symbols, typically coded in natural language" (p. 9). Lastly, Batini et al. (2009) state that semi-structured data is "data that have a structure which has some degree of flexibility" (p. 9). They claim that the more unstructured the data is, the more complex the data quality techniques become (Batini et al, 2009). Examples of the different types of data are presented in figure 4.3 below:

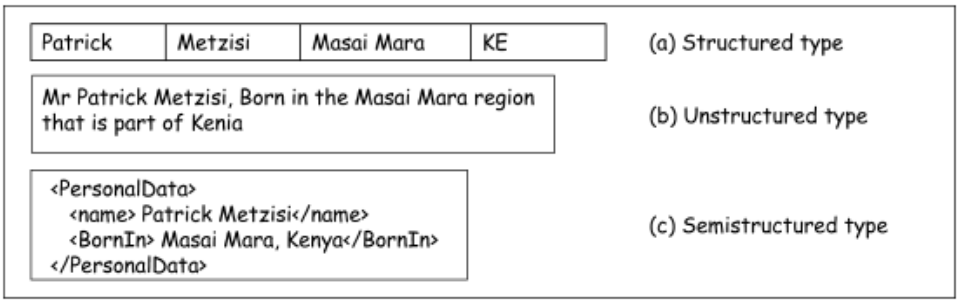


Figure 4.3 Examples of Different Types of Data (Batini et al., 2009, p. 10).

Since much of what organizations collect in terms of unstructured data is in textual format, e.g. emails, blogs, social media etc., it is common to refer to semantic data (Arinei & Berta, 2012; Chen et al., 2012). A trend has become to redesign organizations' BI in order to integrate semantic data with the existing data processed (Arinei & Berta, 2012).

Lau, Liao, Wong & Chiu (2012) argue that environmental scanning is crucial for companies and executives in order to make decisions in a dynamic business environment. Yet, due to the vast amount of information, manual scanning of the Internet would be too impractical for executives. Instead, the authors of the article claim, online environmental scanning can be made possible for top executives through new BI applications. Chau & Xu (2012) state that companies could benefit from reviewing blogs through BI in order to recognize existing and potential customers, as well as customize marketing activities more effectively. In HFMA

(2012), it is stated that within health care, chart extraction previously was performed manually, requiring substantial time and effort. In order for health care companies to improve their processes, there are now BI tools accessible that can automatically transform this type of unstructured data into a structured format.

In conclusion, there are several researchers that acknowledge that BI has potential to further help organizations by providing decision support through analyzing unstructured and semantic data. Nowadays, environmental scanning is seen as very important, and much data and information are to be found in textual format. Thus, analyzing unstructured and semantic data manually would require too much time and resources. Therefore, BI solutions that could automate this process are considered to be very beneficial for decision makers.

The assessment levels for "Unstructured & Semantic Data" were set to be the following:

1. No usage today, and no view of it as having clear future potential for the company
2. No usage today, but view of it as having clear future potential for the company
3. Certain pre-analyzed data is purchased from a third party today, and view of it as having clear future potential for the company
4. An internal BI endeavor in this area is recently initiated, or is soon to be, and view of it as having clear future potential for the company
5. An internal BI endeavor in this area is already implemented, and view of it as having clear future potential for the company

4.2.3 Reporting & Performance Analytics

From the literature review, a frequent discussion has been recognized regarding using BI to measure and analyze the organization performance (e.g. Borking et al., 2009; Loshin, 2003; Turban et al., 2011). Subsequently, the findings from such measurements and analyses should be reported, and therefore several authors also discuss reporting within the context of BI (e.g. Borking et al., 2009; Pirttimäki, 2007). Lastly, not only should the rest of the organization performance be analyzed, but also the BI function in itself could be reviewed and improved (Pirttimäki, 2007).

Three areas that are related to reporting and performance analytics and often discussed by researchers are presented separately below.

4.2.3.1 Performance Measurement (F)

According to Borking et al. (2009), some subcategories of BI are monitoring, follow up, and target controlling. These areas require measurement tools like Key Performance Indicators (KPIs), balanced scorecards, and different types of dashboards that top management can use to assess organization performance (Borking et al., 2009). Loshin (2003) states that a KPI is "some objective measurement of an aspect of a business that is critical to the success of that

business. Such KPIs are a component of the conceptual scorecard for a business and can be associated with a number of different business activities" (p. 24). Moreover, Loshin (2003) promotes the use of a dashboard that presents these KPIs to management. Davenport (2006) argues that an organization is competing on analytics when proprietary metrics are invented for use in key business processes.

However, Borking et al. (2009) highlight the problem with establishing definitions when creating KPIs. Since many people believe that their definition is superior, agreeing upon a common definition is often time-consuming, but essential in order to be successful in using KPIs (Borking et al., 2009). A related theory by Pagels-Fick (1999) involves a political behavior in the decision-making process, where some decisions are made to benefit certain people or departments. Thus, Pagels-Fick (1999) claims that one needs to be aware that not only rational behavior influences decision making.

Both Rasmussen et al. (2002) and Turban et al. (2011) claim that KPIs should be aligned with company objectives and strategy. They concur with other authors on the difficulties in agreeing upon KPI definitions, and the importance in doing so is also emphasized (Rasmussen et al., 2002; Turban et al., 2011). According to Loshin (2003), defining success metrics is a crucial factor for successfully implementing BI. In HFMA (2012), improving BI involved standardizing definitions of data in order to use common metrics throughout the organization, enabling the data to be credible, comparable, and actionable.

In conclusion, in order to use BI for evaluation and monitoring of business performance, one can use measurement tools like KPIs, balanced scorecards and dashboards. When constructing these metrics, it is crucial to make sure that the definitions are agreed-upon, so that everyone interprets them the same way to ensure conformance and credibility.

The assessment levels for "Performance Measurement" were set to be the following:

1. No usage of KPIs, scorecards, or dashboards
2. Some KPIs, scorecards, or dashboards are used, but they lack enterprise-wide definitions
3. Several KPIs, scorecards, or dashboards are used, but they lack enterprise-wide definitions
4. Some KPIs, scorecards, or dashboards are used that include enterprise-wide definitions
5. Several KPIs, scorecards, or dashboards are used, and they all include enterprise-wide definitions

4.2.3.2 Reporting Needs (G)

According to Rasmussen et al. (2002), one success factor for BI is to not forget listening to the end users. On the same note, Popovic et al. (2010) present that a common information gap is that management receives extensive reports that are either inappropriate, or just not used.

Borking et al. (2009) state that target controlling traditionally involved creating a large amount of paper reports continuously. When these reports no longer have a recipient or purpose, they often keep coming, resulting in a waste of resources. An indication that an organization's target controlling needs improvement, is when large amounts of reports are created (Borking et al., 2009).

Pagels-Fick (1999) argues that a BI function cannot succeed without strong internal customers for its services. An organization should make sure that there is a demand for the information the BI function provides, and not let the information gathering become a goal in itself (Pagels-Fick, 1999). Pirttimäki (2007) states that identifying information needs is crucial for success in the information management process. Decision makers should receive information corresponding to concrete needs, otherwise a common information gap occurs between real information needs and the information gathered. In addition, Pirttimäki (2007) found, through her literature review and research, that there can be different information needs at different organizational levels, and that top and middle management are the most significant user groups of BI products. Thereby, everyone does not need the same information, and one should try to minimize useless information distribution (Pirttimäki, 2007). On the contrary, Davenport (2006) claims that you compete on analytics if you "seize every opportunity to generate information, creating a "test and learn" culture based on numerous small experiments" (p. 106).

In conclusion, many researchers tend to state that it is crucial that the BI function clearly investigates what information needs there are in the organization. Otherwise, they risk creating products without recipients or purpose. The information needs should be continuously assessed in order to avoid that a large amount of reports are created on routine without anyone consuming them. Thus, a waste of resources can be minimized. However, there are researchers promoting excessive information generation in order to create an experimenting culture.

The assessment levels for "Reporting Needs" were set to be the following:

1. No reporting is conducted
2. A majority of the reports are created on routine without knowingly having a recipient or purpose
3. A majority of the reports have initially been assessed based on information needs, but these needs are not regularly reviewed
4. A majority of the reports have initially been assessed based on information needs, and these needs are regularly reviewed
5. All of the reports have initially been assessed based on information needs, and these needs are regularly reviewed

4.2.3.3 Business Intelligence Review & Improvement (H)

According to Pagels-Fick (1999), there is no contradiction in viewing BI as both a function and a process. In most large organizations, there needs to be a BI function executing the BI process (Pagels-Fick, 1999). Popovic et al. (2010) state that improved business processes, and consequently improved business performance, represent the real value of BI systems. On the same topic, Williams and Williams (2007) claim that, in order to capture value from BI, organizations need to be adept at process change through adopting continuous process improvement.

Pirttimäki (2007) states that by measuring BI, you are able to systematically improve management of the BI process. Subsequently, the products and services that BI provides improve and become more tailored to decision makers' needs. However, the focus for researchers regarding BI measurement has been on its effects, rather than the management of the BI process in itself (Pirttimäki, 2007). According to Pirttimäki (2007), some measures presented in academia for managing the BI process have rather been illustrating properties of the BI software used. Therefore, Pirttimäki (2007) proposes a balanced performance measurement that could be useful in measuring BI processes.

In conclusion, in the same sense that BI is considered to improve other business processes, BI can be viewed a process in itself in need of continuous improvement. Researchers suggest that organizations working with continuous process improvement are more adept at handling change, and this could be applied to management of the BI process, with the aim of improving the BI products and services. Even though these types of measurements have not been the primary focus of academia, there are some researchers that propose various metrics useful for assessing the management of the BI process.

The assessment levels for "Business Intelligence Review & Improvement" were set to be the following:

1. No BI review or improvement work at all
2. Sporadic BI review without any, or limited, improvement work
3. Regular BI review with sporadic improvement work
4. Regular BI review and improvement work
5. Continuous BI review and improvement work

4.2.4 Information Strategy & Alignment

Several researchers in the literature review have promoted the importance of alignment between BI and overall company strategy (e.g. Davenport, 2006; Ranjan, 2008; Williams & Williams, 2007). In addition, another topic often highlighted in academia as a crucial factor for BI success is top-management support and sponsorship (e.g. Davenport, 2006; Kessler, 2011; Loshin, 2003; Williams & Williams, 2007). In order to receive the sponsorship sought for, many authors propose a practical approach to internally market the value and benefits of BI (e.g. Loshin, 2003; Williams & Williams, 2007).

Three areas that are related to information strategy and alignment and often discussed by researchers are presented separately below.

4.2.4.1 Strategy Alignment (I)

Davenport (2006) states that a firm competes on analytics when it coordinates BI from an enterprise level, down to decision makers at all levels, with the overall company strategy in mind. Using their Business Performance Management (BPM) cycle, Turban et al. (2011) illustrate how a company should start by strategizing, then translating strategic objectives into well-defined tactics, and use strategic objectives and key metrics as top-down drivers for the allocation of assets in order to achieve alignment and strategic success.

Ranjan (2008) states that BI is new for many organizations, resulting in a lack of coordination at the enterprise level. When strategic goals and BI objectives are incompatible, it can be hard to get management support (Ranjan, 2008). According to Pagels-Fick (1999), it is not self-evident that the BI function's work corresponds with the company vision, but it is likely that it does if the BI function has strong top-management support. Williams and Williams (2007) propose steps for achieving strategic alignment, as well as state that organizations that "strategically align BI to support business goals are well positioned to identify and fund high-impact BI projects that have high ROI potential" (p. 47).

Moreover, Williams and Williams (2007) state that organizations should identify BI opportunities using both top-down techniques, by starting with the strategic picture, as well as getting the operational perspective through bottom-up techniques. Pagels-Fick (1999) discusses the same topic when stating that a organization's environment can be viewed from both a top-down and bottom-up perspective. The top-down perspective involves starting off from the long-term conditions, which are believed to drive the competitive environment. From this perspective, you try to break it down into detail, in order for it to become relevant for the specific unit. The bottom-up perspective starts off from specific situations, and then tries to consolidate information to a higher level, which in turn creates a holistic picture for the organization (Pagels-Fick, 1999). Furthermore, Pagels-Fick (1999) argues that it is the responsibility of top management to clearly communicate strategic objectives in order to frame the operational work. However, at the same time, the BI function should serve top management with a view of the environment, thus affecting their strategic decision making (Pagels-Fick, 1999).

In conclusion, clearly, several researchers believe that it is of great importance that an organization's BI approach is linked to the overall organization strategy. If not, you risk not working in the same direction, and the result can be a lack of top-management support for the BI function. Instead, the strategic objectives should be communicated to the rest of the organization, creating top-down strategic drivers that are broken down into operational and tactical objectives. However, the BI function also provides top management with a holistic

view of the organization's competitive situation, thus affecting the strategic decisions made in a bottom-up fashion. In order to be successful, you need to find a balance between these approaches of aligning strategy with BI.

The assessment levels for "Strategy Alignment" were set to be the following:

1. BI and overall strategy alignment is not considered at all
2. Overall strategy is not sufficiently broken-down into operational objectives to provide guidance for BI
3. BI is loosely aligned with overall strategy by either a top-down or bottom-up approach
4. BI is closely aligned with overall strategy by either a top-down or bottom-up approach
5. BI is closely aligned with overall strategy by both a top-down and bottom-up approach

4.2.4.2 Top-Management Support & Sponsorship (J)

One of the most common success factors for BI throughout the literature review has been top-management support and sponsorship (Davenport, 2006; Kessler, 2011; Liebowitz, 2006; Loshin, 2003; Pagels-Fick, 1999; Williams & Williams, 2007).

Kessler (2011) states that best practices in BI involve partnering with senior management, and make a clear business case in order to receive enough resources. Davenport (2006) stresses the need for senior executive advocates, who give analytics a primary focus. Liebowitz (2006) claims that a BI team needs executive sponsorship, and that many BI endeavors are unsuccessful without it. Pagels-Fick (1999) concurs by promoting good relations with management, who in turn must have faith in BI personnel, and he explores different structures in the collaboration between BI and management.

According to Loshin (2003), for data to transform into actionable knowledge, top-management support is the key success factor, rather than the BI technology in itself. If top management is not convinced that a BI endeavor will bring value, it is doomed to fail, and this is one of the most common reasons for BI failure (Loshin, 2003). Williams and Williams (2007) agree, and the primary reason for them to write their book was that "if companies are going to fully realize the profit potential of business intelligence (BI), there needs to be a better understanding of BI in the executive and managerial ranks" (p. xiii).

In conclusion, many researchers point out that one of the most critical factors for an organization's BI to succeed involves top-management support and sponsorship. This is so since without it, the BI function will have a difficult time getting enough resources to make the impact sought for. There have been many BI projects that have failed due to a lack of top-management support. Instead, the BI function should try to partner with top management to uncover their information needs, thus facilitating the process of bringing value to the organization.

The assessment levels for "Top-Management Support & Sponsorship" were set to be the following:

1. No top-management support or sponsorship at all
2. Very limited top-management support and sponsorship, where instead other areas are prioritized
3. Some degree of top-management support and sponsorship, but more is needed
4. A high degree of top-management support and sponsorship, but more is needed
5. A sufficient degree of top-management support and sponsorship

4.2.4.3 Value & Benefits of Business Intelligence (K)

As previously presented, many BI endeavors fail due to a lack of top-management support, and top-management will not pay attention if it is not clearly shown how BI investments will bring business value (Williams & Williams, 2007). According to Liebowitz (2006), a common reason for BI failure is a lack of understanding how data impacts business profitability.

However, Turban et al. (2011) list some benefits of BI, including improved reporting and decision making, and state that these benefits' intangible nature result in many executives not requiring extensive investment justifications for BI. Riabacke, Larsson and Danielson (2011) take the same approach by stating that business cases rarely are built around BI investments due to the difficulties in measuring its impact using standard models. Ranjan (2008) claims that BI success is measured by business improvements, and that, although hard, by using an iterative justification process, managers will be more at ease with investing in BI.

Pagels-Fick (1999) claim that the debate revolving BI efficiency and profitability is only partly relevant if you consider BI as a fundamental company function, since other functions, like HR or Finance, are not questioned the same way. Moreover, he states that he has not encountered any profitability calculation applicable for BI, and that the question of BI being worth the investment only truly can be answered by the company decision makers. Another approach could be to imagine how decisions would have been made if the BI function had not been there (Pagels-Fick, 1999).

Popovic et al. (2010) state that it is much easier to define BI costs than its benefits. Moreover, they state that today, "measuring in practice is not being done as either no suitable measurement methods have been identified or the companies having no resources for such activity. With the help of appropriate measurement methods, BI activities could be more easily proved beneficial and valuable; for instance, to a management board not yet committed to the operations" (p. 11). Pirttimäki (2007) uses a similar discussion, and state that another aspect making it difficult to measure BI benefits is the fact that they often are dispersed throughout the company. Pirttimäki (2007) continues by stressing the importance of measuring BI impact on business results, and states that, although few and imperfect, some companies have implemented tools for measuring BI value.

As for solutions to the above dilemma, Williams and Williams (2007) have claimed that it is crucial to design return on investment (ROI) into the BI program from start, and use BI to have an impact on core processes affecting profit and performance. Furthermore, the authors argue that the ROI of BI has received more attention due to many previous endeavors not being successful when "measured against the business value yardstick" (Williams & Williams, 2007, p.45). Another proponent of an ROI strategy is Loshin (2003), and he claims that one can "confidently say that knowledge derived from a company's data can be used as an asset, as long as senior managers understand that an investment in turning data into actionable knowledge can have a significant payoff" (p.25).

In conclusion, from the literature review it is noted that several researchers believe it to be crucial for the success of a BI initiative to prove that it comes with financial benefits. In order to justify investments in BI, several researchers have stressed the importance of constructing measurements that clearly shows the benefits from BI. Without a good justification, top-management support might be lost and the BI endeavor unsuccessful. Even though many researchers highlight the problems of defining adequate measurements of the value and benefits of BI, some authors have claimed that incorporating an ROI strategy could solve the problem.

The assessment levels for "Value & Benefits of Business Intelligence" were set to be the following:

1. No initiative for demonstrating the value and benefits of BI at all
2. Usage of abstract and intangible descriptions only for the value and benefits of BI
3. Are planning on creating clear measurements of the value and benefits of BI, e.g. through an ROI strategy
4. Usage of some tangible metrics for the value and benefits of BI, but are not clearly defined or sufficient for continued justification of BI investments
5. Usage of a full framework for assessing the value and benefits of BI , e.g. in the form of an ROI strategy

4.2.5 Information Management & Decision Making

Information management culture is frequently discussed as an important aspect of successful BI (e.g. Davenport, 2006; Pirttimäki, 2007; Williams & Williams, 2007). Such a culture could enable organizations to make more decisions based on facts rather than intuition, which is also a common topic covered by BI researchers (e.g. Borking et al., 2009; Davenport, 2006; Williams & Williams, 2007).

Two areas that are related to information management and decision making and often discussed by researchers are presented separately below.

4.2.5.1 Information Management Culture (L)

Davenport (2006) states that even though analytics as a discipline is hard, and culture is considered soft, it is crucial that firms introduce a company-wide culture characterized by respect for quantitative evidence. Furthermore, Davenport (2006) claims that you compete on analytics when "you treat fact-based decision making not only as a best practice but also as a part of the culture that's constantly emphasized and communicated by senior executives" (p. 106). On the same note, Williams and Williams (2007) argue that some disregard culture due to it not being related to technology, but it should be considered very crucial for BI success.

Pirttimäki (2007) presents one study showing that a company's information flow is obstructed without a company culture promoting information sharing and utilization. Instead, an open and supportive company culture enables increased information sharing and organizational learning (Pirttimäki, 2007). Loshin (2003) promotes the view of data as a strategic resource, since handling data as a company asset facilitates the building of business cases for BI investments though demonstrating an increased data asset value. If organizations see themselves as information businesses, regardless of industry, competitive advantages can be obtained (Loshin, 2003).

In conclusion, several researchers believe that, in order for an organization to succeed in BI, it is important that a culture of information sharing is present, as well as and viewing information as a strategic company asset through trust. If you believe that BI only involves technology, you risk not achieving an optimal information flow in the organization. Instead, viewing your organization as an information business might result in competitive advantages.

The assessment levels for "Information Management Culture" were set to be the following:

1. The information management culture is not addressed at all
2. Information is to a very low extent shared and viewed as an asset in the company
3. Information is to a medium extent shared and viewed as an asset in the company
4. Information is to a rather high extent shared viewed as an asset in the company
5. Information is fully shared and viewed as an asset in the company

4.2.5.2 Bases for Decision Making (M)

According to Riabacke (2007), even though one expects most business decisions being based on facts, most are not based on concrete information and thorough analyses. Instead, many make decisions based on traditions or intuition, and the use of decision analysis is rare. The reason for this seems to be that decision makers often lack accurate and relevant data, and if present, lack the means of adequately accessing that data (Riabacke, 2007). Riabacke et al. (2011) claim that the integration between BI systems and decision-making processes in businesses is lacking, and that the result is a loss of business value from the investment.

Borking et al. (2009) claim that, in practice, many organizations use an intuitive decision-making process, where little attention is given to calculations. A rational analysis is often instead used as a verifying tool after a decision has been made, and then it is often performed in a way that conforms to the pre-made decision. The authors state that intuition can be a good complement in order to get a holistic view of a situation, since intuition is founded on certain information and experience. However, the problem is that many situations requiring strategic decisions are new, where there is no previous experience. The solution is to create good decision-making processes based on models, in order to make decisions based on facts instead of intuition (Borking et al., 2009).

Popovic et al. (2011) argue that one should recognize that "the amount of information increases slower than the number of decisions that (should) have appropriate information support" (p. 12). Moreover, the authors state that, although intuition is still essential, it is currently only a complement to fact-based decision making (Popovic et al., 2011).

Williams and Williams (2007) argue that using fact-based decision-making processes enables organizations to capture value from BI activities. Nevertheless, the authors of the book have worked with large companies making a majority of the decisions based on intuition, instead of fact-based analysis. The authors stresses, however, that you can balance a fact-based decision-making process together with the use of individual intuition and judgment (Williams & Williams, 2007). As previously presented, Davenport (2006) claims that you compete on analytics when "you treat fact-based decision making not only as a best practice but also as a part of the culture that's constantly emphasized and communicated by senior executives" (p. 106). However, the author acknowledges that every decision should not only be based on facts, and it is a challenge for executives to know when to primarily base decisions on facts and when on intuition (Davenport, 2006).

In conclusion, from the literature review it is noticed that researchers experience that many organizations rely more on decisions based on intuition than facts. This can be risky, and instead decision-making processes based on proper models should be used to lay the foundation for fact-based decisions. Nonetheless, intuition can be used to a certain extent to provide a holistic picture and take other factors into account than the rational analysis does.

The assessment levels for "Bases for Decision Making" were set to be the following:

1. Decisions are based solely on intuition and other sources than information provided by BI
2. Decisions are to a great extent based on intuition and other sources than information provided by BI, and BI information is only used for supporting the decision made
3. Decisions are based on intuition and other sources than information provided by BI in a majority of cases, sometimes complemented by BI information
4. Decisions are to a great extent based solely on BI information
5. Decisions are primarily based on BI information, but supplemented by intuition and other sources than information provided by BI in order to take other aspects into account when appropriate

5 Empirical Findings [2]

In this chapter, the results from the semi-structured interviews will be presented organization-wise, with subsections based on the BIAF Areas. All the information provided in this chapter is coming from the informants, including any valuating statements.

In table 5.1, a list of the interviews conducted, together with relevant information, can be found. Furthermore, brief presentations of the organizations and the informants interviewed can be found in appendix 3.

Table 5.1 List of Interviews Conducted

Organization	Informant	Interview Setting	Interview Date	Interview Guide
Arbetsförmedlingen	Martin Andersson: *Development and Administration Analyst*	Telephone	23 April, 2013	Revised
"Manufacturer A"	Anonymous: *Head of BI*	In person	4 April, 2013	Original
Ericsson	Mattias Priebe: *Head of Analytics at IT*	In person	9 April, 2013	Original
Folksam	Stefan Lindqvist: *Group Leader of Decision Support*	Telephone	2 May, 2013	Revised
Postnord	Patrick Eckemo: *Director of Information Management*	In person	9 April, 2013	Original
Swedbank	Niclas Olsson: *Head of Group Business Intelligence*	In person	16 April, 2013	Original
"Bank A"	Anonymous: IT Architect	Telephone	2 May, 2013	Revised
Skandia	Thomas Carlbring: *Head of IT Decision Support*	In person	5 April, 2013	Original
"Logistics Company A"	Anonymous: *Project Manager*	Telephone	8 May, 2013	Revised
VGR	Bodil Nielsen: *Project Manager of Decision Support*	Telephone	3 May, 2013	Revised

5.1 Arbetsförmedlingen

5.1.1 Data & Information Quality

5.1.1.1 Organization of Data & Information Quality Work (A)

They do not have a person or department with the head responsibility of assuring data quality. However, information entered into the BI system is reviewed by employees at Arbetsförmedlingen.

[2] N.B., any valuating statements, or any other information for that matter, presented in this chapter are provided by the informants, and not by the authors of this master thesis.

5.1.1.2 Data & Information Quality Criteria and Frameworks (B)

There are no clear cut data quality criteria or frameworks used throughout the entire organization; instead, the approach can vary between departments.

5.1.1.3 Data Structure (C)

They have a large system called AIS for matching employees with employers, which is a central part of the system structure serving as the source of information. From there information is loaded into the DW, where analyses, comparisons, and reports can be made. This is updated on a daily basis. Entering of the information is to a large extent performed by the job seekers, and follows a structured pattern in order to ensure quality, but there is then a difference in the amount of extra information that is added by Arbetsförmedlingen personnel, e.g. regarding qualification criteria for subsidies.

5.1.2 Information Sources

5.1.2.1 Internal & External Information Sources (D)

The majority of the information is internally generated; however, there is quite extensive information sharing, such as statistics and reports, with other agencies, especially Försäkringskassan[3].

5.1.2.2 Unstructured & Semantic Data (E)

There is a good deal of media coverage relating to Arbetsförmedlingen, which stems from its political connections. This unstructured data is monitored, and displayed through a certain service to all of Arbetsförmedlingen's employees. However, it is only a monitoring service; it does not generate automated responses etc.

5.1.3 Reporting & Performance Analytics

5.1.3.1 Performance Measurement (F)

Arbetsförmedlingen uses KPIs that stem from the governmental annual budgets and the appropriation, specifying what should be done and prioritized. Arbetsförmedlingen uses strategic and operational objectives from which they define the KPIs. According to Martin,

[3] http://www.forsakringskassan.se/sprak/eng

some of these definitions are clear, but some are somewhat unclear and in need of improvement. In addition, Arbetsförmedlingen uses scorecards for monitoring performance in relation to their KPIs, and these are broken down all the way to local-office level.

5.1.3.2 Reporting Needs (G)

Since Arbetsförmedlingen is a public authority, there is extensive reporting and follow-ups made regarding budgets and whether political targets have been met. According to Martin, Arbetsförmedlingen also attract a lot of media attention that has further forwarded the need of clear and comprehensive reporting. Apart from the scorecards and targets, this additional reporting has caused extra red tape making the general view of the systems negative in some situations, where the reporting required is seen as excessive and redundant.

5.1.3.3 Business Intelligence Review & Improvement (H)

Arbetsförmedlingen receives the budget constraints and appropriation each year that requires a review and update of the goals and targets. Furthermore, they perform their own prognoses and reviews, which are reported to the monitoring governmental agency. On a monthly basis the performance is evaluated through a scorecard, and once every four months a more extensive review is performed.

5.1.4 Information Strategy & Alignment

5.1.4.1 Strategy Alignment (I)

According to Martin, Arbetsförmedlingen's strategy is clearly defined and broken down into smaller parts all the way to local-office and project levels, and linked to the various subareas and divisions of the organization. As for a bottom-up linkage, the monitoring of media conveys society's view on their work, which has bearing on the decisions made at Arbetsförmedlingen.

5.1.4.2 Top-Management Support & Sponsorship (J)

According to Martin, the decision-support systems are considered prioritized and important by top management. Regarding sponsorship, it relates to the funds given to the organization by the government, but it could be viewed as prioritized to a certain extent.

5.1.4.3 Value & Benefits of Business Intelligence (K)

They do not work actively with demonstrating the value of BI activities, but according to Martin, it is seen as important in order to get the holistic picture and map how constituents correlate, as well as identifying indicators of where the organization is heading. Martin sees great potential in increasing the interaction with other agencies, and consolidating systems and reports. This would increase efficiency in a large number of process as well as reducing the red-tape work load.

5.1.5 Information Management & Decision Making

5.1.5.1 Information Management Culture (L)

According to Martin, the scorecards and the objectives communicated are viewed as positive in the organization; however, some reporting is seen as redundant. The decision-support systems are trusted and people dare use the information provided. However, Martin sees great potential in increasing information sharing, especially between agencies.

5.1.5.2 Bases for Decision Making (M)

As previously stated, the information provided by the decision-support systems is trusted and used to make decisions. However, decision making at Arbetsförmedlingen is not solely based on the information from the systems. Another factor to account for is problems arising from changes in political targets or the rules for subsidies.

5.2 “Manufacturer A”

5.2.1 Data & Information Quality

5.2.1.1 Organization of Data & Information Quality Work (A)

“Manufacturer A” is currently running a program called COMPASS (Common Processes and Standardized Systems), including ERP components as well as BI. The program involves an MDM team that spans across the organization. Input from their ERP system is considered to be of high quality since there is a validity phase before data entering the ERP system. However, “Manufacturer A” struggles in the interfaces with legacy systems used. Even though they try to assess the data from the legacy systems, maturity is lacking from a governance aspect, mainly concerning master data stewardship. A major obstacle for information use in “Manufacturer A” at the moment is considered to be multiple “sources of truth”, thus, decommissioning of legacy systems is prioritized.

5.2.1.2 Data & Information Quality Criteria and Frameworks (B)

As stated, the data from the ERP system is considered to be of high quality thanks to the system's validity phase, where SAP is considered a robust tool. The issue lies with assessing data quality from legacy systems, and for that they use control reports for constant review in order to proactively detect missing or wrongly coded data. Other than the ERP validity phase, and these control reports, they do not use any quality criteria or frameworks. From the aspect of accessibility, SAP is considered a really robust tool where data is easily traceable, and data security is high. However, an area lacking is the timeliness of data, where more up-to-date and real-time data is needed to improve decision making; this requires a different infrastructure with in-memory technology.

5.2.1.3 Data Structure (C)

At "Manufacturer A", BI takes the starting point in master data and measure standardization, the latter defined by Business Process Owners (BPOs) across business verticals. Nevertheless, in achieving a "single source of truth", the legacy systems need to be decommissioned in order to increase use of information. However, in terms of traceability and data security, these areas are of good quality thanks to the integration between the ERP and BI systems.

5.2.2 Information Sources

5.2.2.1 Internal & External Information Sources (D)

At "Manufacturer A", 98 % of the data used for BI purposes is acquired internally through the ERP system. The remaining external data consists of market data, which is not maintained by the BI unit.

5.2.2.2 Unstructured & Semantic Data (E)

"Manufacturer A" does not look into unstructured data at the moment, and the SAP system does not have any application for that purpose. However, they recognize a future need of looking into social media sources etc.

5.2.3 Reporting & Performance Analytics

5.2.3.1 Performance Measurement (F)

Today, the operational reporting at "Manufacturer A" is rather mature. For management reporting, they have developed multiple dashboards, but they do not contain true KPIs and they are not targeted towards executives, but instead targeted towards middle management.

Their BI platform is very financial-based and operational in nature. The financial planning is to a high degree based on spreadsheets, but this is currently being replaced. A weakness is that they have not gone live with SAP in all of their geographical sectors and hence deferred the focus on executive dashboard reporting. Furthermore, the overall group management and the management of the various geographical sectors have different information needs at the moment, thus making executive dashboard reporting hard.

The head of BI believes that fact-based decision making is only going to be accomplished when standard measures like KPIs are reinforced across the organization, and there is a need for faster response times through in-memory platforms.

5.2.3.2 Reporting Needs (G)

Currently, there are problems with various legacy systems providing contradictory information. Thus, it is questionable how much of everything produced by the systems is actually used to make decisions. There is a need for a certain degree of integration in the templates with legacy systems. Moreover, they have a need for more real-time information, especially in connection to promotions.

One single source of truth is critical, which for "Manufacturer A" will be achieved by going live with SAP in a full geographical area[4]. Until then, multiple sources of information will cause non-productive discussions, thus hindering fulfillment of information needs. In addition, the BPO teams need to be strengthened and better communicate the overall agenda set by top management.

5.2.3.3 Business Intelligence Review & Improvement (H)

In order to review themselves, they use BI statistics on both the reporting and DW loading sides. The "Manufacturer A" commitment to SAP is considered non-arguable. The main challenges for their BI work revolve around improving governance, performance, and reporting tools.

[4] First one will be Europe in late 2013

5.2.4 Information Strategy & Alignment

5.2.4.1 Strategy Alignment (I)

When it comes to aligning BI with strategy, the Head of BI does not consider their BI to be positioned on its own, as leading BI organizations typically have, but instead very closely connected to the ERP implementation. The BPOs need to be better at breaking down what top management requires. In addition, there needs to be integration in the templates with legacy systems. However, today there is a company strategy of taking out savings in the overhead areas, where BI helps by trying to reduce time on data management activities and put that into sales-related activities.

5.2.4.2 Top-Management Support & Sponsorship (J)

Whilst rolling out the COMPASS program across regions is a prioritized area for top management, investments into BI is consciously moderate and not prioritized. BI will certainly follow, but it is not currently focused upon. This is also reflected in the positioning of BI at “Manufacturer A”; in organizations with higher BI maturity, the Head of BI would report directly to the CIO or CFO, but this is currently not the case at “Manufacturer A”.

5.2.4.3 Value & Benefits of Business Intelligence (K)

According to the Head of BI, the crucial aspect for proving value of BI is on the process side and turning time spent on data management into action-based changes in the execution with its customers. In order to achieve this type of benefit from BI, strong Business Process Ownership is needed, in addition to investing in an in-memory infrastructure to increase speed of information delivery. Thus, there is no current focus on incorporating e.g. and ROI approach.

5.2.5 Information Management & Decision Making

5.2.5.1 Information Management Culture (L)

According to the Head of BI, there are three challenges in order to enhance information usage in the organization; improved BPO governance, improved BI infrastructure to increase speed of information delivery, and more agile reporting tools. The bottom line deals with defining and agreeing upon measures and KPIs, in order to start acting on the consistent set of information.

5.2.5.2 Bases for Decision Making (M)

Currently, “Manufacturer A” is lacking the trust needed in the BI system in order to make decisions based on its information; this is partly due to multiple sources of truth but also users not sufficiently educated in where to look for different types of information. It is not because of non-reliable data, but more an issue from a BPO governance perspective. It has to do with defining different measures and KPIs and agreeing upon them. Additionally, in order to make more fact-based decisions, the Head of BI sees a need for more up-to-date and real-time data, although you will always have some sort of intuition left in the decision-making process.

5.3 Ericsson

5.3.1 Data & Information Quality

5.3.1.1 Organization of Data & Information Quality Work (A)

The data quality from the SAP platform is generally considered high. There is a specific unit within Ericsson that is fully occupied with master data management and data quality. This unit also has specific targets to work at. However, this does not apply to all of Ericsson, but only parts of its operations.

5.3.1.2 Data & Information Quality Criteria and Frameworks (B)

On some levels, Mattias believes that Ericsson has high data quality. This is so, since SAP was early introduced, and also recently consolidated, resulting in homogenous data of high standard. At Ericsson they view data quality from two perspectives; process execution and analytics. The process execution deals with transactional data, whilst analytics comprises data structure. It is not quite clear if any criteria or frameworks are used to ensure data quality.

5.3.1.3 Data Structure (C)

Data structure is a complex problem for Ericsson according to Mattias. The issue is that various definitions of data and concepts are used across Ericsson, and different product groups have different data architectures. A lack of top-down controlling has led to this situation organically emerging over time.

5.3.2 Information Sources

5.3.2.1 Internal & External Information Sources (D)

The financial department at Ericsson is mainly concerned with internal information. However, other departments could be interested in more external information. It is hard to establish an organization-wide appraisal of the extent of internal vs. external information used.

5.3.2.2 Unstructured & Semantic Data (E)

When it comes to external data, Ericsson uses data mining in the area of social media, through the help of external providers.

5.3.3 Reporting & Performance Analytics

5.3.3.1 Performance Measurement (F)

At Ericsson, there are several dashboards for top management, but the problem is that the material viewed by top management has been processed by ten people in order to be accurate. When top management does not recognize the effort behind the dashboards, it can be hard to get the sponsorship needed. Traditionally, measurement has been common at Ericsson, but it has not been reported to a high level in the organization. Again, there is a problem with agreeing upon definitions of data and concepts.

5.3.3.2 Reporting Needs (G)

In an organization like Ericsson, it is common for someone to generate a report that is seen as necessary, but it lacks a purpose for the end user. Consequently, a substantial amount of reports are generated without any need from a recipient. Mattias believes that this could be a result from a lack of breaking down the overall strategy.

5.3.3.3 Business Intelligence Review & Improvement (H)

The analytics unit has previously not been good at assessing its efficiency and effectiveness. The scorecards that were used to assess their work showed good results, while the stakeholders in fact were disappointed with the services supplied. Now they are improving, e.g. by starting to measure the lead time between a need for their service occurs and when it is satisfied. According to Mattias, it is all about creating material for continuous improvement of the quality of their services.

5.3.4 Information Strategy & Alignment

5.3.4.1 Strategy Alignment (I)

At Ericsson, the strategy and BI is to a certain extent linked using both bottom-up and top-down approaches. However, the bottom-up link mainly consists of customer requirements, and the top-down link is not as good as it could be according to Mattias. According to Mattias, the company strategy should indicate what value drivers the analytics unit should focus on, and the analytics unit should in turn support the strategy. However, this is not the current case since the company strategy is too abstract to be broken down to operational goals. Mattias concludes that Ericsson has a lot more competition now than before, and therefore they need to be more strategically oriented, as well as more coherent as a company since some departments are better at this than others.

5.3.4.2 Top-Management Support & Sponsorship (J)

Mattias experiences a great focus on the analytics unit and BI within Ericsson as several people want to use their services for several purposes. However, there is no clear sponsorship since there are conflicting needs, and there is a lack of good governance resulting in detached organizational silos. As stated previously, the fact that management does not notice all the imposition needed for providing dashboards etc. makes it hard to get the sponsorship needed.

5.3.4.3 Value & Benefits of Business Intelligence (K)

So far, Ericsson has not had the resources necessary to concretely demonstrate the benefits of BI and analytics. They have started with establishing the TCO (Total Cost of Ownership), but to identify the realized business value is difficult. However, Mattias is now responsible for value realization within IT, so they are improving. In order to get sponsorship, they rely on good business cases where expected qualitative benefits are described.

5.3.5 Information Management & Decision Making

5.3.5.1 Information Management Culture (L)

Traditionally, Ericsson has not been an organization where decisions have been based on facts. In addition, the lack of proper governance has resulted in organizational silos with limited information sharing between them, since they are not used to working cross-functionally. However, they are trying to improve in this area.

5.3.5.2 Bases for Decision Making (M)

When making decisions at Ericsson, one often relies a lot on intuition. Usually, the data quality is high, but sometimes it is not, and therefore it is considered unreliable. As previously presented, the decision-making tradition has not been based on facts, but rather intuitive thoughts of where the market is heading. Mattias believes that intuition always should play a part in decision making since it comprises one's experience, however, analytics should be more frequently used in order to verify the intuitive thoughts; one does not often begin with quantitative analysis without having any initial thoughts about the market.

5.4 Folksam

5.4.1 Data & Information Quality

5.4.1.1 Organization of Data & Information Quality Work (A)

Folksam has people responsible for data quality, and they work continually to make sure the data is of a high quality. However, there is no one with the total overall responsibility for the entire organization's data quality. The data quality process can be automated to a large extent, but information quality is trickier and requires that the rest of the organization is involved and the information is aligned. At the moment, they are working on arranging responsibilities so that there are people in charge of various information objects.

5.4.1.2 Data & Information Quality Criteria and Frameworks (B)

The current legislation has specific requirements regarding quality and reporting standards, which Folksam has to adjust to. The data quality process can be automated to a large extent, but it is unclear if specific criteria or frameworks are used.

5.4.1.3 Data Structure (C)

A major concern for Folksam is that they have a lot of old legacy systems with large amounts of data in many different places and formats. Now, there is a need for convergence resulting in a great deal of work. They are currently in the process of developing a common definition framework for the entire organization, which will enable comparisons and analyses between different functions and operations.

5.4.2 Information Sources

5.4.2.1 Internal & External Information Sources (D)

Folksam uses mostly internal information, but some external data is incorporated into the BI system. However, their primary focus is structuring the internal data from the various legacy systems.

5.4.2.2 Unstructured & Semantic Data (E)

As they are currently focusing on internal data, they have not yet incorporated any unstructured data into the BI platform. However, there is a function at Folksam responsible for monitoring the market, where they utilize some unstructured data.

5.4.3 Reporting & Performance Analytics

5.4.3.1 Performance Measurement (F)

According to Stefan, Folksam does not work with KPIs etc. as much as they should do. In addition, the measures that they are in fact using are not adequately defined and agreed-upon. They utilize some overall target KPIs, but the underlying subparts are not broken down enough, resulting in lack of definitions and trust for the measurement.

5.4.3.2 Reporting Needs (G)

At some places in the organization, the BI platform has been thoroughly developed and integrated, thus resulting in a satisfaction of internal customer needs. However, there are cases where the system does not provide the user with the full picture, and other systems are required to fulfill the user's needs.

There is an articulated decision that all information concerning the entire organization should come from the BI platform. Thus, when a need arises in the organization, sponsorship is provided and the project is reviewed by the architects to ensure that it is in line with the IT strategy. However, it can be hard to work on internal projects for the decision-support group, as it is hard to build a business case for them. Then there are several reports made in response to the many regulatory demands existing in the insurance industry.

5.4.3.3 Business Intelligence Review & Improvement (H)

As they have identified troubles with definitions and lack of KPIs etc., Folksam has now initiated the development of a common definition framework for the entire organization. However, other than that there is no regular review conducted.

5.4.4 Information Strategy & Alignment

5.4.4.1 Strategy Alignment (I)

The decision-support group is a unit under the IT department, which is a supporting function for the entire organization. The IT strategy is defined, broken down, and well-embedded within the IT department, and has a clear link to the overall strategy of the organization. Before a BI project is launched, it is reviewed by the architects to ensure that it is in line with the IT strategy. However, there only appears to be a linkage through a top-down approach.

5.4.4.2 Top-Management Support & Sponsorship (J)

There is an articulated decision from top-management that all information concerning the entire organization should come from the BI platform. Thus, it is easy to get sponsorship for a project addressing a specific department's needs. However, if the decision-support group wants to do a project for themselves, it is more difficult to get sponsorship, since it is difficult to articulate the business case in terms of how much revenue will be generated or how many new customers it will attract. Naturally, projects addressing regulatory needs are easy to obtain funding for.

5.4.4.3 Value & Benefits of Business Intelligence (K)

According to Stefan, instead of calculating how much revenues or the customer base will increase, decision-support projects have to focus on other factors. These are often of an intangible nature, e.g. benefits like reduced dependency on specific people, faster access to information, and increased accuracy in quality control. Thus, no ROI or similar is used to demonstrate value.

5.4.5 Information Management & Decision Making

5.4.5.1 Information Management Culture (L)

At some places in the organization, the BI platform has been thoroughly developed and integrated, thus resulting in a positive view of information and BI. However, where the system does not provide the user with the full picture, the view of the information provided is not as good. Without clear targets and communicated needs, confusion can arise when the BI says one thing, and the user has another opinion based on other factors. The work of developing these standards takes time since it is a large organization and all the various departments and people in them need to be convinced of the benefit of changing from the old ways.

5.4.5.2 Bases for Decision Making (M)

According to Stefan, it depends on the nature of the decision if the BI platform is used. However, in most cases they do base their decisions on the information provided, especially when it comes to sorting and selecting which customers to target. However, other factors and tools should be included in decision making, and extensive work is being put into integrating the decision-support platforms into the user's existing methods and tools; making sure they are easy and effective to use.

5.5 Postnord

5.5.1 Data & Information Quality

5.5.1.1 Organization of Data & Information Quality Work (A)

Postnord has a master data management unit (MDCC), and in addition, they have one person as a data quality analyst, with the focus of making sure the quality framework used is being followed and implemented correctly. Also, the BI team as such works on various data quality issues that might arise in the BI area.

5.5.1.2 Data & Information Quality Criteria and Frameworks (B)

Postnord has developed a Master Data Framework consisting of governance, data quality, ownership, policies, KPIs and reporting. This is primarily managed through the Master Data Management (MDM) platform but some data quality issues may also be managed in the BI platform. Nevertheless, MDM is considered to be a pre-requisite for high quality BI.

5.5.1.3 Data Structure (C)

As stated previously, Postnord uses a comprehensive framework for data quality that includes governance, which is developed and managed by the MDM unit. They implement common definitions and concepts, which makes the data structure more aligned and harmonized. Postnord has a target architecture for BI and MDM that defines where they are and where to go over time.

5.5.2 Information Sources

5.5.2.1 Internal & External Information Sources (D)

The primary focus is on internal information, but there is a process of incorporating more external information into decision making. Currently, the external data being used is considered to be of high quality. Postnord also purchases unstructured information in the form of analyses. However, these are not integrated with the BI platforms, but are used by other departments for monitoring markets, strategy planning etc.

5.5.2.2 Unstructured & Semantic Data (E)

Postnord currently purchases some unstructured information, but this is not integrated into the BI platform. Patrick believes that there is great future potential in incorporating external unstructured data into the BI platforms, as well as in connecting unstructured data to structured data in real time.

5.5.3 Reporting & Performance Analytics

5.5.3.1 Performance Measurement (F)

Within the different departments, they have scorecards for monitoring the performance, which could also be seen as dashboards. In these they measure several things, many of which are based on their KPIs. It is Patrick's feeling that these scorecards work well, however they are not standardized between the different departments and they are still to a large extent manual excel sheets. However, most of the users appear to be satisfied with them, even though they definitely could be improved and synchronized. Above all, they have made an effort in defining several measures and concepts internally.

5.5.3.2 Reporting Needs (G)

A main focus currently is on process convergence in order to reduce redundant processes and increase effectiveness. Also, there are different needs given various departments, and there is a constant need for new reports in all business areas. They are in the process of launching a tool that enables users to satisfy their own information needs without involving IT. Therefore, there seems to be an assessment of the new information needs across the organization, but it is unclear whether all the reports already in place still fulfill a need.

5.5.3.3 Business Intelligence Review & Improvement (H)

During the last couple of years there have been a number of internal restructurings of the BI function, and currently they are in the middle of a major one. Aspects such as a lack of personnel, politics, and uncertainty make BI review and improvement challenging. A main focus right now is on process convergence in order to reduce redundant process and increase effectiveness, something that is stated in the road map constructed.

5.5.4 Information Strategy & Alignment

5.5.4.1 Strategy Alignment (I)

Patrick believes that they align BI with strategy from both a top-down and bottom-up approach. The business plans provided by top management are broken down to IT objectives, and they have put in a lot of effort into making these objectives comprehensive and thorough. The road map developed is initially based on the company strategy. In addition, they have defined in detail how the BI unit should support the business plans and overall strategy.

5.5.4.2 Top-Management Support & Sponsorship (J)

Patrick says that both BI and MDM are highly prioritized areas by top management, and getting sponsorship is not a major problem today, but they have worked hard to obtain it. The fact that the CIO feels strongly for BI helps a great deal, and especially the process convergence is heavily supported. However, the internal politics causes disruptions in the BI work, thus it would be desirable to get a clearer sponsorship from other managers than the CIO.

5.5.4.3 Value & Benefits of Business Intelligence (K)

Patrick admits that there are difficulties in calculating ROI on BI since there are few tangible outcomes. However, in order to deal with the issue and get support for their business cases,

they have spent four years in constructing a financial model for MDM, which is used for BI and MDM. These value models focus on tangible benefits from operational efficiency and IT cost savings.

5.5.5 Information Management & Decision Making

5.5.5.1 Information Management Culture (L)

It is Patrick's general feeling that people in the organization dare to rely on the information given to them by the BI platforms, which also was confirmed by an internal survey a couple of years ago. Even though some mediocre information tools are used, most of the users seem satisfied with the information provided.

5.5.5.2 Bases for Decision Making (M)

As mentioned, the information provided by the BI platforms is relied upon at Postnord, and therefore it is used in making decisions. Since the financial aspect of decisions are strongly interconnected with the ERP system, it entails high quality information relied upon by decisions makers.

5.6 Swedbank

5.6.1 Data & Information Quality

5.6.1.1 Organization of Data & Information Quality Work (A)

At Swedbank, the do not have any formal department or person for ensuring data quality. However, according to Niclas, it is in the BI unit's own interest to ensure high data quality, and therefore they follow-up any quality problems and correct them whenever they arise.

5.6.1.2 Data & Information Quality Criteria and Frameworks (B)

According to Niclas, the internal information quality they have today is not good enough and needs improvement. Currently, they are assessing information quality from two dimensions; consistency and functionality. Consistency revolves around making information on an aggregated level correspond to the information seen when broken down to the smallest state. Functionality comprises having sufficient information in order to make the analyses they want to do, and this is mainly a structural problem at the moment.

5.6.1.3 Data Structure (C)

At Swedbank, the focus is currently on trying to improve the structure of the enormous amount of internal data they have. This structural problem is viewed as a top challenge at the moment, and it is a consequence of all the demands put forth by new regulations regarding bank and insurance company reporting and data handling.

5.6.2 Information Sources

5.6.2.1 Internal & External Information Sources (D)

The nature of being a bank results in a lot of internal information, especially from all of the clients' transactional information. Consequently, Swedbank only uses internal information for internal controlling, and 99 % internal information within areas such as CRM due to its availability. However, according to Niclas, they are looking into using external information for macro analyses and environmental scanning.

5.6.2.2 Unstructured & Semantic Data (E)

This is not an area where Swedbank is active at the moment, but it has potential to be included in the above-mentioned macro analyses and environmental scanning. However, within the financial industry, a lot of customer information is readily available internally. Nevertheless, reputation is crucial within the industry from a risk perspective, and they would like to be more active within social media. Still, they must structure their internal data before starting to structure unstructured data.

5.6.3 Reporting & Performance Analytics

5.6.3.1 Performance Measurement (F)

Niclas believes that there is too much imposition in reporting at the moment, and due to regulatory demands, they are required to report in all types of formats. Internally, they work with KPIs, however, not as much when dealing with financial data. They do not use management dashboards, but instead they use a lot of standardized reports.

5.6.3.2 Reporting Needs (G)

As for the standardized reports, there is not always a recipient needing the information in the other end. In fact, Niclas describes that Swedbank performed an inventory recently, showing that they in deed produce too many reports, i.e. between 70 000 and 100 000. However, if one were to replace these with dashboards, the reports would be needed as a foundation, so it would be questionable if the maintenance required is motivated from a cost perspective. Lastly, the BI unit makes sure that their work is connected to the overall strategy, thus they do not work on new projects or reports just because they are interesting to them.

5.6.3.3 Business Intelligence Review & Improvement (H)

They do not work with any control reports and such internally at the BI unit. Nevertheless, it is in their interest to ensure high quality in their work since there are quality benefits to gain. If something needs follow-up and improvement, they do it at an ad-hoc basis, but there is no structural process of continuous review at the BI unit.

5.6.4 Information Strategy & Alignment

5.6.4.1 Strategy Alignment (I)

According to Niclas, there is a tight connection between the BI practices and the overall Swedbank strategy. Through the regulatory demands on banks that the BI unit adheres to, it becomes both a bottom-up and top-down connection to company strategy since the purpose of the regulations often reflect Swedbank's strategic objectives of profitability, minimizing risk etc. Objectives set by the BI unit has to be connected to the overall strategy, and it regards better structured information, which in turn lower costs and enables better risk assessments.

5.6.4.2 Top-Management Support & Sponsorship (J)

Niclas does not believe that top management would think in terms of sponsoring BI as such, but through the substantial investments in BI infrastructure that they have approved, he sees a strong support for BI. Niclas does not feel that more top-management support is needed, and one reason for that is the fact that they are organized under the CFO in order to get the sponsorship sought for.

5.6.4.3 Value & Benefits of Business Intelligence (K)

As of today, Niclas does not see a need for demonstrating the value of BI in the form of e.g. ROI. Their services are demanded, and the connection to Swedbank's profitability is

considered apparent. If one would use more business case-driven BI, it could be harder to get the sponsorship needed, but as of now it is rather easy to demonstrate BI benefits, especially with the regulatory demands that need to be followed.

5.6.5 Information Management & Decision Making

5.6.5.1 Information Management Culture (L)

There is a culture of trusting the risk reports produced by the BI system, and a lot is based on the internal data at hand. However, the internal data structure needs a lot of improvement in order to enable better information sharing.

5.6.5.2 Bases for Decision Making (M)

As said, decision makers have to trust e.g. the risk reports produced, and not make decisions opposing them. But at the same time it depends on what information it regards, and sometimes a report's premises are wrong, and then decisions are made based on other variables. Often, decisions are based on a combination of intuition and BI information.

5.7 Remaining Organizations

Due to the limited space assigned for this master thesis, the empirical findings from all of the organizations interviewed cannot be as thoroughly presented as the ones above. Therefore, a summarizing table has been included in appendix 4, where the remaining findings are briefly presented.

6 Analysis

In this chapter, the analysis of the empirical findings will be performed using the assessment framework provided in chapter 4, and presented through BIAF Radar Charts. Lastly, the discrepancies between theory and practice are discussed.

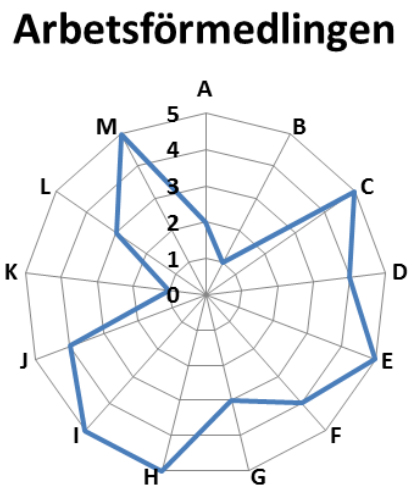
6.1 Assigning of BIAF Scores by Area

Based on the empirical findings presented in chapter 5, scores were assigned to the organizations through the BIAF presented in chapter 4. The assigning of scores is presented and briefly motivated in appendix 5, and then graphically displayed using the BIAF Radar Charts in section 6.2.

6.2 Organization BIAF Radar Charts

In this section, the BIAF scores of each organization will be illustrated through a BIAF Radar Chart. Even though the main purpose of this thesis does not involve causally explaining why the organizations scored like they did, the implications of these scores will be briefly discussed, as well as what potential areas should be focused on in order to improve the overall BI work. The general discrepancies will be further discussed separately in section 6.3.

6.2.1 Arbetsförmedlingen



Arbetsförmedlingen tends to use a decentralized approach for data and information quality, where it is up to the individual employees to assess the quality on an ad-hoc basis, resulting in low scores for A and B. However, the data structure applied includes standardized facets as well as flexibility, providing a high score on C. The high scores on information sources help Arbetsförmedlingen to get a holistic picture of their situation, enabling a bottom-up linkage between BI and organization strategy, resulting in a top score on I.

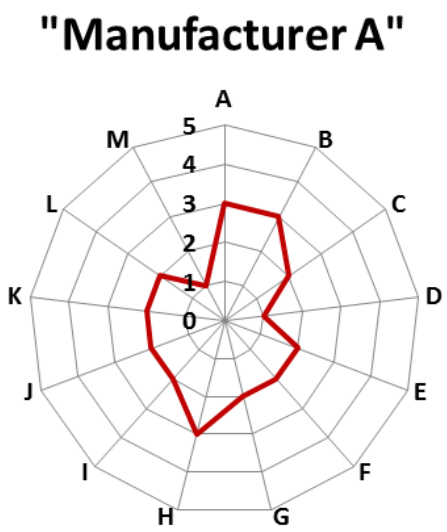
Figure 6.1 Arbetsförmedlingen BIAF Radar Chart.

One could be surprised that they still receive high top-management support, despite the low score on K. However, it seems as for now, the Arbetsförmedlingen management appreciates

the intangible benefits brought by BI enough to give the support needed. The reason for not obtaining a higher score on L was the need for further information sharing and some reporting viewed as redundant. Nevertheless, the information was positively viewed and trusted, which could have laid the foundation for such a high score on M, in addition to the high degree of strategy alignment.

Overall, Arbetsförmedlingen's BI practices appear to be quite aligned with academia's best practices in most areas. In order to further improve their BI, Arbetsförmedlingen could organize a work group ensuring data and information quality through establishing clear quality criteria. Thus, quality could be raised, and reporting needs further met, and consequently demonstration of more tangible BI benefits could be possible in order to secure future top-management support and sponsorship.

6.2.2 "Manufacturer A"



Three critical areas identified by the Head of BI that hindered information use at "Manufacturer A" were insufficient governance, reporting tools, and performance measures. These could explicitly explain the low scores on C, G, and F respectively. Moreover, the difficulties in agreeing upon KPI definitions etc. obstruct information use and trust, resulting in low scores on L and M. The low score on K could be a partial explanation to the low top-management support and sponsorship. Another explanation could be the lack of strategy alignment, originating from BPOs not breaking down top-management requirements and a lack of integration.

Figure 6.2 "Manufacturer A" BIAF Radar Chart.

Overall, "Manufacturer A's" BI practices appear to be poorly aligned with academia's best practices. Relatively low scores on all areas could be explained by the areas' interconnectedness; resulting in a vicious circle. Even though much could be improved, a two-fold focus is proposed initially; integrating or removing the various legacy systems in order to improve data structure, and agreeing upon common definitions of KPIs and measures. Thus, reporting needs could better be met, in turn increasing the trust and sharing of the information provided. Thereby, it could facilitate demonstration of tangible BI benefits in order to increase top-management support and sponsorship. Subsequently, all of these improvements could increase fact-based decision making.

6.2.3 Ericsson

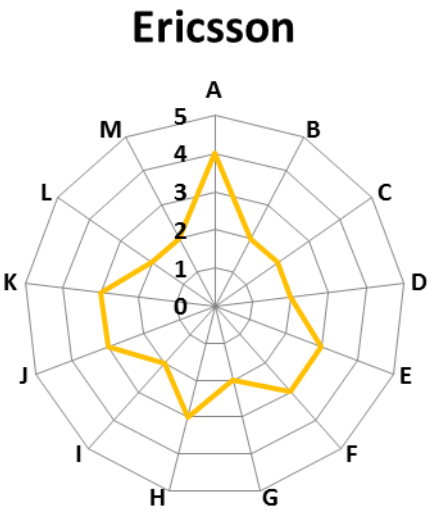


Figure 6.3 Ericsson BIAF Radar Chart.

The fact that Ericsson can reach a high score on A, but at the same time receive fairly low scores on B and C could be explained by the unit for MDM and data quality not being applied across the entire organization. Thus, common quality criteria and aligned data structure are not obtained. Their abstract company strategy was hard to break down and link to the BI work, resulting in organizational silos with different data architectures and concept definitions. Consequently, this misalignment and lack of governance could make reporting needs hard to fulfill, leading to a lack of trust and sharing of the information provided, and resulting in decisions based on other sources. In addition, top-management sponsorship is insufficient, arguably due to conflicting needs as well as no demonstration of tangible BI benefits.

Overall, Ericsson's BI practices appear to be fairly aligned with academia's best practices. In order to improve the BI practices at Ericsson, the primary focus should be to enhance strategy alignment and the overall data structure. Thereby, organizational silos could be removed, and facilitate agreement of concept and measure definitions, enabling better fulfillment of reporting needs. As a result, information trust and sharing could increase, causing more fact-based decision making. Subsequently, tangible BI benefits will be easier to demonstrate in order to obtain further top-management sponsorship.

6.2.4 Folksam

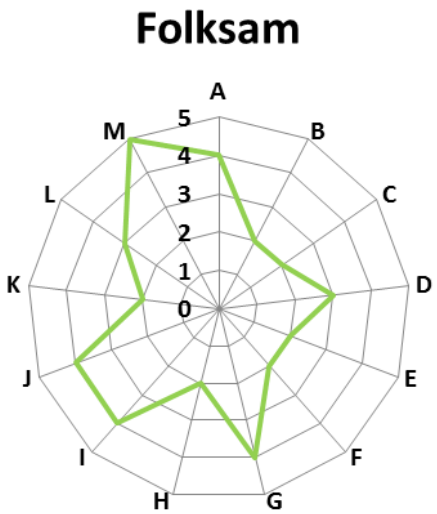


Figure 6.4 Folksam BIAF Radar Chart.

The data and information quality work at Folksam corresponds to a high degree with Ericsson; good organization for quality work, but it is not adopted across the organization, resulting in low scores on B and C. The lacking data structure is to a high degree a result of diverging legacy systems and various definitions used. As the focus is on converging internal data, the scores on information sources are not as high as they could be. Although F is fairly low, G is high, which could be a result from the close top-down strategy linkage, enforced by the architects' project reviews. Since the reporting needs are fulfilled to a high extent, decisions are presumably based upon BI information. The top-management support is often sufficient, however,

sponsorship for internal projects are hard to get due to difficulties in demonstrating value, providing a low score on K.

Overall, Folksam's BI practices are on some areas well-aligned with academia's best practices, while fairly aligned on the rest. In order to improve further, Folksam could organize for enterprise-wide data and information quality work; thereby facilitating the establishment of common definitions. Simultaneously, the various legacy systems should either be more integrated or removed, allowing for better information sharing and trust. Also, by starting an endeavor of demonstrating tangible BI benefits, further top-management sponsorship for internal projects could be obtained.

6.2.5 Postnord

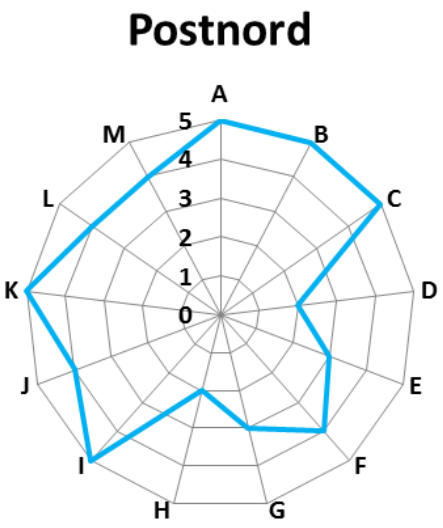


Figure 6.5 Postnord BIAF Radar Chart.

Postnord scored consistently high on the categories data and information quality, information strategy and alignment, as well as information management and decision making. The Postnord data and information quality work is very integrated, where the MDM unit has constructed a thorough framework addressing both data and master data quality, leading to high scores on both B and C. In addition, the MDM unit has spent four years in developing a framework for demonstrating tangible BI benefits, thus making it easy to get the top-management sponsorship needed, especially when the BI work is closely linked to company strategy. Since data and information quality is high and performance measures defined, reporting needs are more easily met. Thus, information sharing and trust is high, resulting in basing decisions on the BI information provided. However, Postnord scores fairly low on D, since they do not use as much external information as they could, and it is not properly integrated. The BI review and improvement at Postnord could be better, but the current and past restructurings have made that area challenging.

Overall, Postnord's BI practices are to a high extent aligned with academia's best practices in most areas. The current shortcomings are not major ones, but could be addressed to further improve the BI work. By focusing on creating continuous BI review and improvement, Postnord could continue to develop their work, and reporting needs could be further met. In addition, by integrating more external information into to BI system, a more holistic picture of the Postnord situation could be obtained.

6.2.6 Swedbank

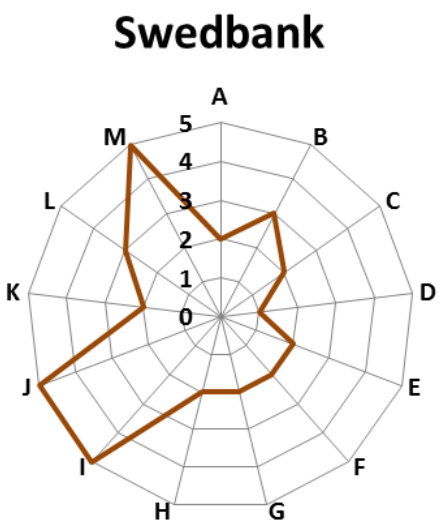


Figure 6.6 Swedbank BIAF Radar Chart.

At Swedbank, they trust a lot in being self-motivated in assuring good quality of data and information, as well as reviewing their own BI work, thus receiving relatively modest scores on A, B, and H. The recent regulatory demands on their industry have made them experience structural problems with their internal data, as well as redundant reporting. The low focus on external information can be explained by their rich internal information on their customers. The regulatory demands also bring a bottom-up strategy linkage, providing a high score on I. As of now, tangible demonstrations of BI benefits are not viewed as necessary, since top-management support and sponsorship is present. Even though the experienced redundancy in reporting results in a low score on G, the close strategy alignment can be assumed to enable decision making based on BI information.

Overall, Swedbank's BI practices are somewhat poorly aligned with academia's best practices in most areas; however, they are completely aligned in three areas. In order to achieve a more consistently high degree of alignment, Swedbank could focus on improving their overall data and information quality work, and developing more enterprise-wide performance measurement tools in order to better fulfill reporting needs and increase information sharing. Lastly, they should try to develop ways of demonstrating tangible BI benefits, since sponsorship might not be so easily obtained in the future once the regulatory demands are satisfied.

6.2.7 "Bank A"

"Bank A" employs a data structure framework, but the usage of diverging systems across the organization lowers the score on C. They use several measurements that are revised regularly, which could be the reason behind the high score on both F and G. Consequently, the information provided is trusted, and used as a base for decision making. The top-management support is high, which might stem from the fulfilling of reporting needs.

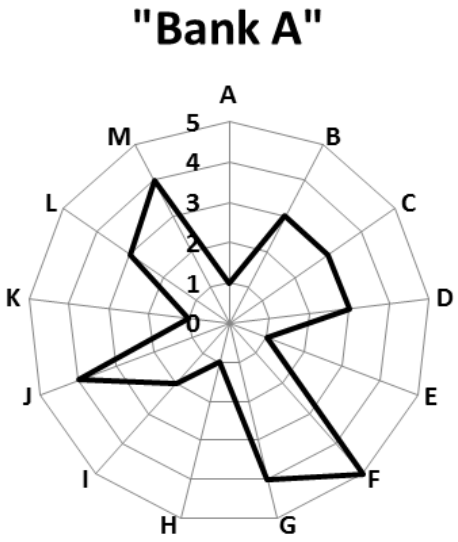


Figure 6.7 "Bank A" BIAF Radar Chart.

Overall, the BI practices of "Bank A" are unevenly aligned with the best practices proposed by academia. By focusing on creating a clear strategy and then breaking it down, the diverging systems could be handled, resulting in better alignment. By establishing a group for ensuring data and information quality, further trust in the information communicated could be achieved. In order to get sponsorship for internal projects, tangible BI benefits should be demonstrated. Lastly, continuous BI review and improvement are needed to identify future shortcomings.

6.2.8 Skandia

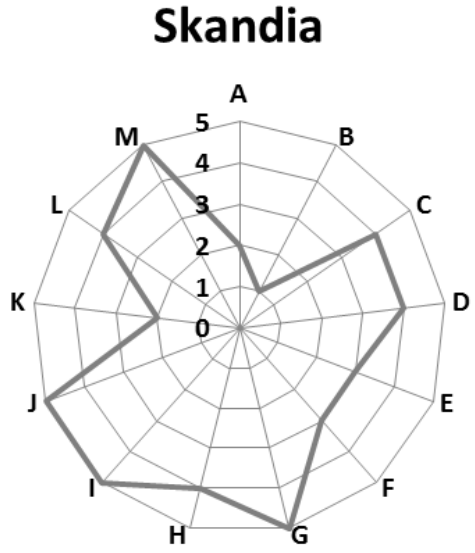


Figure 6.8 Skandia BIAF Radar Chart.

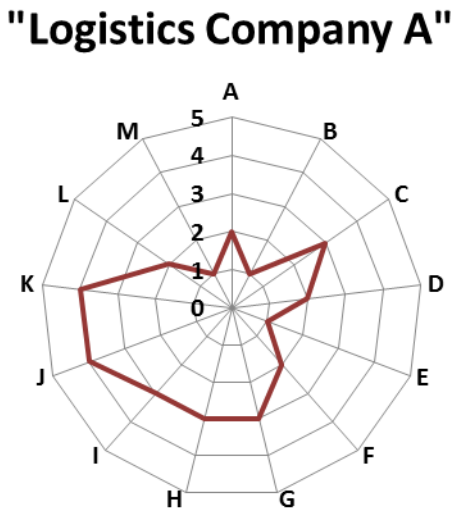
Skandia employs an ad-hoc approach to assessing data and information quality, without the use of quality criteria, which led to low scores on A and B. However, data structure was prioritized since the many entrepreneurial business areas needed to be aligned. These business areas had their own definitions, but they are now in the process of agreeing upon enterprise-wide definitions which will make F improve. They have made sure that there always are recipients for the products they generate, which together with high scores on I and J provide a culture of information sharing and trust. Subsequently, decisions are based on the information provided.

Overall, Skandia's BI practices are quite aligned with academia's best practices, apart from a few areas. In order to improve, Skandia could focus on establishing more structure in their data and information quality work in order to facilitate the ongoing alignment of business areas. In addition, they should try to demonstrate tangible BI benefits in order to keep getting the sponsorship needed, especially for their internal "R&D" projects.

6.2.9 "Logistics Company A"

Just like Skandia and Swedbank, "Logistics Company A" has an ad-hoc approach to data and information quality work, resulting in low scores on A and B. Due to an entrepreneurial tradition in their different subsidiaries, data structure and measurement definitions are inconsistent. Since there has been limited reporting historically, as well as an entrepreneurial tradition, strategy alignment has been limited, reporting needs not adequately addressed, and information sharing and trust low. Subsequently, decisions have been based on other sources than the BI information provided. However, since they have been reasonably good at

demonstrating tangible BI benefits through their project model, top-management support and sponsorship is relatively high.



Overall, "Logistics Company A's" BI practices are somewhat poorly aligned with academia's best practices in several areas. In order to improve, "Logistics Company A" could better structure their work with data and information quality and try to establish enterprise-wide definitions to facilitate integration between the subsidiaries. For the same reason, strategy alignment should be a priority, as well as better fulfillment of reporting needs in order to establish a culture of information trust and sharing. Presumably, this could eventually lead to decision making based on BI information.

Figure 6.9 "Logistics Company A" BIAF Radar Chart.

6.2.10 VGR

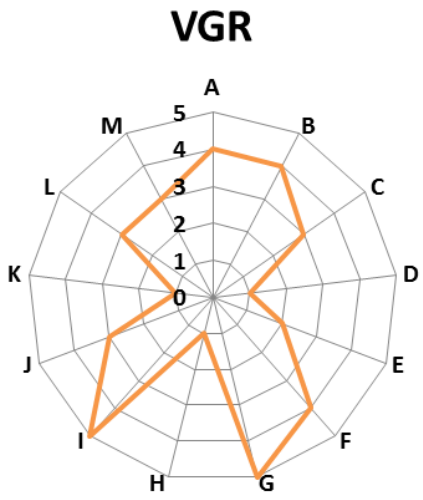


Figure 6.10 VGR BIAF Radar Chart.

VGR has relatively high overall scores on data and information quality work, while low scores on information sources. The good data and information quality work, together with a high score on F, result in reporting needs being fulfilled. Consequently, the ones using the information also base their decisions on it.

Overall, VGR's BI practices are unevenly aligned with academia's best practices. In order to improve, VGR could integrate more external information into the BI system so a more holistic picture of the company situation is obtained. Furthermore, they should try to demonstrate tangible BI benefits in order to increase top-management support and sponsorship. Thus, the overall information management culture could be improved, and more decisions based on the BI information. Lastly, continuous BI review and improvement should be established in order to further develop their BI practices.

6.3 Analysis of Discrepancies

From the BIAF Radar Charts, one could see that the organizations differ quite much in their BI practices, as suggested by Williams and Williams (2007). Even though a qualitative

research approach was chosen for this thesis, an average of the BIAF scores by area was calculated and illustrated in figure 6.11. Given that the lowest score possible was 1 and the highest 5, the middle score of 3 could represent a fairly good focus on each area. Thus, the alignment between the organizations' BI practices and the best practices proposed by academia could be considered fair or more in 6 out of the 13 areas, while 7 of the areas were below fair alignment. The overall mean score for all the areas put together was 2.96, representing a general alignment of just below fair.

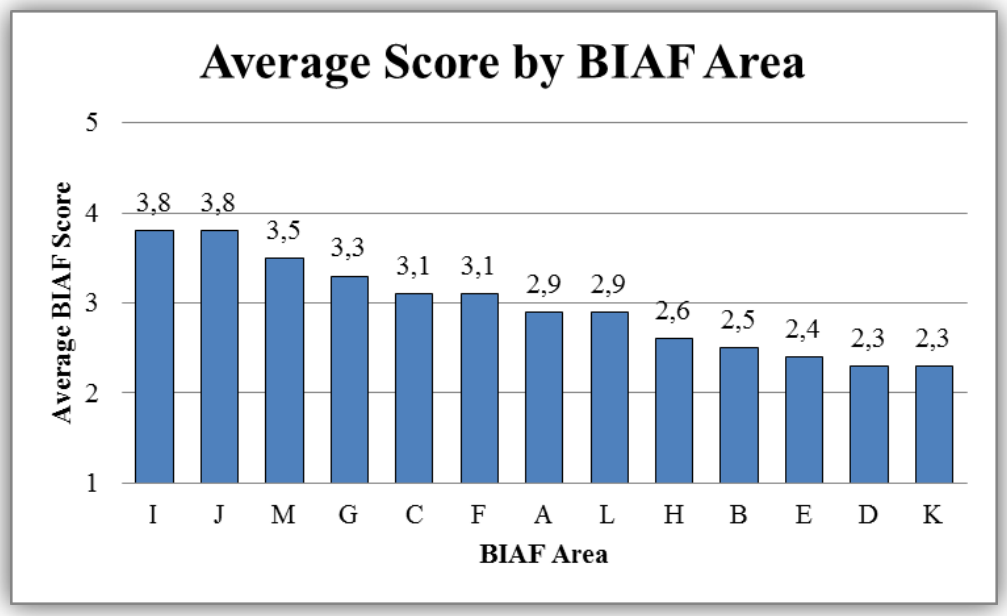


Figure 6.11 Average Score by BIAF Area.

The top two areas most focused on in the organizations' BI practices were Strategy Alignment and Top-Management Support & Sponsorship, which indicates that the organizations agree with researchers in that these areas are of high importance for the success of BI work. In addition, as Pagels-Fick (1999) claims, there is an interconnection between the two areas, which can be seen in several of the organization BIAF Radar Charts where the two areas are scored fairly similarly. As for area J, top-management support is by many researchers considered to be the most important success factor, and if one from figure 6.12 scrutinizes the top three organizations with the highest aggregate BIAF score, all three scored high (i.e. 4 or 5) on area J.

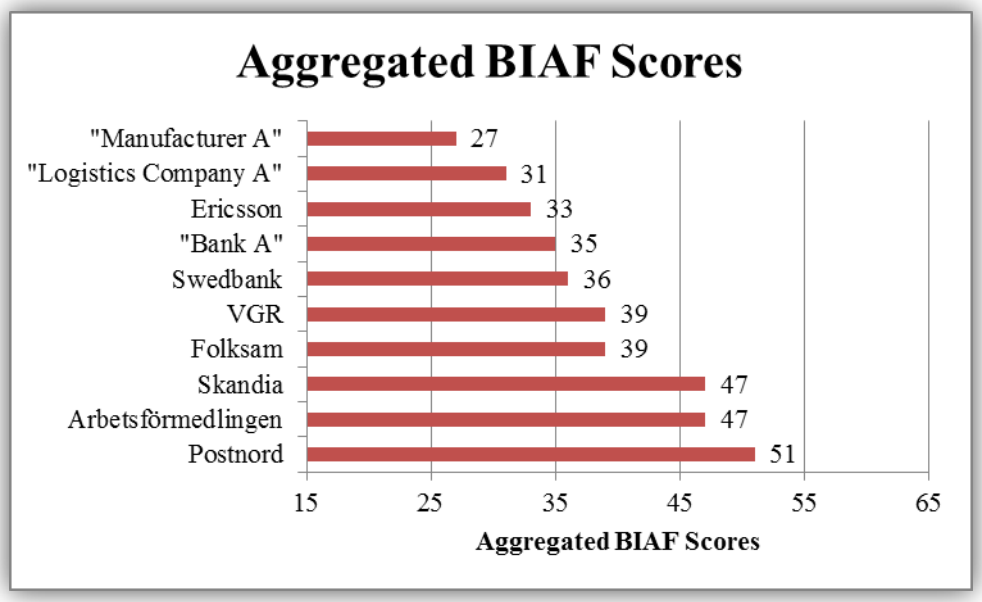


Figure 6.12 Aggregated BIAF Scores.

Moreover, the third area focused on the most was M; Bases for Decision Making. For this area, six out of the ten organizations scored 4 or higher, thus contradicting the experience of several researchers (e.g. Borking et al., 2009; Riabacke, 2007) that most firms rely more on intuition than facts when making decisions. Also, there appears to be a connection between the scores on I, J, and M in all organizations but "Logistics Company A", i.e., an organization with a high score on I and/or J received a high score on M, and the same applies for low scores. Therefore, an area for further research could be to investigate whether close strategy alignment and strong top-management support positively affect the use of BI information in decision making throughout an organization.

The two areas generally focused on the least were the balance between Internal & External Information Sources, as well as the demonstration of Value & Benefits of Business Intelligence. As for D, only two organizations scored above 3, resulting in eight out of ten organizations only using external information to a limited portion or less. This is not in line with what researchers promote, as presented in section 4.2.2.1, and these organizations risk not getting a holistic picture of the environment they operate in, and thus risk not making the best decisions possible. In this study, there have been two common explanations for why external information is not used to a greater extent; the prioritization of solving structural problems with internal information, and a view that the internal information is exhaustive enough to cover most of the information needs. The first explanation could be considered reasonable; if the internal information is not structured in a comprehensive way, then incorporating external information would possibly worsen the structural problems, rather than help providing a clearer picture of the organization's environment. Thus, a good data structure should be established before incorporating external information, and several of the BIAF Radar Charts illustrate a relationship between C and D. Accordingly, the two organizations scoring the highest on D, Arbetsförmedlingen and Skandia, also scored high on C.

Regarding the second explanation, this view is considered dangerous and relatively naïve by the authors of this thesis. Even though an organization is able to gather extensive information internally, this should always be supplemented by external information to further support or nuance the internal information. If not, the organization's adaptability might suffer (Pirttimäki, 2007) and information gaps arise (Popovic et al., 2010). Thereby, regardless of explanation, the organizations studied could improve their BI practices by focusing on incorporating more external information in their BI work.

The other low-scoring area was Value & Benefits of Business Intelligence. Seven out of the ten organizations scored 2 or lower in this area, meaning that they only use abstract and intangible descriptions of BI benefits if any, and that they do not plan on introducing more tangible and financial ones. This is not consistent with the approach proposed by several researchers, as presented in section 4.2.4.3, where even though hard, organizations are prompted to find ways of demonstrating tangible BI benefits in order to receive top-management support and sponsorship. The two most common explanations encountered in this study were the difficulties in finding appropriate tools to use, and a view that it was not necessary in order to get support. Again, the first explanation is found reasonable, especially since it coincides with what several researchers on the subject claim (e.g. Riabacke et al., 2011). However, even though it can be hard, it is an aspect that should be focused on in order to keep receiving the support and sponsorship needed.

As for the second explanation, this is a finding that has not caused much discussion in previous research, i.e. that managers are aware of the difficulties in demonstrating tangible BI benefits, and therefore provide the support and sponsorship needed based on abstract and intangible descriptions of the value BI brings. This could be connected to what Pagels-Fick (1999) argues when claiming that BI profitability is only partly relevant if one should view BI as a fundamental function. Nevertheless, even though the support and sponsorship might be sufficient for now in these organizations, in order to keep receiving the funds and support required more tangible ways of demonstrating BI value should be introduced. The two organizations receiving the highest BIAF scores on K also received high top-management support and sponsorship. In addition, the organization receiving the highest aggregate BIAF score, i.e. Postnord, was the only organization scoring a 5 on K. In conclusion, it is acknowledged that there might be top managers that for now provide the support and sponsorship needed without requiring tangible demonstrations of BI benefits. However, in order to secure long-term commitment from top-management, this area should be further prioritized by the organizations studied.

Other areas less focused on by the organizations studied were E, B, and H. As for E, this is connected to D in that unstructured data often originate from external information sources. In addition, only two of the organizations did not use it and saw no clear future potential in it, while the rest saw it as beneficial in the future. Thus, one could assume that within the area of unstructured and semantic data, the practice by organizations are not keeping up with the pace of BI research.

As for area B, half of the organizations use none or only one of the criteria most commonly advocated by researchers, and only two organizations score 4 or higher according to the BIAF. In some cases, the reason is a lack of informant knowledge regarding how quality is assessed, but a frequent explanation has been that organizations employ an ad-hoc approach in assessing data and information quality. These organizations risk using inconsistent assessments, resulting in varying quality of the data and information incorporated in the BI work. Consequently, this is an area that could be improved by several organizations in order to reach better quality coherence.

Regarding area H, only half of the organizations perform regular reviews of their BI work, and only two perform regular improvement work. Researchers believe, as presented in section 4.2.3.3, that continuous review is needed in order to better handle change, and that BI products and services should be constantly improved in order to better match the needs from the internal customers. Thus, a majority of the organizations studied should focus more on establishing routines for continuous BI review and improvement work.

As for the remaining five areas not discussed (A, C, F, G, and L), the alignment between the organizations and academia could be seen as fair. However, these could also be more prioritized by the organizations in order to improve their overall BI work. A common explanation for modest scores on C dealt with the use of legacy systems. Thus, some interviewees stressed the importance of either integrating or decommissioning them in order to get a better overall data structure. A reflection regarding F is that several of the interviewees voiced a need for agreeing upon enterprise-wide definitions of KPIs and such in order to practice BI successfully, which is also stressed by researchers, as seen in section 4.2.3.1. However, the average score of 3.1 suggests that even though its importance is noted by the organizations, many have not yet succeeded in applying common definitions.

In section 4.2.3.2, it was noted that Davenport (2006) had a differing opinion regarding G from other researchers in that he proposed generating information from small experiments, nurturing a reporting culture of testing. Among the organizations studied, Davenport's (2006) view tends to be represented by the internal BI "R&D" projects at Skandia, while the opposite can be said for e.g. Folksam and Swedbank. On a similar note, Folksam, "Bank A", and "Logistics Company A" experienced troubles in receiving sponsorship for these types of internal projects; often due to not being able to demonstrate any tangible benefits.

In conclusion, even though there are some patterns, the organizations in this study practice BI rather differently. Moreover, most areas discussed could generally be more prioritized by the organizations in order to improve their overall BI practices.

7 Conclusions

In this chapter, consequences from the study will be discussed in light of the research questions. Also, potential generalizations and limitations will be presented, as well as suggestions for future research on the subject.

7.1 Consequences

In order to fulfill the purpose of this master thesis, three research questions were presented in chapter 1. These questions will now be answered in separate sections below.

7.1.1 Research Question no. 1

"What are the best practices regarding BI promoted by academia?"

- **Data & Information Quality**
  - A. Organization of Data & Information Quality Work
  - B. Data & Information Quality Criteria and Frameworks
  - C. Data Structure
- **Information Sources**
  - D. Internal & External Information Sources
  - E. Unstructured & Semantic Data
- **Reporting & Performance Analytics**
  - F. Performance Measurement
  - G. Reporting Needs
  - H. Business Intelligence Review & Improvement
- **Information Strategy & Alignment**
  - I. Strategy Alignment
  - J. Top-Management Support & Sponsorship
  - K. Value & Benefits of Business Intelligence
- **Information Management & Decision Making**
  - L. Information Management Culture
  - M. Bases for Decision Making

Figure 7.1 Areas for BI Best Practices.

The best BI practices proposed by researchers on the subject were compiled and consolidated according to the process described in section 2.1. The result was the new assessment framework constructed, namely the BIAF, as presented in chapter 4. In brief, the best practices promoted by academia regarded a prioritizing of 13 focus areas, grouped under five categories, as displayed in figure 7.1.

The Data & Information Quality category comprised recommendations on how to organize the work with ensuring high data and information quality, what quality criteria to use, as well as guidelines for a good data structure. In the Information Sources category, researchers proposed the integration of both internal and external information in the BI work, as well as incorporating unstructured data. Regarding Reporting & Performance Analytics, agreed-upon measurement tools were advocated, the review and fulfillment of reporting needs highlighted, and the importance of continuous BI review and improvement articulated. The Information Strategy & Alignment category consisted of recommendations of aligning BI with company strategy, securing top-

management support and sponsorship, as well as demonstrating tangible BI benefits and value. Lastly, in the Information Management & Decision making category, researchers expressed a need for promoting a culture of information trust and sharing, and also the importance of basing decisions on BI information.

7.1.2 Research Question no. 2

"How is BI practiced in large Swedish organizations?"

The BI practices in large Swedish organizations were mapped using semi-structured interviews at ten selected organizations, and then assessed through the BIAF. Thereby, the BI practices of the organizations studied were illustrated through the BIAF Radar Charts, and these can be seen in figure 7.2 below. Thus, each chart shows to what the degree the various organizations focus on the different areas (labeled A-M) in their BI practices, and the findings suggest that BI is practiced very differently in large Swedish organizations.

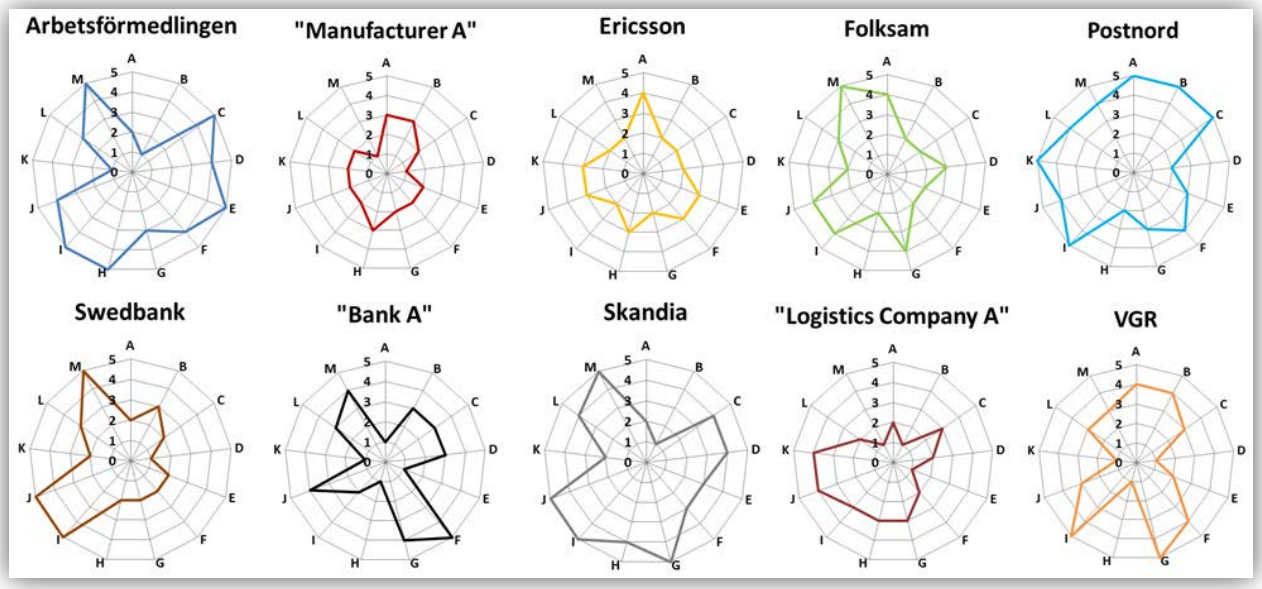


Figure 7.2 BIAF Radar Charts.

7.1.3 Research Question no. 3

"Are there any discrepancies between the above that could be seen as potential areas of improvement regarding BI practices in large Swedish organizations?"

Through the BIAF, each organization's BI practices were assessed through determining to what degree they focused on the areas promoted by researchers. This assessment resulted in the BIAF Radar Charts presented above in figure 7.2. Through the charts, various degrees of alignment between the organizations' BI practices and the BI practices proposed by academia

could be seen. There were some areas that generally were highly focused on by the organizations, such as BI alignment with strategy and the need for top-management support and sponsorship. However, there were also areas that were poorly focused on by the organizations, demonstrating discrepancies between the best practices proposed by academia and the organizations' BI practices. Overall, the mean of all scores for all areas put together were 2.96, which indicates a general alignment just below fair between academia and the organizations.

The two areas given the least focus by the organizations in general were the balance between Internal & External Information Sources, as well as the demonstration of Value & Benefits of Business Intelligence. While researchers proposed integration between internal and external information, several organizations focused extensively on internal information. However, that increases the risk of lacking in adaptability and not getting a nuanced view of your own organization's situation, according to researchers. Consequently, this could be an area of improvement for the organizations studied. Moreover, several organizations only focused on demonstrating intangible benefits of BI, if any, while researchers stress the importance of finding ways to demonstrate tangible and financial benefits to obtain top-management support. Even though there might be top managers that currently do not require tangible demonstrations of BI benefits, in order to secure long-term commitment from top-management, this should be seen as an area of improvement for the organizations studied.

Other areas, in which the discrepancies between the organization's BI practices and the best ones proposed by academia were substantial, were Unstructured & Semantic Data, Data & Information Quality Criteria and Frameworks, and Business Intelligence Review & Improvement. It was concluded that most organizations saw the potential of unstructured data, but they were not yet using it, making this an area for future improvement. Another identified area for improvement was the incorporation of more formal criteria for assessing data and information quality. In addition, the establishment of formal routines for continuous BI review and improvement work, which several organizations lacked, was considered an area of improvement. Lastly, there were several other areas that also could be in need of improvement, however, the above-mentioned were the ones where the discrepancies were the greatest.

7.1.4 Generalizations

The BIAF was constructed with an aim of being fairly industry-neutral. Thus, the authors believe that the framework could be used to assess BI practices in any industry. Here, the BIAF was used to assess BI practices in large Swedish organizations; however, the authors consider it to be a flexible framework that could be applied also for smaller organizations, as well as in other geographical sectors. In addition, the BIAF could also be adjusted in order to be applied in assessments of practices involving other types of systems than BI, e.g. ERP or CRM systems. This is so, since the authors believe that most areas in the BIAF are relevant regardless of the system targeted, and the radar chart structure is a good and illustrative tool in

quickly identifying areas that need improvement. Consequently, the BIAF is a transparent, comprehensive, and integrated tool, and other researchers are able to identify what parameters that have been used, from where they originate in research, and which scoring criteria that have been applied. Therefore, the authors believe that the BIAF has overcome the limitations in existing BI research presented in chapter 3. In addition, another finding indicating the strength of the BIAF is the impact of the assessment levels used; i.e. the variation in area scores between organizations signals that the levels applied pinpoint crucial differences in BI practices. If the BIAF Radar Charts had indicated homogenous scoring across organizations, while the interviews provided a picture of varying BI practices, the BIAF would not be a reliable tool. However, this was not the case, and the BIAF has proved its ability to distinguish and illustrate differences.

As for the findings of the BI practices by the organizations studied, they are hard to generalize given the limited sample. However, as the organizations to a high degree scored very differently in BIAF assessment, a potential conclusion is that large Swedish organizations to a high degree differ in their BI practices.

The discrepancies found between the organizations' BI practices and the ones proposed by academia could be applied to a bigger context. Especially the discrepancies regarding data and information quality, as well as external information sources, plausibly affect other systems and practices in the organizations studied. Thus, improvements in these areas would not only be beneficial for the BI practices, but could also enhance work with other systems and parts of the organizations. If the general low-scoring areas of these organizations also apply to all large Swedish organizations, further research has to evaluate.

7.2 Limitations

Even though the BIAF was constructed to have a broad focus; there are areas that could be included to make the framework even more all-encompassing. For instance, the area of staffing could have been given a greater focus to examine what skills, competencies, and methods that are required in BI practices. In addition, other more industry-specific parameters could be included to better fit the BIAF into a certain context. Nevertheless, the basic structure of the BIAF enables future users to easily add or modify areas, without encountering the risk of weighing areas or criteria against each other.

Moreover, the scoring levels used in the BIAF could be further improved by articulating clearer descriptions of, and boundaries between, the levels used. The need for improvement in this area became apparent when using the BIAF to assign scores to the organizations in this study. Not all answers provided by the informants clearly corresponded to a specific level in every area, making some assigned scores rather ambiguous. This problem could also have been addressed by constructing an even more thorough interview guide.

Another limitation was that the interviews were only conducted with one informant at each organization. Consequently, the view of that informant becomes prevailing, even though that informant may only have a limited view of the organization's BI practices. In order to get a richer and more nuanced view of each organization, interviews could have been conducted with several informants at various levels and divisions at the respective organizations. However, this study was aimed at investigating several organizations' BI practices in a limited time, and thus only one informant at each organization was interviewed.

7.3 Suggestions for Further Research

The primary suggestion for future research is to test and develop the new BIAF. The framework could be enhanced by incorporating more areas, such as BI staffing, and future research could be made in order to identify other crucial areas for successful BI work. In addition, each of the categories currently included in the BIAF could be further developed, e.g. by constructing separate BIAF Radar Charts and scoring criteria for each category in order to further increase the framework's transparency. Also, the framework's applicability to other types of organizations and geographical sectors could be studied, as well as its suitability for assessing work with other systems than purely BI.

In addition, the areas for improvement suggested by the analysis, as well as the causally linkages between areas discussed, should be further examined. In doing so, the interconnectedness between various factors could be unveiled, and the areas critical for BI success exposed, potentially leading to a greater focus from organizations in improving BI practices in these areas.

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9 Appendices

9.1 Appendix 1: Original Interview Guide

General Questions:

Interviewee characteristics:

- Describe your previous and current role in the organization
- Describe your experience with BI/decision support

Overall BI and Alignment with Company Strategy:

- How do you view BI in your organization?
  - Which areas does it contain?
- How would you say your BI approach and practice is connected to your organization's overall strategy?
  - Do you break down the strategy into strategic objectives and align with your BI?
  - Do you have a top-down or bottom-up approach to BI in relation to strategy?

Core Business Intelligence:

Data:
A crucial part of every BI platform is the company data. BI is about extracting the relevant data and converting it into useful information. The usefulness of the information is dependent upon the features of the data, and now we would like you to assess your own data given certain criteria.

- How do you assess the average quality of your data?
  - What criteria do you use?
- How would you assess the average quality of your data?
  - Is there a difference in quality between the different types of data?
- Is there any type of data that you consider to be more valuable/of a higher quality?
  - How do you weigh different data against each other?
    - Who decides the weighing?
    - Is this weighing continually reviewed?
- When it comes to data about data, i.e. "metadata", how is this structured?
  - What is your data architecture?
    - Where is the data?
    - Do you use data modeling/mapping?
- How do you acquire your data?
  - Man or machine?
  - Internal data?
  - External data?
    - How broad/deep do you look when acquiring external data?
      - E.g. blogs, news articles, annual reports etc.?
        - Web 2.0/Semantic BI?

System:
When discussing BI, one often relates it to certain systems. Sometimes a single system is considered to be the "BI system", but sometimes it involves a bundle of various subsystems. We would now like to know some more about your system(s) in general.

- What system(s) are you using?
  - One system or several subsystems?
  - Custom made or off-the-shelf?
- What analyses are done using your BI system?
  - How is the decision to do these analyses made?
- Who is in charge of operating the system?
  - Who is in charge of data identification and converting into relevant information?

Enterprise Performance Management:

Reporting:
One main feature when it comes to BI is how the relevant information extracted by the BI platform gets reported. Here we would like to know more about your routines considering who gets what information, in what format and when.

- Overall, how would you describe your reporting system?
    - What gets measured and reported?
    - Who gets the information?
    - How is the information reported?
    - How standardized are the processes /tools?
        - Do you use some sort of dashboard?
            - How would you asses the ease of use of the interface?

- Do the above differ between divisions and/or levels?

Planning/forecasting:
Another important aspect for which a BI platform could be useful is planning and forecasting features. We would now want to know more about how you use your BI platform for planning/forecasting purposes.

- In what way would you generally say you use your BI system for planning/forecasting?

- Are your projects always on time?
    - If not, what would be the main issue?
    - If yes, what would be the main reason?

Information Strategy and Management:

Information strategy:
Many experts press the importance of aligning your business information with the overall company strategy. We would now want to know more about your thoughts in this area.

- In what way would you say your information is linked to your strategy?
    - Exemplify!

- What questions do you need your BI to answer?
    - Are they linked to your strategy?

- Is BI a prioritized area of yours?
    - In what way? Exemplify!

- Do you feel that the BI platform is worth the money?
    - Does that opinion differ among divisions/levels?

Information management:
Another aspect is the general culture and approach within an organization towards information and BI systems etc.

- How would you generally describe your organization's view of information?
    - Do you view information as an asset across the organization?
        - How? Exemplify!

- Do you have clear roles in the organization when it comes to working with BI?

- Do you incorporate use of intelligent information in culture; a culture of fact-based decision-making?
    - What do you do in order to reduce reliance on intuition?
        - If you still rely on intuition;
            - Why?
            - Then what is the BI platform for?

Risk and Performance Analytics:

With so much data around, companies often try to analyze different aspects of their business. We would like to know more about how you use your BI platform to analyze company risk and performance.

- How do you analyze risk?
  - Do you use a separate unit for this?
  - Is it under constant review?

- Do you feel that the costs and risks of owning information exceed the benefits from it?
  - Is there a tight budget demand on your IT?

- Does your risk exposure according to your BI platform correspond to your agreed risk appetite?

- Do you focus decision-making on performance drivers?
  - How have you chosen your drivers?
    - One could begin with identifying outcome metrics, then identifying the internal and external drivers of those outcome metrics
  - Do you work a lot with Key Performance Indicators (KPIs)
  - In what ways do you respond to fluctuations in your performance drivers?
    - Do you trust that information or do you continue with business as usual?

Decisions and actions based on BI:

Tell us more about how your BI platform help you make decisions and take action.

- Take us through a typical information flow from your BI platform that helps you make a decision

- What is the decision cycle time?

- How will decision turn into action?

- Does the BI usage differ between divisions and/or levels?
    - Why?

- Do you trust the platform in the end or do you rely on intuition?
  - Why?
  - Exemplify!

- What is the overall opinion of the BI platform?
  - Positive/negative? Extra workload/efficient decision support

- Who is responsible for monitoring decision impact?

Oversight and Future Use of Business Intelligence:

In addition to the areas covered, we would like to know you regard the future use of BI within your organization.

- Will you change your use of BI within the future?
  - Expand/decrease usage?
    - Why?

- Is your BI platform and usage reviewed constantly?
  - How do you measure its efficiency and effectiveness?
  - Do you feel that your current review is sufficient?
    - If no, in what way could you get a better grasp of it?

9.2 Appendix 2: Revised Interview Guide

General Questions:

Interviewee characteristics:

- Describe your previous and current role in the organization
- Describe your experience with BI/decision support

Overall BI:

- How do you view BI in your organization?
    - Which areas does it contain?

Data & Information Quality:

- Data Quality
    a. How is Data Quality work organized?
        - Special department/employee/nothing?

    b. Criteria/Framework?
    c. Importance of data governance/structure

Information Sources:

- Internal/External information?

- Unstructured/semantic data:
    a. To what extent is it used today?
    b. View of its future potential?

Reporting & Performance Analytics:

- Overall, how would you describe your reporting system?
    - What gets measured and reported?
    - Who gets the information?
    - How is the information reported?
    - How standardized are the processes /tools?

1. Measuring instruments
    a. Do you focus decision making on performance drivers?:
    b. KPIs/Dashboards/Scorecards
        - Where and how are these used on different organizational levels?
        - The importance of defining KPIs etc.

2. Demand for reports:
    a. Always recipient for reports or just routine?

3. BI review/control:
    a. How do they review and control themselves?
        - Control reports/scorecards/manager review/nothing?
    b. How do they work to improve themselves?

Information Strategy & Alignment:

1. Top-down/Bottom-up approach for strategy alignment:
    a. How is the BI work linked to the overall strategy?
        - Importance of breaking down the strategy to operational guidelines

    b. What is driving the BI work?

2. Sponsorship/Prioritizing:
    a. Need for top management support

    b. Assessment of the perceived prioritization of BI work from top management

3. Demonstrated benefits from BI work:
    a. How do you internally market yourself in order to get sponsorship?
        - ROI or more intangible results?

Information Management & Decision Making:

1. Culture toward information in the organization:
    a. Does the organization view information as an asset?

2. Fact-based/Intuition-based decisions:
    a. Do decision makers trust/base their decisions on the products of BI?
        - Or is intuition used a lot?

    b. Importance of defining e.g. KPIs in order to rely on the BI products?

Oversight and Future Use of Business Intelligence:

- Will you change your use of BI within the future?
    - Expand/decrease usage?
        - Why?

- What do you believe to be your organization's largest challenge regarding BI?
    - Why?

9.3 Appendix 3: Organization and Informant Presentations

Arbetsförmedlingen

Organization
Arbetsförmedlingen is a national government organization and the largest placement service for work in Sweden. Their most important task is to bring together those who have a vacancy to fill with those who are looking for work. They have 320 local employment offices and over 12 500 employees, of which nearly 10 000 have direct contact with either employers or job seekers. Since Arbetsförmedlingen is part of the public sector they are financed by appropriations, and in 2012 these appropriations were approximately 70 billion SEK. Their headquarters is located in Stockholm (Arbetsförmedlingen web page, 2013). Systems they use include; "ProDacapo" for managing scorecards and performance assessment in the areas of client, operations, employees and finance. They also use "Presto" for budgeting purposes and "Ledning och Styrning" for statistics and results, both of which are proprietary systems.
(Martin Andersson, personal communication, 14th of May, 2013)

Informant
The informant at Arbetsförmedlingen was Martin Andersson at the unit for development and administration, which is a part of the financial department. Martin currently has a focus on the budget system, and prior to this assignment he was working with management control. He has been with Arbetsförmedlingen since 1995 and prior to his current assignment he has worked with similar questions concerning management accounting, planning and reporting. Therefore, he was considered having a good understanding and experience from relevant fields.
(Martin Andersson, telephone interview, 23rd of April, 2013)

"Manufacturer A"

Organization
This organization has chosen to be anonymous, and is a large manufacturer of goods that are sold to both home and professional users. "Manufacturer A" makes a wide range of products in different price ranges that are used in various settings. They sell their products in more than 100 countries all over the globe, and they meet this study's three selection criteria. They use SAP as their core system, around which many other systems are built including those used for BI purposes.
(Head of BI, personal interview, 4th of April, 2013)

Informant
The informant at "Manufacturer A" was the Head of BI, who has a full view into all of the BI aspects of "Manufacturer A" and about 10 years of experience working with BI. In his position he has great influence on the future direction of the BI tools, both in terms of which ones to be used and how they are utilized.
(Head of BI, personal interview, 4th of April, 2013)

Ericsson

Organization
Ericsson is a world-leading provider of telecommunications equipment and services to mobile and fixed network operators, and was founded as early as 1876. Over 1 000 networks in more than 180 countries use Ericsson's network equipment, and more than 40 % of the world's mobile traffic passes through their networks. Ericsson has 110 000 employees and strong R&D focus, with approximately 20 % of their total workforce engaged in

R&D. Their net sales amounted to 228 billion SEK in 2012 and their headquarters is located in Stockholm. (Ericsson web page, 2013)

Informant
The interviewee at Ericsson was Mattias Priebe, who started as a consultant at Ericsson in 2010 and later became a regular employee responsible for strategy questions working under the CIO. In 2012, he became the Head of Analytics on the IT department. Given his position and experience, he fulfills the informant criteria set for this study.
(Mattias Priebe, personal interview, 9th of April, 2013)

Folksam

Organization
Folksam is a Swedish insurance company that offers a wide range of different insurance products which include personal insurance, house owners' insurance, as well as group insurances for trade unions and savings products. They have around 4 million customers, 3 600 employees, revenues of approximately 21 billion SEK, and insure every second home and every fifth car in Sweden (Folksam, 2012). Systems they use in their BI work include "SAS" for analyzing, "Cognos" for reporting and systems specially designed for sorting and segmenting customers.
(Stefan Lindqvist, personal communication, 13th of May, 2013)

Informant
The informant at Folksam was Stefan Lindqvist, who is Group Leader of the Decision Support Group, which is a part of the IT department that serves a supporting function for the entire organization. The Decision Support Group consists of approximately 15 people and has a strong focus on information, reporting and analyses, all with a strong focus on providing value to the operations of the organization. Stefan has been with Folksam for the last five years. Prior to his current position he has 25 years of experience working in the IT sector with things including CRM and call center solutions as well as running his own company. In his position at Folksam he has a good possibility of affecting the BI work.
(Stefan Lindqvist, telephone interview, 2nd of May, 2013).

Postnord

Organization
Postnord is the parent company of the group formed by the merger between Post Danmark A/S and Posten AB. It is the mail operator for all of Sweden and Denmark, a leading logistics operator and the strongest e-commerce business partner in the Nordic Region. They have 40 000 employees and revenues of more than 39 billion SEK, and deliver 27 million mail items every day (Postnord web page, 2013). Their headquarters is located in Solna, Sweden. Systems they use include "SAP" for information delivery and "SAS" for analyses.
(Patrick Eckemo, personal interview, 9th of April, 2013)

Informant
The informant at Postnord was Patrick Eckemo, who is the Director of Information Management Postnord IT at the IT department, which is a supporting division for all of Postnord's other business areas. He is head of the IM group which consists of 30 people and contains subparts such as MDCC and BICC. The view on IM is a concept for handling various subareas relating to BI. Patrick has worked at Postnord since 2008, prior to that he was at the software analyses company SAS for eleven years, where he held a number of positions including management positions. In his position at Postnord, he has a view of how the systems are used throughout the organization and he is able to affect the work and strategies regarding the BI platforms.
(Patrick Eckemo, personal communication, 13th of May, 2013)

Swedbank

Organization

Swedbank is Sweden's largest bank in terms of the total number of customers, with approximately 4 million private clients and 300 000 company clients. They operate in Sweden and in the Baltic countries and have a total of 8.5 million clients. Swedbank employs 14 500 people divided among 500 local offices and their revenues amounted to 36 billion SEK in 2012. They offer traditional banking services, stock trading, payment solutions and realtor services.
(Swedbank web page, 2013)

Informant

The interview was conducted with Niclas Olsson, who is both Head of Group Business Intelligence as well as BIO at Finance, Risk, and Treasury. He has several years' experience from consulting, and he started at Swedbank in 2012. He has a good overview of Swedbank's BI work and along with his experience he is considered to fulfill the informant criteria.
(Niclas Olsson, personal interview, 16th of April, 2013)

Remaining Organizations

	"Bank A"	Skandia	"Logistics Company A"	VGR
Organization	Well above the selection criteria	Bank and insurance industry. Revenues of 36 bn SEK, 2 500 employees	Well above the selection criteria.	Public sector organization. Appropriation: 51bn SEK, 50 000 employees
Informant	IT Architect with a good overall perspective.	Thomas Carlbring, Head of IT Decision Support	Project Manager on IT, with good overall perspective.	Bodil Nielsen, Project Manager of decision support on group level, "Regionskansliet Vänersborg"
Source	IT Architect, telephone interview, 4th of April, 2013	Thomas Carlbring, personal interview, 5th of April, 2013	Project Manager, telephone interview, 8th of May, 2013	Bodil Nielsen, telephone interview, 3rd of May, 2013

9.4 Appendix 4: Table of the Remaining Empirical Findings

BIAF Area	"Bank A"	Skandia	"Logistics Company A"	VGR
A	No formally or informally responsible unit or person for assessing data quality.	No formal responsibility, but ERP system provides quality info, and other quality issues are assessed as they arise.	No formally responsible unit or person for assessing data quality, but informally it is managed on ad-hoc basis.	The guaranteeing of data quality is decentralized to the departments, and it is clear who has the responsibility.
B	They use a framework for data structure, but no criteria for data quality.	No formal quality criteria or frameworks used.	They are going to construct a framework for data structure, but no criteria for data quality.	Quality control is performed when data is entered into the system, with the criteria of being correct, reliable, timely and accessible.
C	They use a data structure framework, but different systems in departments lead to structural problems.	Metadata is very important, with definitions and traceability. Internal and external audit assess this.	They have projects for improving overall data structure, and are going to construct a framework for it.	Accessibility and user-friendliness is focused upon. But information alignment is still lacking in some areas.
D	A majority of internal info due to financial focus. Some structured external info is incorporated.	A lot of internal info from legacy systems due to entrepreneurial business areas, but also substantial amount of external info, but all is not integrated.	A majority of internal info, some external info is used throughout the subsidiaries, but it is not integrated in the BI platform.	Almost exclusively internal information, which is incorporated from various systems throughout the organization.
E	No use of unstructured data, and doubts if the benefits of it would exceed the resources required.	No internal use yet, but has future potential. Limited purchasing of social media scanning.	No usage today and sees no potential within their industry (B2B shipping).	No present usage, but sees future potential.
F	They use scorecards and KPIs, which definitions are revised regularly.	They use numerous measurement formats due to entrepreneurial business areas. Working with agreeing upon definitions, but takes time due to politics.	Uses a dashboard in the form of an information cube. Some KPIs will perhaps be used, but they need to define and agree upon them first. Focus is establishing automated reports.	They use some measures, which are broken down from the main steering document, i.e. the political annual budget. Thus, they are annually revised.
G	Too many reports due to regulatory demands, but there is a need for other types of reports.	There is always a recipient for the reports generated. Also working on new "R&D" projects without clear needs yet, in order to keep up with technology.	Traditionally not so much reporting, due to privately held. This is changing; more reports are needed to measure and control in order to standardize throughout the group.	The BI project for VGR was initiated due to a strong need from both top and lower levels in the organization, to reduce redundant reporting.
H	Only ad-hoc quality problem solving.	The head of BI performs a monthly review through a controlling tool.	Decentralized continuous review of BI system through "IT councils" with clear roles.	No continuous review.
I	Lack of clear overall strategy, and too many BI systems due to federal governance, results in bad strategy alignment.	Top-down through consolidating business areas, and bottom-up through regulatory demands.	Top-down through breaking down of overall company strategy. But IT strategy of each subsidiary is not so linked due to entrepreneurial tradition.	Top-down through managers of different departments needing monitoring and review, bottom-up through information accessibility and alignment needs.
J	Support and sponsorship is easily received for enterprise-wide projects, but not for own projects.	Strong top-management support and sponsorship. Many of the prioritized areas until 2014 deal with BI.	Support and sponsorship are easily received when customer value is shown to increase through their project model.	Strong initial top-management support, but enough resources have not been provided to make the best of the BI project.
K	No ROI or any sort of demonstration of efficiency or effectiveness.	Hard to demonstrate tangible benefits like ROI. Focuses on the intangible and fulfilling of regulatory demands.	The project model is used, and most business cases have been concrete. However, the model includes intangible elements.	Since the BI project recently has been launched, its benefits are hard to demonstrate at this stage.
L	There is general trust for info from BI, except for reports demanded by regulation.	Positive view and high internal demand for BI and information.	Entrepreneurial tradition at subsidiaries results in lack of information sharing and trust.	There is a mixed feeling towards the BI system and its information, but the trust in it is increasing.
M	Decisions are mostly based on the info from the BI information.	A lot of decisions based on BI info, but one should always be critical and also use intuition.	Decisions based on experience, intuition and manual tools, not on info from BI at the moment.	The ones using the BI system trust it enough to base their decisions on the information provided.

9.5 Appendix 5: Assigning of BIAF Scores by Area

Data & Information Quality

Organization of Data & Information Quality Work (A)

Arbetsförmedlingen
Arbetsförmedlingen's lack of any formal locus of accountability for data quality work results in a low score on the BIAF scale. However, since the quality of data input is reviewed on a time-to-time basis by the employees, they avoid the lowest score, and instead receive a BIAF score of 2 in this area.

"Manufacturer A"
"Manufacturer A" is to some extent formally organized here through the MDM function of their COMPASS program. Nevertheless, there is an obvious lack of governance in the data quality work, resulting in an obstacle for the information use in the company. Thus, the organization is assigned a BIAF score of 3 in this area.

Ericsson
Since Ericsson has a specific unit fully occupied with master data management and data quality, they end up at the top of the BIAF scale. In addition, roles are clear and they have specific targets to work at. The only disadvantage is that this is not yet applied to all part of Ericsson, thus they receive a BIAF score of 4 in this area.

Folksam
Folksam has certain people or groups formally responsible for ensuring high data quality, but there is no one with an overall enterprise-wide responsibility, resulting in a BIAF score of 4 in this area.

Postnord
Postnord's MDM unit, together with the specific data quality analyst employed, results in a high BIAF score. Through the implementation and monitoring of the quality framework, a clear structure is in place, resulting in the highest BIAF score of 5 in this area.

Swedbank
Swedbank does not have any formal responsible person or group, but they informally manage data quality issues on an ad-hoc basis. Thus, Swedbank reaches a BIAF score of 2 in this area.

Remaining Organizations:
- *"Bank A":* No formal or informal responsibility results in a BIAF score of 1.
- *Skandia*: No formal responsibility, but quality issues are managed on an ad-hoc basis, resulting in a BIAF score of 2.
- *"Logistics Company A"*: No formal responsibility, but quality issues are managed on an ad-hoc basis, resulting in a BIAF score of 2.
- *VGR*: Formal and clear responsibility, but decentralized to people across the organization resulting in a lack of overall responsibility, results in a BIAF score of 4.

Data & Information Quality Criteria and Frameworks (B)

Arbetsförmedlingen
Since no criteria, framework, or tools are used in order to assess data and information quality, Arbetsförmedlingen receives the lowest BIAF score of 1 in this area.

"Manufacturer A"

Even though they do not assess quality through formal criteria or frameworks, the tools that they use, i.e. control reports and the ERP validity phase, ensures data and information accessibility and traceability. However, the lack assessment for the other criteria used in the BIAF, especially in terms of timeliness, and therefore they receive a score of 3 in this area.

Ericsson
Even though it was not clear whether Ericsson uses formal quality criteria or frameworks, they do think of data quality from two perspectives, and has made sure to consolidate their ERP systems in order to get homogenous data. Thus, one could claim that Ericsson at least assess quality from the BIAF dimension consistency, as defined by Loshin (2003). Consequently, that results in a BIAF score of 2 in this area.

Folksam
Although Folksam might not employ internally-constructed formal quality criteria or frameworks, they do adhere to the standards provided by regulation. Thus, one could suppose that those standards relate to at least one or a few of the dimensions proposed by the BIAF. Therefore, Folksam was assigned a BIAF score of 2 in this area.

Postnord
Even though the authors of this thesis were not able to scrutinize the quality framework used by Postnord, the overall impression was that it was thorough, including relevant parameters, and together with the ERP system ensured that both internal and external information were of high quality. Consequently, Postnord was assigned the highest BIAF score of 5 in this area.

Swedbank
Swedbank employed two quality criteria; consistency and functionality. Consistency was also one of the BIAF dimensions, and functionality, as described by Niclas, corresponds to a mixture of the BIAF dimensions accessibility and completeness. Thus, Swedbank receives a BIAF score of 3 in this area.

Remaining Organizations:
- *"Bank A":* The framework for data structure can be viewed to represent the quality dimensions of accessibility and traceability, thus resulting in a BIAF score of 3.
- *Skandia:* No quality criteria or framework results in a BIAF score of 1.
- *"Logistics Company A":* Even though they are going to construct a data structure framework, no criteria or frameworks are used yet, resulting in a BIAF score of 1.
- *VGR:* The criteria of correctness, reliability, timeliness, and accessibility correspond to at least four of the BIAF dimensions, resulting in a BIAF score of 4.

Data Structure (C)

Arbetsförmedlingen
The AIS system, as described by Martin, has a clear data structure enabling traceability, and still it has a flexible dimension of allowing employees add varying degrees of extra information. This results in a BIAF score of 5 in this area.

"Manufacturer A"
The data structure situation at "Manufacturer A" needs improvement, especially by decommissioning legacy systems. Thus, "Manufacturer A" is assigned a BIAF score of 2 in this area.

Ericsson
The data structure situation at Ericsson is viewed as insufficient, resulting in low consistency etc. Thus, Ericsson is assigned a BIAF score of 2 in this area.

Folksam
Folksam is currently working at improving their data structure, but as for now, their data structure is lacking through the dispersed legacy systems. This results in a current BIAF score of 2.

Postnord
Postnord uses a comprehensive framework including governance aspects. Even though there was no possibility to scrutinize the framework in detail, the impression was that it is thorough and includes all relevant aspects revolving data structure. Therefore, this results in a BIAF score of 5 in this area.

Swedbank
The data situation at Swedbank, as described by Niclas, needs improvement in order to be viewed as sufficient. Therefore, Swedbank is assigned a BIAF score of 2 in this area.

Remaining Organizations:
- *"Bank A":* Even though they employ a data structure framework, the structural problems from the various systems used throughout the organization results in a BIAF score of 3.
- *Skandia:* Metadata is viewed as important, and traceability is focused upon. However, there is no corresponding focus on flexibility, thus resulting in a BIAF score of 4.
- *"Logistics Company A":* They are currently working at improving data structure through projects, and will construct a framework as well. Thus, the BIAF score assigned is 3.
- *VGR:* Even though accessibility and user-friendliness is focused upon, information alignment is currently lacking, resulting in a BIAF score of 3.

Information Sources

Internal & External Information Sources (D)

Arbetsförmedlingen
Even though Arbetsförmedlingen uses mostly internal information, they exchange information with other agencies, and thus use quite extensive amounts of external information as well. However, the integration is an area that could be improved according to Martin, therefore a BIAF score of 4 is assigned in this area.

"Manufacturer A"
Virtually no external data or information is used by the BI unit, thereby resulting in a BIAF score of 1 in this area for "Manufacturer A".

Ericsson
Even though there is no clear picture of the extent external information used, it seems to be fairly limited. In addition, the integration tends to be limited as well, thus, resulting in a BIAF score of 2 in this area.

Folksam
Folksam only uses a limited portion of external information, however, the integration can be considered as high. Consequently, Folksam is assigned a BIAF score of 3 in this area.

Postnord
At Postnord, the amount of external information used is limited, and the portion that is used is not properly integrated with the internal information. Thus, Postnord is assigned a BIAF score of 2 in this area.

Swedbank

Even though Swedbank is looking into incorporating external information, they virtually use no external information as of today. Consequently, they are assigned a BIAF score of 1 in this area.

Remaining Organizations:
- *"Bank A":* Limited external information but that is integrated result in a BIAF score of 3.
- *Skandia:* Adequate balance between information sources but lacking integration, result in a BIAF score of 4.
- *"Logistics Company A":* Limited external information with low integration, results in a BIAF score of 2.
- *VGR:* Almost exclusively internal information used, resulting in a BIAF score of 1.

Unstructured & Semantic Data (E)

Arbetsförmedlingen
Arbetsförmedlingen uses an internal service to collect and distribute unstructured data from media to the employees. Thus, they receive the highest BIAF score in this area, i.e. 5.

"Manufacturer A"
Since "Manufacturer A" does not use unstructured data at the moment, but sees a future potential in it, they are assigned a BIAF score of 2.

Ericsson
Ericsson uses unstructured data, but only through an external provider, thus, receiving a BIAF score of 3.

Folksam
The BI function at Folksam does not incorporate unstructured data at the moment, but they see future potential in it, and thus, they receive a BIAF score of 2 in this area.

Postnord
Postnord really views unstructured data as beneficial in the future, and they are buying some from a third-party provider at the moment. Consequently, they are assigned a BIAF score of 3 in this area.

Swedbank
As for now, Swedbank does not use unstructured data, but from an environmental-scanning perspective, as well as regarding reputation, it is viewed as having future potential. Therefore, Swedbank is assigned a BIAF score of 2 in this area.

Remaining Organizations:
- *"Bank A":* No usage today and doubtful of future potential results in a BIAF score of 1.
- *Skandia:* Some purchasing from third-party provider, and is viewed as having future potential, resulting in a BIAF score of 3.
- *"Logistics Company A":* No usage and sees no future potential, results in a BIAF score of 1.
- *VGR:* No usage today, but sees future potential in it, resulting in a BIAF score of 2.

Reporting & Performance Analytics

Performance Measurement (F)

Arbetsförmedlingen
They use both KPIs and scorecards, and although many are clearly defined, some are unclear and need improvement. Thus, Arbetsförmedlingen receives a BIAF score of 4 in this area.

"Manufacturer A"
Even though some dashboards are used, they do not target top management, and instead manual spreadsheets are used to a high degree. In addition, a lack of agreed-upon definitions hinders the use of information in the organization. Thus, "Manufacturer A" receives a BIAF score of 2 in this area.

Ericsson
Several dashboards and other measurements are used, but there are issues regarding different definitions. Thus, Ericsson is assigned a BIAF score of 3 in this area.

Folksam
Folksam only uses a few KPIs and such, and they are not adequately defined and agreed-upon, resulting in a BIAF score of 2.

Postnord
At Postnord, they use several scorecards and KPIs, and they have worked hard in order to internally define several concepts and measures. However, still there is a lack of standardization and synchronization between departments, resulting in further need of enterprise-wide definitions and standards. Therefore, Postnord is assigned a BIAF score of 4 in this area.

Swedbank
KPIs and reports are used at Swedbank, while management dashboards are not used. Although they use a lot of standardized reports, the amount of imposition needed signals a need for greater alignment in definitions. Thus, Swedbank is assigned a BIAF score of 2 in this area.

Remaining Organizations:
- *"Bank A":* Both scorecards and KPIs are used and regularly revised, thus resulting in a BIAF score of 5.
- *Skandia:* Several different measurements formats are used, but they still lack agreed-upon definitions for all, resulting in a BIAF score of 3.
- *"Logistics Company A":* Apart from the information cube, no other measurement formats are consistently used, and the definitions need to be established, resulting in a BIAF score of 2.
- *VGR:* Some measures are used, which are revised annually, resulting in a BIAF score of 4.

Reporting Needs (G)

Arbetsförmedlingen
One could assume that the reports that Arbetsförmedlingen produces have initially been a response to information needs. However, now some reports are thought of as redundant, thus indicating that the information needs are not regularly reviewed. Therefore, Arbetsförmedlingen receives a BIAF score of 3 in this area.

"Manufacturer A"
Currently, the information needs at "Manufacturer A" are not met, and much of what is reported and produced do not knowingly fulfill a purpose. Thus, "Manufacturer A" receives a BIAF score of 2 in this area.

Ericsson
A majority of the reports generated at Ericsson does not knowingly fulfill a purpose, and information needs are not regularly reviewed. Therefore, Ericsson is assigned a BIAF score of 2 in this area.

Folksam
Even though some areas of the Folksam reporting does not fulfill internal customer needs, most reports seem to be a response to true information needs that are regularly reviewed. Consequently, Folksam is assigned a BIAF score of 4 in this area.

Postnord
Although most of the generated reporting tends to have been assessed initially, a lack of continuous review of information needs has led to an increased focus on reducing redundancy. Therefore, Postnord receives a BIAF score of 3 in this area.

Swedbank
The amount of imposition required, as described by Niclas, signals that the initial reports have not been altered in response to the information needs. In addition, regulatory demands have led to extensive reporting in numerous formats. The regulatory demands, although potentially viewed as redundant, fulfill the information needs required. However, the remaining reporting does not and is redundant to a high degree, as seen by the report inventory made. Thus, this results in a BIAF score of 2 for Swedbank in this area.

Remaining Organizations:
- *"Bank A":* Perceived redundancy in regulatory reporting, but otherwise information needs are identified and reviewed, resulting in a BIAF score of 4.
- *Skandia:* They claim to always have recipients for the reports generated, resulting in a BIAF score of 5.
- *"Logistics Company A":* Historically not so much reporting conducted, however, increasing information needs call for reviewed reporting, resulting in a BIAF score of 3.
- *VGR:* Clear needs are identified, and no appeared redundancy in reporting, resulting in a BIAF score of 5.

Business Intelligence Review & Improvement (H)

Arbetsförmedlingen
Arbetsförmedlingen uses both external and internal review and improvement tools continuously, resulting in the highest BIAF score of 5 in this area.

"Manufacturer A"
"Manufacturer A" uses statistics in order to review themselves, however, there are several areas that need improvement according to Head of BI, resulting in a BIAF score of 3 in this area.

Ericsson
Historically, this was an area lacking at Ericsson. However, this is in the process of changing, and currently they are regularly reviewing themselves through new measurements in order to improve. Therefore, Ericsson's work in this area is currently considered to correspond to a BIAF score of 3.

Folksam
The recently initiated development of a common definition framework will make Folksam improve in this area. However, at the moment, there seems to be only sporadic reviews with no improvement work, thus resulting in a BIAF score of 2 in this area.

Postnord
The restructurings at Postnord have made BI review and improvement challenging. However, they are currently improving process convergence, but this seems to address the overall Postnord processes, and not specifically the BI unit as such. Thus, Postnord is assigned a BIAF score of 2 in this area.

Swedbank
Since no continuous review or improvement of the BI unit is made, but only ad-hoc reviews and improvements, Swedbank receives a BIAF score of 2 in this area.

Remaining Organizations:

- *"Bank A":* Only ad-hoc quality problem solving results in a BIAF score of 1.
- *Skandia:* Monthly reviews and improvement work are conducted, resulting in a BIAF score of 4.
- *"Logistics Company A":* Regular review but unclear improvement work due to decentralization, result in a BIAF score of 3.
- *VGR:* No review or improvement work, due to it being implemented recently, result in a BIAF score of 1.

Information Strategy & Alignment

Strategy Alignment (I)

Arbetsförmedlingen
The alignment between BI and company strategy appears to be strong at Arbetsförmedlingen. Although there seems to be a focus on a top-down linkage, there is a bottom-up linkage as well. Consequently, Arbetsförmedlingen is assigned the highest BIAF score of 5 in this area.

"Manufacturer A"
As described by Head of BI, "Manufacturer A" tends to be immature in this area, and even though there seems to be a linkage to some degree, company strategy is not sufficiently broken-down. Consequently, "Manufacturer A" receives a BIAF score of 2 in this area.

Ericsson
Even though there seems to be loose linkages using both bottom-up and top-down approaches, this is an area that needs improvement at Ericsson. The main issue appears to be a too abstract company strategy that is not sufficiently broken-down, and this result in a BIAF score of 2 for Ericsson in this area.

Folksam
The IT strategy is considered to be broken-down and defined adequately, as well as connected to the overall company strategy, resulting in a close top-down linkage. Nevertheless, there tends to be no bottom-up linkage, resulting in a BIAF score of 4 for Folksam in this area.

Postnord
Despite the numerous restructurings at Postnord, there seems to be a close linkage between BI and company strategy from both a bottom-up and top-down perspective. The business plans are thoroughly broken-down, and the work by the BI unit is supporting the business plans, which is defined in detail. Thus, Postnord receives the highest BIAF score of 5 in this area.

Swedbank
As described by Niclas, Swedbank clearly has a close alignment between BI and overall company strategy from both bottom-up and top-down perspectives. Consequently, Swedbank is assigned the highest BIAF score of 5 in this area.

Remaining Organizations:
- *"Bank A":* Lack of clear overall strategy, as well as dispersed systems, result in a BIAF score of 2.
- *Skandia:* Close alignment through both bottom-up and top-down, result in a BIAF score of 5.
- *"Logistics Company A":* A loose top-down linkage results in a BIAF score of 3.
- *VGR:* Close alignment through both bottom-up and top-down, result in a BIAF score of 5.

Top-Management Support & Sponsorship (J)

Arbetsförmedlingen

As for top-management support, this seems to be sufficient the BI unit at Arbetsförmedlingen. However, the sponsorship is a bit ambiguous since it depends on the funding from the government. Nevertheless, sponsorship tends to be prioritized to a certain extent, indicating an expectation for more to come. Thus, Arbetsförmedlingen is assigned a BIAF score of 4 in this area.

"Manufacturer A"
From what Head of BI described, "Manufacturer A's" top-management does not provide sufficient support and sponsorship, and instead the ERP system implementation is prioritized. Consequently, "Manufacturer A" receives a BIAF score of 2 in this area.

Ericsson
At Ericsson, top-management support for the analytics unit and BI seems to be sufficient. However, the sponsorship is not adequate, and it is not expected to improve as long as there is a lack of governance and the amount of imposition in providing dashboards are not noticed. Therefore, Ericsson receives a BIAF score of 3 in this area.

Folksam
Top-management support and sponsorship for BI at Folksam is sufficient when it comes to another department having an articulated information need, and when regulation requires certain projects. However, for internal projects initiated by the decision-support group themselves, sponsorship is difficult to get due to challenges in building business cases for them. Thus, Folksam is assigned a BIAF score of 4 in this area.

Postnord
Top-management support for BI at Postnord is viewed as sufficient, and the sponsorship is not a problem to receive. However, further and clearer sponsorship from other top managers than the CIO is desirable due to all of the internal politics. Consequently, Postnord receives a BIAF score of 4 in this area.

Swedbank
The top-management support and sponsorship received are viewed as sufficient, and thus, Swedbank receives the highest BIAF score of 5 in this area.

Remaining Organizations:
- *"Bank A":* Support and sponsorship are sufficient for enterprise-wide projects, but not for internal ones, resulting in a BIAF score of 4.
- *Skandia:* A strong and sufficient support and sponsorship results in a BIAF score of 5.
- *"Logistics Company A":* Through the project model, support and sponsorship is received when customer value increases are demonstrated, but could be hard for other projects, resulting in a BIAF score of 4.
- *VGR:* Initially strong support, but increased sponsorship is now needed, thus resulting in a BIAF score of 3.

Value & Benefits of Business Intelligence (K)

Arbetsförmedlingen
Even though Martin believes BI is viewed as important through intangible aspects, by not actively trying to demonstrate the value and benefits of BI activities, Arbetsförmedlingen receives the lowest BIAF score of 1 in this area.

"Manufacturer A"
As the Head of BI focuses on demonstrating BI value through intangible measures, and not tangible and financial measures such as ROI, "Manufacturer A" receives a BIAF score of 2 in this area.

Ericsson

Currently, Ericsson focuses on establishing TCO as well as building business cases based on intangible benefits from BI. However, an initiative for value realization is launched, in which this aspect is planned to be improved. Thus, Ericsson receives a BIAF score of 3 in this area.

Folksam
Since no ROI or similar is used to demonstrate BI value, and instead intangible benefits are focused on and communicated, Folksam is assigned a BIAF score of 2 in this area.

Postnord
Even though admittedly challenging, Postnord has spent four years in developing a comprehensive framework in order to demonstrating tangible benefits of BI. Consequently, Postnord receives the highest BIAF score of 5 in this area.

Swedbank
Since Niclas sees no current need for demonstrating BI value in the form of e.g. ROI, but relies on the intangible benefits of e.g. following regulatory demands, Swedbank receives a BIAF score of 2 in this area.

Remaining Organizations:
- *"Bank A":* No value demonstration of BI at all results in a BIAF score of 1.
- *Skandia:* Since viewed as hard to demonstrate tangible benefits, intangible ones are communicated, resulting in a BIAF score of 2.
- *"Logistics Company A":* The project model used includes tangible benefits, but also includes intangible elements, and thus results in a BIAF score of 4.
- *VGR:* No benefits demonstrated at all, resulting in a BIAF score of 1.

Information Management & Decision Making

Information Management Culture (L)

Arbetsförmedlingen
There is a trust in information across Arbetsförmedlingen, but information sharing could be improved. Thus, it is assessed that Arbetsförmedlingen's work in this area corresponds to a BIAF score of 3.

"Manufacturer A"
At "Manufacturer A", information use and sharing need improvement, e.g. through better governance, performance measurement, and reporting tools. Thus, "Manufacturer A" is assigned a BIAF score of 2 in this area.

Ericsson
Sine Ericsson traditionally has not based on fats, information trust and sharing has been limited. Even though this is to be improved, the current situation results in a BIAF score of 2 in this area for Ericsson.

Folksam
Based on the different views of information within Folksam, i.e. both positive and less positive perspectives, the assessment is that the work in this area corresponds to a BIAF core of 3.

Postnord
Information is to a high degree trusted and used in Postnord according to Patrick, even though several tools could be improved. Thus, Postnord is assigned a BIAF score of 4 in this area.

Swedbank

Even if there is trust in the information provided by the BI system at Swedbank, the information sharing is lacking. Therefore, Swedbank receives a BIAF score of 3 in this area.

Remaining Organizations

- *"Bank A":* There is an overall trust for information, except for reports demanded by regulation, resulting in a BIAF score of 3.
- *Skandia:* Since there is a high demand for information provided by BI, the trust and information sharing can be assumed to be high, resulting in a BIAF score of 4.
- *"Logistics Company A":* Low degree of information trust and sharing result in a BIAF score of 2.
- *VGR:* Mixed feelings toward information and its sharing result in a BIAF score of 3.

Bases for Decision Making (M)

Arbetsförmedlingen

Arbetsförmedlingen tends to use an appropriate mixture of facts and intuition in making decisions. The information provided by the decision-support system is relied upon, but it is not the only foundation for decision making in the organizations since other factors should be accounted for as well. Thus, Arbetsförmedlingen receives the highest BIAF score of 5 in this area.

"Manufacturer A"

The information provided by the BI system is not trusted enough due to governance issues, and subsequently it is not used as a base for decision making. Even though intuition always should be a parameter in decision making, according to Head of BI, more fact-based decision making is needed. Therefore, "Manufacturer A" is assigned the lowest BIAF score of 1 in this area.

Ericsson

The decision making at Ericsson is to a great extent based on intuition, and BI information is mostly used to verify the decision proposed by intuitive thoughts. Thus, Ericsson receives a BIAF score of 2 in this area.

Folksam

In most cases, decisions at Folksam are based on BI information. However, other factors are integrated in decision making as well. Consequently, Folksam is assigned the highest BIAF score of 5 in this area.

Postnord

It appears like decision making at Postnord to a great extent is based on BI information, and other bases are rarely used. Thus, Postnord receives a BIAF score of 4 in this area.

Swedbank

Based on the view provided by Niclas, decision making at Swedbank is characterized by a sound mixture of BI information and intuition depending on the situation at hand. Therefore, Swedbank is assigned the highest BIAF score of 5 in this area.

Remaining Organizations:

- *"Bank A":* Since decisions are mostly based on BI information, this results in a BIAF score of 4.
- *Skandia:* A lot of decisions are based on BI information together with a review provided by intuition, resulting in a BIAF score of 5.
- *"Logistics Company A":* Decisions are based on intuition and other sources than BI, resulting in a BIAF score of 1.
- *VGR:* Even though those using the BI system base their decisions on the information provided by it, there are several not using it, resulting in a BIAF score of 3.

9.6 Appendix 6: Fictitious Article

Below is the fictitious article that was a mandatory part of this Degree Project. The article is written in Swedish and as if it was published into a local newspaper, similar to Sydsvenskan.

SÖDRA SVERIGES TIDNING

LUND – AKTUELL FORSKNING

Hur Business Intelligence förbättrar beslut

Moderna datorsystem visar på stor potential i att förbättra organisationers beslutsfattande - förutsatt att man vet vad som behöver göras.

Vid Ekonomihögskolan i Lund har de två masterstudenterna Sebastian Johansson och Mikael Nilsson nyligen avslutat en undersökning som kan hjälpa företag att bli bättre på att fatta rätt beslut, effektivisera arbetet och i slutändan också tjäna mer pengar.

Undersökningen handlar om vad som på affärsspråk kallas *Business Intelligence* (förkortat BI) och hur företag kan ha nytta av detta. BI är ett paraplybegrepp som innefattar allt ifrån insamlande och analys av information, till rapportering och uppföljning. Det handlar helt enkelt om att omvandla rådata till meningsfulla beslutsunderlag för att förbättra beslutsfattandet. –Kan ett företag få tillgång till all relevant information, och efter analys få det presenterat på ett intuitivt sätt så blir det automatiskt mycket lättare att fatta rätt beslut. Om denna process dessutom är ögonblicklig minskar man risken att missa viktiga chanser, berättar Sebastian Johansson.

Business Intelligence som fenomen är i sig inget nytt, begreppet myntades redan på 50-talet av en forskare på IBM, men det är den senaste tidens oerhört snabba teknologiska utveckling som har öppnat dörrar till en rad nya möjligheter. Processer som det tidigare tog en hel analysavdelning dagar att genomföra kan nu göras av datorer på mindre än en bråkdel av tiden. – Föreställ dig arbetet med att analysera en stor annonskampanj: vilka produkter såldes det mer av, hur hög var lönsamheten, fanns det några skillnader mellan butiker i olika länder, fungerade transporterna på ett fullgott sätt? Dessa är bara några av de frågor en företagsledning vill ha svar på. Att sammanställa detta material och presentera var tidigare tidskrävande och kunde bara göras *efter* annonskampanjen var över. Nu när butikskassorna ständigt är uppkopplade kan företaget följa försäljningen i realtid, och vid behov fatta beslut för att justera kampanjen så den blir ännu bättre, berättar Mikael Nilsson.

Ett annat område som utvecklats kraftigt de senaste åren är verktyg för omvärldsbevakning. I takt med att allt fler personer är aktiva på sociala medier, såsom Facebook och Twitter, ökar också den tillgängliga informationsmängden. Om en kund skriver något om ett företag på Facebook, kan det vara av stort intresse för företaget att snabbt veta vad det är. BI-systemen läser helt enkelt av användarnas kommentarer, analyserar dem, och presenterar innehållet för berörd beslutsfattare.

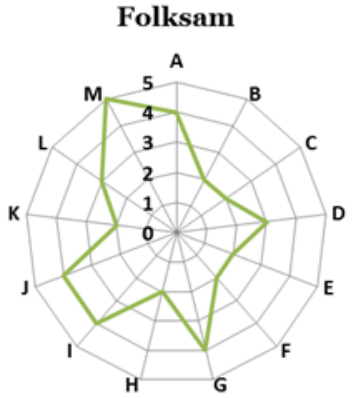
”Tidigare kunde man lita mer på sin magkänsla, men nu vill man dessutom ha tryggheten av en robust analys eller en snabb övervakningsfunktion”

Undersökningen är egentligen tredelad berättar de två lundastudenterna. – I första steget sammanställde vi vad befintlig forskning säger om hur man teoretiskt bör göra, sk *best practice*, och utvecklade med hjälp av det vårt eget analysverktyg. I steg två undersökte vi hur företagen faktiskt gör, och i steg tre analyserade vi eventuella skillnader och likheter däremellan, beskriver Mikael Nilsson.

– När vi gick igenom den befintliga forskningen såg vi att det saknades ett enhetligt analysverktyg

som täcker in alla delar av Business Intelligence. Många av de verktyg som fanns var snävt fokuserade, och var ofta kommersiellt sponsrade, vilket inte alltid gav en rättvisande helhetsbild, förklarar Sebastian Johansson.

Analysverktyget, som studenterna valt att kalla *BIAF*, innehåller 13 parametrar (A-F), som delats in i fem huvudkategorier som berör: datakvalitet, informationskällor, rapportering/uppföljning, strategi, samt beslutsfattande. Beroende på hur företagens arbete med BI ser ut tilldelas de sedan poäng mellan ett och fem i de olika parametrarna och sammanställs i ett radardiagram, se bild.



BIAF Radar Chart illustrerar på ett finurligt sätt hur företagen kan vara olika bra på de respektive parametrarna. Här är det försäkringsbolaget Folksams BI-arbete som presenteras.

Undersökningen visar tydligt på att alla organisationer har insett vikten och potentialen med BI, men de har kommit olika långt och möter olika problem.

– Vi har sett att området får mycket uppmärksamhet och att det finns tydliga önskningar från företagens högsta ledningar att jobba aktivt med BI. Detta är givetvis positivt då det ofta är stora projekt som påverkar arbetssätten hos många människor, och förändringar kan ofta upplevas som lite motigt, berättar Mikael Nilsson.

Vidare visar undersökningen att organisationer i allt större utsträckning ställer om till att bli mer faktabaserade i sina beslut, man vill ha tydliga objektiva belägg för sina handlingar. Något som författarna tror kan ha koppling till den ekonomiska krisen och att företagen idag har väldigt begränsade utrymmen för att våga chansa. Tidigare kunde man lita mer på sin magkänsla, men nu vill man dessutom ha tryggheten av en robust analys eller en snabb övervakningsfunktion, förklarar Sebastian Johansson.

Resultatet från studien visar att organisationerna skiljde sig förvånansvärt mycket åt i deras arbete med BI. De områden som organisationerna generellt var bäst på var att synka BI-arbetet med den övergripande företagsstrategin, samt att arbeta för att få ledningens stöd. Dock så var resultaten i övrigt relativt blygsamma, och det var många förbättringsområden som identifierades.

När det gäller vad organisationerna istället var sämst på finns det ett genomgående tema, nämligen att de fokuserar för mycket på den interna informationen, dvs. den som genererats av företaget självt. Genom att inte lyfta blicken och se vad som händer runt om riskerar man att missa viktiga chanser menar studenterna. Dessutom var organisationerna dåliga på att demonstrera påtagliga finansiella fördelar av BI-arbetet, något som kan försvåra möjligheten till att få de resurser som krävs.

– Med de kraftfulla BI-system som finns idag har företag stor möjlighet att fatta bättre beslut snabbare. Dock måste man inse att systemen inte gör allt; om man inte arbetar med BI på ett kompetent sätt riskerar man att systemen kostar mer än de smakar. Det är här vi tror att BIAF kan hjälpa företag utvecklas, avslutar Sebastian Johansson.

Författare: *Sissuneb Gellintenic*

FAKTA: BUSINESS INTELLIGENCE

Förkortas BI och är ett samlingsbegrepp för olika processer och system som omvandlar rådata till meningsfulla beslutsunderlag.

BI-verktyg används för att förbättra och förenkla beslutsfattande. Detta görs på flera olika sätt, exempelvis genom att information analyseras och presenteras på ett smart sätt. Företagens processer övervakas och beslutsfattare kan direkt få information om hur verksamheten går.

Ett branschneutralt utvärderingsverktyg kallat BIAF (Business Intelligence Assessment Framework) har utvecklats för att kunna kartlägga hur bra en organisations arbete med BI är, och vad som behöver förbättras.

Källa: Johansson & Nilsson (2013)