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**MANAGING BUSINESS INTELLIGENCE
TRANSITION: SUPPORT AND USER ACCEPTANCE IN
DATA ANALYTICS ADOPTION**



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ABSTRACT

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Managing Business Intelligence Transition: Support and User Acceptance in Data Analytics Adoption

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The emergence of big data analytics has been apparent for a while now. Data quantities get bigger, and machines get smarter by the day, enabling new methods of analysis and insight. Organizations are required to harness these data capabilities to stay competitive in a rapidly evolving environment, which has led to organizations treating data as an organizational asset. This has led to the rise of cloud-based massive data storing capabilities and modern business intelligence (BI) tools, that deliver insights to business users in real time. However, replacing the old reporting systems with modern BI solutions can be a lengthy and complex process, requiring understanding of technical, business, and organisational aspects. Organizational change is typically slow, difficult, and expensive of nature, requiring careful planning, communication, and time to succeed. When it comes to the process of renewing or implementing analytics and BI, assuring the onboarding of end-users is exceptionally important, as the value gained from BI systems is dependent on insights and decision making made by the users. If the end-users do not accept the system or are not supported throughout the implementation, shortcomings are bound to occur.

To limit resistance and help the implementation in such initiatives of change, this thesis aims to review factors affecting the acceptance and utilization of business intelligence tools as well as means for organizations to support their end-user through-out the project. In addition, means of managing organizational change are explored and reflected to the context of BI implementations. The thesis is done in cooperation with the largest department store chain in Finland Sokos, where an ongoing legacy reporting system ramp down and BI tool implementation is in progress. Business users were interviewed to better understand the current state of analytics & BI in the chain, and to identify various enabling and limiting factors related to the implementation. Themes like sufficient communication, end-users training, and data quality of the will be in the spotlight of the project as the end-goal of BI is to have a user who can drive the right conclusions in a timely manner, from valid data which is easy for them to access.

Keywords: Business Intelligence, BI, Data Analytics, Organizational transition, BI Acceptance, End-user training, BI implementation, Change management

TIIVISTELMÄ

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Datan ja analytiikan kehityksen ei pitäisi tässä vaiheessa olla kenellekään yllätys. Valtavat datamassat ja koneiden muuttuessa alati älykkäämmäksi analytiikan ja datan kultakausi tuntuu vain jatkuvan entisestään. Yritykset ovat alati etsimässä uusia keinoja datan hyödyntämiseen, mikä on johtanut datan luonteen muutokseen. Modernissa liiketoimintaympäristössä data on organisaatioiden arvokkain materiaaliton pääoma, jota pyritään johtamaan ja hallitsemaan parhaimman mukaan. Datavetoisuus on monille yrityksille arkipäivää ja eri tason käyttäjät hyödyntävät dataa arjen työtehtävissään. Tämä datan kultakausi on myös johtanut suureen määrään tietovarasto- ja analytiikkahankkeita, jossa vanhoja kyvykkyksiä pyritään uusimaan ja kehittämään. Kyseiset hankkeet eivät kuitenkaan aina ole helppoja, sillä ne vaativat monipuolista ymmärrystä teknologiasta, liiketoiminnasta ja ihmisistä. Uusien analytiikkaratkaisujen käyttöönotto vaikuttaa työntekijöiden päivittäisiin toimintatapoihin, jossa muutos ei aina ole tervetullutta. Muutos ja sen hallinta on perinteisesti ollut pitkä, raskas ja kallis prosessi, mikä pätee myös datauudistuksiin. Muutoksen hallinnan ja uusien järjestelmien hyväksymisen rooli korostuu entisestään, sillä loppupuleissa analytiikkatyökalut eivät ole minkään arvoisia, jos loppukäyttäjät eivät hyödynnä niiden tarjoamaa dataa päätöksenteossaan

Tämän pro gradu tutkielman tavoitteena on kartoittaa tekijöitä, jotka vaikuttavat loppukäyttäjien asenteisiin ja järjestelmien hyväksymiseen osana BI-työkalujen käyttöönottoa. Tutkielmassa pyritään myös tunnistamaan keinoja, joilla loppukäyttäjää voidaan tukea osana analytiikkamuutosta ja uusien työkalujen käyttöönottoa. Tämän lisäksi tutustun muutoksen hallinnan peruseriaatteisiin ja peilaan niitä analytiikkakontekstiin. Tutkielma on tehty yhteistyössä Suomen suurimman tavarataloketju Sokoksen kanssa, jossa on käynnissä legacy-raportoinnin alasajo hanke, sekä korvaavan modernin raportoinnin käyttöönotto. Tutkimuksessa haastateltiin järjestelmien käyttäjiä analytiikan nykytilan kartoittamiseksi, sekä uuden järjestelmän käyttöä rajaavien tekijöiden tunnistamiseksi. Lisäksi haastateltavat tunnistivat käyttöönottoa tukevia tekijöitä ja kanavia, joita pyritään kategorisoimaan käyttöönoton helpottamiseksi. Datan laatu, riittävä viestintä, sekä loppukäyttäjien koulutus ovat hankkeen keskiössä, jotta uuden BI työkalun käyttöönotto etenee ja vanhan raportoinnin valoja voidaan alkaa pikkuhiljaa sammuttamaan.

Asiasanat: Business Intelligence, BI, Data Analytiikka, Muutoksen Hallinta, BI Hyväksyntä, Loppukäyttäjäkoulutus, BI käyttöönotto, Organisaatiomuutos

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1 INTRODUCTION

1.1 Harnessing Data in Modern Business Environment

Data can be seen as a vital enterprise asset in modern business environment. It can give valuable insight about for example sales, customers, products, and services (DAMA International, 2017). It is no surprise that the role of data and analytics has grown massively over the past decade or so. Greater processing power of information, constant collection of data and massive data storing capabilities have revolutionized the use of big data analytics and business intelligence (BI) across different fields and businesses. If you are not collecting data and using it for decision making, you are already putting yourself in a great disadvantage. Adapting to this has been an enormous challenge for many businesses, as change, especially in large organizations does not come easily and without a cost. This thesis aims to answer those challenges that my target organization, like many other organizations have faced when trying to adapt in this rapidly evolving environment of big data analytics.

To understand the meaning of this thesis, we must investigate the nature of data analytics as a whole and the role of data in modern day businesses. Alpar & Schulz (2016) highlight, how the scope of BI has extended from strictly strategic matters to more practical matters and operational tasks. This emphasizes the role of business users that previously might not have needed to be that data savvy. Modern environment has pushed end-users to new areas of analytics, requiring new areas of skills and knowledge. The rapid evolution has also led to many of the older analytics systems turning obsolete, challenging the adaptability of organizations. Updating existing legacy systems and implementing new analytics tool can be a lengthy and complex process, requiring competence in managing technology, business, and people. The whole nature of analytics use in an organization is highly dependent on the commitment of end-users, as the use of analytics tool tends to be voluntary in nature, highlighting the importance of

motivation and capabilities of its users (Fetzner & Freitas, 2011). One could even argue that analytics tools are as useful as the insights and decisions that their data provides, leaving most of the responsibility to the users.

To transition into using modern analytics tools, organizations need carry out lengthy projects that effect the workflows and daily tasks of their workforce. Like with most technological advances, people need to face change and adjust their ways of working to stay relevant in a rapidly evolving market. In an environment of technological and business aspects, where the motivation and capabilities of end-users determine the amount of value gained from the systems, it is essential for organizations to manage the change process effectively. Leaving the people out of the transition can lead to devastating shortfalls. Assuring user satisfaction and acceptance of the new tools implemented is a challenge many organizations face daily. While the significance of the issue is apparent, the topic can be problematical to approach, as successful implementation of analytics capabilities requires understanding of change management, source systems, data storing, managing data assets, reporting, business context and end-users to succeed Hawking & Sellitto (2010). With the cooperation of the largest department store chain in Finland, this thesis aims dissect this complex topic and provide insights and reflections on different areas of the transition process.

1.2 Research Problem and Questions

This thesis focuses on managing the transition process of business intelligence implementations, by reviewing an ongoing implementation in the target organization. The research problem is centred around three focus areas: transition process, BI acceptance, and end-user support. The following research questions were established to provide insights and better understanding to assist the implementation process in target organization:

How can organizations manage the transition process of adopting and upgrading data analytics?

What elements can reduce BI system acceptance and utilization?

What types of support do end-users need when implementing or renewing analytics & BI?

These topics will be valuable for the target organization as well as practical for other organizations facing analytics transition. Understanding change and resistance of it from the perspective of individuals is an objective most modern organizations should thrive for. The research was carried out by interviewing seasoned analytics users and managers inside the organization, to better understand their analytics use as well as factors enhancing and hindering it. The interviews followed a predetermined set of questions, but were carried as semi-structured interviews, promoting an open environment of discussion, which revealed

various challenges in the implementation process. Another aspect of the thesis is to find out different kinds of support that the end-users consider valuable in terms of the implementation, providing the target organization with practical means on assisting the end-users during the implementation.

1.3 Structure

The starting point of this thesis aims to introduce the target organization and characteristics of the analytics environment in use. Research problems of this study are deduced from the current BI implementation process present in the target organisation. To better understand the issues at hand, literature review was conducted to define the nature of business intelligence systems, lifecycle of data from the moment of creation to decision making, as well as the role of data in modern business environment. This is followed by reviewing the meaning of change and transformation in corporate setting. Themes like individual change, the relationship between change and project work, as well as common change management frameworks are explored. The literature review continues by combining the previous chapters to reach the ultimate topic of the thesis, which is managing the transition process of organisation aiming to implement BI. Elements affecting the transition are identified from literature, followed up by related themes like critical success factors of BI system implementations and establishing a data driven culture within an organization. The literature review aims to comprehensively analyse some core literature within the fields BI & change management, which are reflected with more recent papers as well as blogposts and whitepapers published by analytics practitioners. The literature review is followed by the empirical part of the study, starting with description of research methodology. Then summarization of interview results and citations from the interviews are presented to examine main points and highlights of the interview findings. Next, the results are further discussed and reflected to the literature, followed up by suggesting practical implications and next steps for the target organizations based on interview findings. Lastly, limitations of the study are reviewed followed up by proposes for future literature are presented and the validity and limitations of the study are considered, ending with concluding remarks.

2 TARGET ORGANIZATION

2.1 Target Organization

This thesis is done in cooperation with the largest retail organization in Finland: The S-group. As a customer owned co-op business, the S-group has a unique organizational structure, consisting of 19 independent regional cooperatives. The position of being the largest player in the Finnish retail business, means S-group concerns millions of households on a weekly basis. One of the major business areas of the S-group is the Sokos chain, the largest department store chain in Finland. The analytics nature of department stores and retail in general is heavily focused on sales and inventory reporting. The focus of the thesis is the analytics transition of the Sokos chain, where an organization wide analytics system renewal is in progress. The main goal of the transition is to review current reports and data assets and replace legacy reporting systems with modern data warehousing and reporting tools. Group wide Power BI implementation has been going on recently, which concerns the Sokos chain as well. While the progress has been steady, business users are still heavily dependent on legacy reporting systems that have determined analytics use in the past. This overlapping usage hinders the transition process and brings up questions of data quality and report continuity amongst the end users.

2.2 Current State and Challenges

The benefits of the transition are very apparent. Adoption of modern and updated reports and datasets provides greater versatility in analytics. In addition, the legacy systems are a major expenditure, thus shutting them down eventually would offer great cost savings. While the replacement of the reports is ongoing in coordination with business units and development teams, there is another

challenge that needs to be addressed. Many end users of the legacy systems are still very dependent on the old reports, increasing the possibility of resistance for the new analytics. Many have used these reports for years, making the change process lengthy and difficult for many individuals. In addition, the end users are of different levels of technical and data capabilities, making the transition for new systems even more overwhelming for some. The systems in question are still being used simultaneously, meaning many users will refuse to adapt the newer systems until final ramp down of the old systems is done. In this thesis, I aim to review relevant literature to define the essence of analytics and BI in modern business environment and assess the definition of organizational change and its relationship to analytics and BI. To follow the theoretical background, I will interview different employees of the Sokos chain to reflect their views and experiences with the ongoing analytics renewal to hopefully provide insights and findings for organizations tackling with similar transition processes. The topic of the study comes from my personal experience working in the middle of the BI implementation in question for 9 months during a maturity leave. My main duties were report-development, end-user assistance and communicating user requirements for development teams and facilitating the development replacing reporting for the legacy system. Previous experience in the environment assists me on understanding the challenges that the employees in the chain have faced and gives me practical skills to understand the research area comprehensively. However, this can also be seen as a limiting factor, as my history with the organization might affect the validity and applicability of the study.

3 DATA ANALYTICS AND BI IN MODERN-BUSINESS ENVIRONMENT

3.1 Data, Analytics & BI defined

3.1.1 From Data to Knowledge

To better understand what data analytics is about, we need to grasp the essence of data and what makes it a vital asset in modern business environment. Plain data is usually just numbers or characters, collected from a source like an information system. Ackof (1989) characterizes data as: “symbols that represent the properties of objects and events”. He also adds that data is “a product of observation”, collected and made possible by technology, yet still uncategorized and unorganized, thus having little value. Data analytics in business environment is all about collecting that data and being able to transform and use it to support decision making.

Data’s journey from meaningless characters to valuable business information can be explained by the traditional the DIKW-model, also known as knowledge pyramid. This model is one of the cornerstones of information- and data research. Though being conceptualized earlier, when referring to DIKW-model, Ackof’s (1989) study “From Data to Wisdom” is often cited. Ever since, the model has been revisited and enhanced by many different researchers. Rowley’s (2007) paper revisits the model and evaluates literature on the topic. They present the model in the traditional pyramid shaped hierarchy, consisting of data, information, knowledge, and wisdom (Figure 1).

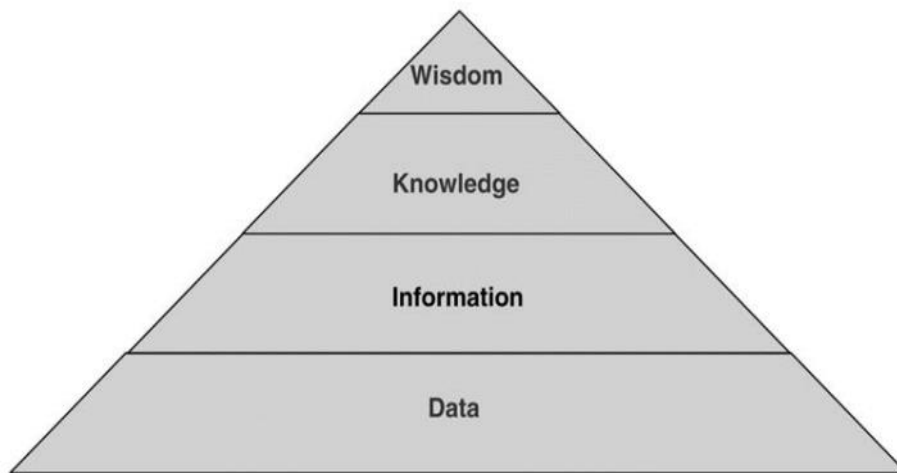


Figure 1 DIKW Hierarchy (Rowley, 2007)

The model explains the difference of data and information by pointing out that information is just data that has a specific context. Information is processed data that can explain its meaning by answering to questions like “who, what, where and when”. The difference between data and information is not structural but functional, as the data is still in the same form, but information gives meaning to it. The number “two” is just data, but if we give it a context in “the price of a cup of coffee is two euros”, it has become information. Information becomes knowledge when information is combined with experience and applied in a larger perspective. Knowledge answers how-questions by applying prior knowledge and values to the given context of information. With the prior coffee example, knowledge would be acknowledging that the price of two euros is cheaper than most places, thus making it a good deal. Finally, the last stage of the model, Wisdom is characterized as “evaluated understanding”, answering questions like “why”. Wisdom aims to increase effectiveness and adds value, which requires judgement and decisions. Following the coffee example, we can perceive that we can use this price of two euros to save money in the long run. (Rowley, 2007)

All these concepts are vital to the data analytics process. In essence, business data analytics is about gathering data like transaction information and transforming it by various means, so employees and management can base their decision making on it. Nowadays many businesses use the term “big data” when referring their data assets, meaning the data has higher volume, velocity, and variety than traditional data assets (Kitchin & McArdle 2016). This is even more apparent in the retailing context of this research as retail data tends to have a plethora of different variables like customers, products, transactions, location, and sales channels, which can also be linked to each other for multidimensional and in-depth analysis (Bradlow et. al, 2017). When applying the four stages of DIKW-model to retail context, the data would be the millions of values collected by cash registers. Those values become information when they are processed and given context

like transaction-time or sales price. Furthermore, this information can be refined to knowledge by using the information to create sales reports to compare this year's sale to last year. Finally, by using the knowledge in the sales report, wisdom can be gained by analysing and understanding the sales numbers and altering business processes, thus improving efficiency based on that knowledge.

3.1.2 Data Analytics & Business Intelligence

Analytics in business environment goes by many names such as data analytics, business analytics, business intelligence, enterprise reporting and the list goes on. All these concepts are very overlapping and generally focus on the process of collecting and transforming raw business data into valuable information to support decision making. To sum this, Wilder and Ozgur (2015) define business analytics to be: "the application of processes and techniques that transform raw data into meaningful information to improve decision making". To add to this definition Power et. al. (2018) generalizes that statement further with the definition of: "business analytics is the application of analytics to business problems". Additionally, in their book, Runkler (2020) defines data analytics to be: "the application of computer systems to the analysis of large data sets for the support of decisions". They also highlight the data analysis process to consist of six phases of: "selection, preprocessing, transformation, data mining, interpretation, and evaluation". Finally, in one of the key studies of the field Chen, Chiang & Storey (2013) refer BI & Analytics to be: "the techniques, technologies, systems, practices, methodologies, and applications that analyse critical business data to help an enterprise better understand its business and market and make timely business decisions." Historically data analytics has been around for decades, even before the modern-day data capabilities made possible by information technology, yet the majority of modern analytics research focuses on big data analytics tools.

Business intelligence (BI), while being highly related, in my opinion stands out the most out of this terminology, being more substantial compared to the rest. Larson and Chang (2016) define BI to be: "a data driven process that combines data storage and gathering with knowledge management to provide input into the business decision making process". They also add that: "BI enables organizations to enhance the decision-making process and requires processes, skills, technology, and data to function.". In addition, in their study Işık, Jones & Sidorova (2013) define BI to be a versatile system consisting of both technical- and organizational elements, that present users with information to analyse. They add to this by stating that the overall goal of BI is to enable effective decision-making and improve organizational performance and efficiency. This definition is very fitting for the context of this thesis, as it highlights the human and organizational aspects of BI & analytics as well. Overall business intelligence, can be seen as more practical theme compared to analytics, often focusing on the final product of BI, meaning the tools and data available for the end user of BI. Chen, Chiang & Storey (2013) list some of the key functionalities of BI tools to be: "reporting, dashboards, ad-hoc queries, interactive visualizations and scorecards". To sum

up, we can acknowledge that BI and analytics go hand in hand and focus on analogous themes.

There is plenty of research and terminology on the field of analytics. After reviewing literature and definitions of different analytics studies, we can identify some fundamental principles that are present in most of the research:

- The analytics process consists of collecting data and transforming it into a meaningful and useful form and analysing it.
- The main goal of analytics & BI is to support improve decision-making in all levels of the organization.
- Analytics is dependent on information technology and -systems to process and present vast amounts of data.

With these high-level principles in mind, it easier to comprehend analytics in a more practical view, digging deeper into different processes and pieces of analytics initiatives. Despite analytics being this multistage process from the cash register to the dashboard, it is essential to remember that analytics is made to enable decision-making, and analysis made by its end-users. Even well executed analytics is worth nothing if no one uses it.

3.1.3 Data analytics in retail

Retail is an industry where the significance of data and analytics is highlighted on all levels of an organization. Typical dimensions of retail analytics consist of sales data, customer and loyalty data, products, date and time, sites and locations, sales channel, inventory, and stock, as well as promotions and campaigns. In the department store business, different users use reporting to monitor sales and manage assortment based on sales and stock data. In larger organizations, data is used on all levels of organization from store workers to upper-level management. This also creates wide diversity of use-cases and needs for information. Typically, most of retail data is generated by POS and ERP systems, through sales transactions and inventory management for example. In general, such data tends to massive in quantity, emphasizing the need for functional and efficient data storing capabilities. A study made by Seetharaman et. al. (2016) estimate that modern analytics capabilities will mould the retail market significantly in the future. Big data analysis will provide greater predictability of sales and demands, boosting the revenue potential and efficiency of the sector significantly. Deeper customer understanding can also help organizations to choose correct products for their customers and better understand customer behaviour. While their paper highlights the apparent benefits of big data to the industry, they also outline the need for sufficient security and safekeep of these large data quantities. Another study made by Santoro et. al. (2018) emphasizes the need for modern retail businesses to adopt new business processes like the use if big data analytics. Some of the major benefits are listed to be better customer targeting, efficient stock

management and predictability, delivery management and overall efficient and cost savings in sales. They also point out that the emergence of these data capabilities brings out the need for competences in data management and -analysis to harness the benefits of this data driven age. They also argue that the adoption of modern-day analytics in retail is heavily dependent on skills and capabilities related on learning and utilizing new technologies and reacting rapidly to new advances that organizations are presented with. More recent technologies like AI and machine learning have further revolutionized the retail analytics environment, as gaining insights from these data masses has become easier and more automated.

3.2 Dissecting Analytics & BI

3.2.1 Data collection

The beginning of the Analytics & BI process naturally starts from the data collection. In retail context this means above all collection of sales data, usually from systems like ERP or CRM. Ramakrishnan, Jones & Sidorova (2012) highlight how the effectiveness of BI is dependent on swift presentation of data with efficient data collection and providing consistent-, high quality-, integrated data. They present two strategic approaches to data collection and implementation of BI capabilities: collecting all data in a single repository like a data warehouse or integration data to specific business needs and dividing the process into smaller applications. Choosing approach to data collection strategy is dependent on the business requirements of BI. In retail, where data consists of several dimensions the usual practise is creating a large enterprise data warehouse, which can be used to create smaller BI applications. In their research Kunnathuvalappil (2018) review typical data sources used for BI applications. At first, they divide data sources to internal and external data sources. Typical internal data sources include transactional data from POS-systems or ecommerce, customer data from CRM systems, internal records of activities, historical data from archives and processed data from other business applications like ERP or HR systems. To follow up, external data sources consist of competitor data and records, public data from government agencies, and data from external platforms like Google or social media. To conclude, they emphasize the importance of POS generated sales data as utilizing it is one of the key elements of analytics in business environment.

When it comes to analytics, specifying the requirements and needs for data should be done as early as possible in the implementation process. The 1-10-100 rule of quality and costs originally introduced by (Loabovitz & Chang, 1993) has been applied to data quality context as well. This basically means that the earlier you notice the flaws in your data, the easier and cheaper it is to transform it. Fixing errors in your data later in the analytics process takes a lot of time, and it most of the time a one-time fix compared to a permanent fix in the data pipeline. Following the rule of 10, as highlighted by Talend (2023) it is estimated

that fixing issues with data is 10 times more expensive at the beginning of the data lifecycle than at the analytics phase, and even more expensive when fixing the consequences of faulty data that has already been used. They also emphasize that the reviewing of data sources should be a constant process, so new business needs can be answered in a timely manner. Overall, data collection process can be seen mostly as a responsibility of IT through source systems like POS or ERP yet is essential that the business needs are considered as well, to ensure that the quality of the data matches the requirements of analytics & BI.

3.2.2 Data Warehousing

Data warehouses are one the key elements of modern BI and analytics implementations. In essence data warehousing consists of processes and methods of collecting, storing, structuring, and loading data, that is usually used by BI & Analytics. According to Krishnan (2013) data warehousing stands for: "subject-oriented, non-volatile, integrated, time-variant collection of data in support of management's decisions". They list key elements of data warehouse architecture to be source systems that feed the warehouse, data flows that move the data to- and from the warehouse, and various databases used for the storing of the data like enterprise data warehouse, data marts, staging areas, and individual analytical databases copied for the use of analytics applications. In a more practical definition, data warehousing aims to serve as a central repository that consolidates various operational databases, and links to a range of front-end applications that are used for querying, reporting, and analytical purposes (Dayal et. al., 2009). One of the main processes of data warehousing is called ETL (Extract, Transform, Load), where extract stands for the collection of data from multiple sources into staging area, transform means cleaning and reformatting the data to match the requirements and information schema of the target and finally load stands for the process writing data to the storing destination like a data warehouse (El-Sappagh et. al., 2011). Essentially, ETL is the process that fills the warehouse with content, which can then be used for different kinds of analytics processes like queries, dashboards, and reporting. The entire data warehouse architecture is illustrated and simplified in figure 2, where the structure of the warehouse and different stages of the data supply chain can be examined. It is important to note that there are several types of data warehouse architectures, and different architectures may be more optimal in different environments.

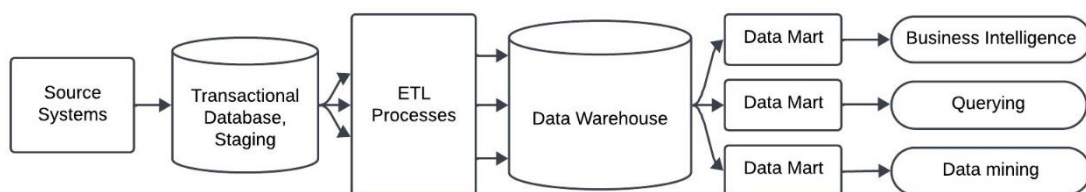


Figure 2 Data warehouse architecture adapted from Dayal et. al. (2009) & Krishnan (2013)

As described, data warehouse serves as the main storage for all the source data used in analytics & BI. Large BI implementations are dependent on the information storing and flows that the warehouse provides, as analytics tools serve as just the user interface of the data lifecycle. It is important to acknowledge that in addition to storing and loading information, the data warehouse process also consists of structuration of data by defining information schemas and data modelling. Maintaining adequate data models and performing metadata management is fundamental for sustaining data quality in data warehousing context (DAMA International, 2017). This means keeping regularly updated data models like conceptual model that describes the overall structure of data from a business point of view. The conceptual model explains data contents on a high level, describing what the data means, yet focusing little on the actual structure of data in the warehouse. This is effective way to communicate with business users about the data contents of warehouses and BI implementations (Sherman, 2015). When digging deeper, the next level of data modelling is logical data model that aims to describe contents and details of data. Sherman (2015) states that this is the ideal model for designing BI and analytical applications, as the logical model describes all the fields and dimensions of the data warehouse. Lastly, they characterize the physical model as a way to describe how the data is implemented in the technical solution. This mostly interests technical users like developers and database administrations.

In practise, data warehouses concern a wide variety of both technical and business users. As stated by (Ponniah, 2011), modern data environments are less dependent on IT-capabilities as end-users are more aware of companies' data assets and more competent on creating own reports and retrieving information themselves. While designated roles for creating reports are still needed, the focus of IT has shifted more to the actual data warehouses, where they build and enable the data usage for other departments of the organization. Essential roles for building and maintaining data warehouses include data engineers who build data pipelines and maintain integrations from the warehouse while designing the structure of the data warehouse, data architects and administrators who maintain the architecture, systems and governance needed to maintain the warehouse, and data users like data- and business analysts that use the data and specify the requirements for the data stored in the warehouse.

3.2.3 Accessing data & self-service analytics

In addition to using analytics tools like dashboards and reporting, many users may prefer using data sets made by themselves. This can be done by for example manually fetching data from data sources like the data warehouse and using it to perform analysis individually in platforms like Excel or R. Some users may even prefer to develop and share personal reports with tools like Power BI to match their specific business requirements. Overall, enabling such behaviour can be characterized as self-service analytics, which is an ever-growing approach for running BI & analytics. Alpar & Schulz (2016) identify how the focus of BI has shifted from mostly strategic questions into operational tasks as well. To answer

this trend, they analyse the concept of self-service analytics, dividing BI users into business oriented “casual users” and IT/data focused “power users”. Overall, the self-service model stands for granting casual users’ higher levels of access into data assets, which enables them to retrieve data directly from sources and create personalized reports, to perform analysis without the need of involving power users like data engineers and BI specialists. They also point out how wider data sharing policies encourages casual users to create customized reporting to exactly match their own specific needs. This removes a large workload from the table of experienced users. In many organizations, BI-specialists and IT-users can receive an excessive number of requests and needs from business users, which in turn takes up a large proportion of their calendar, leaving less time for other essential tasks.

To further examine the concept, Clarke, Tyrell & Nagle (2016) describe the necessity for self-service analytics to come from change in business environment. The demand for swift insights and real-time analysis is constantly growing, thus giving business users access to wider range of data and enhancing their analytics capabilities can enable significantly faster understanding of business developments and more imaginative use cases for data, in comparison to traditional way of each report being individually developed by IT-users. The research evaluates methods of maintaining and managing such self-service practises. While the benefits of self-service analytics are apparent, the challenge of establishing such practises lies in the responsibility given to a wide range of users with different levels of skill and knowledge. Another challenge may arise from the quality and validity of the data. If the data sources are complex and untrustworthy, self-service analytics can cause more harm than good, in case invalid data is used in analysis and decision making. To combat this Clarke et. al. (2016) provide a data governance framework, tailored specifically to self-service context. The key aspects of the framework include supervising data access sufficiently and maintaining information security, sustaining users’ skill level with constant skills development and training to use the data properly, as well as communication between data producers and data consumers to make sure the data matches both business- and quality requirements of all users.

Overall, many organizations should thrive to implement self-service analytics to some extent. The level of self-service is strictly dependent on the business needs of the organization. To further apply the study made by Alpar & Schulz (2016), different levels of self-service analytics can be identified. This is presented in figure 3 below. The visualization presents different levels of self-service by characterizing the level of system support and the increase in self-reliance as more complex practises are established. The lowest level of self-service is the general usage of business reporting, usually prepared by IT/data-departments. The key is in the wide access to different reports, giving users more versatile analytics opportunities. This suits casual users with limited technical and analytical skills, as the reports present the insights automatically. To take this further, a possibility of a wider drill-down approach can be applied. This means further exploration and interaction of reports, enabling different levels of analysis made on

individual reports. These concepts are categorised to the usage of information made by users.

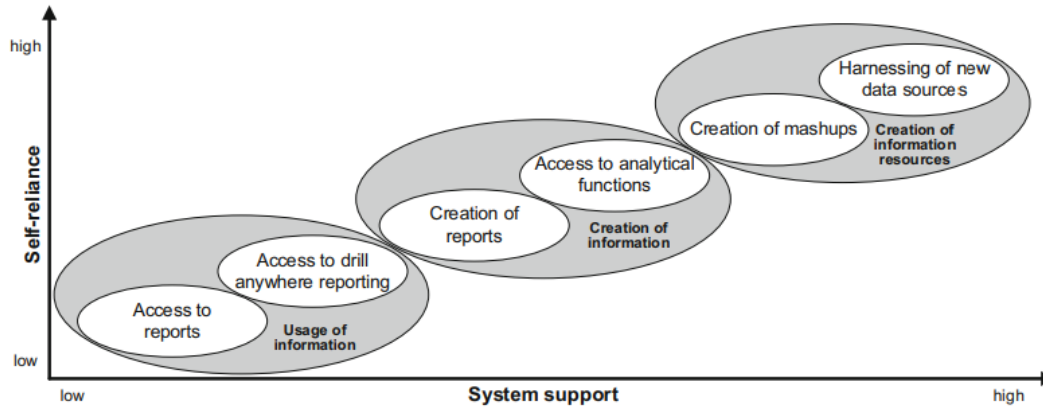


Figure 3 Levels of self-service analytics (Alpar & Schulz, 2016)

The next step is the creation of information, which means the users get a basic access to data assets, to analyse and create new information with it. The research points out that traditional SQL queries may appear overwhelming for more casual users, thus creating own reports and graphs with tools like Power BI and Excel, with direct connections to data sources can be an adequate approach. This level of self-service introduces greater risk of incorrect data excerpts, as the skill level of the casual users might be limited. To take the creation of information even further, users can be familiarized with more advanced analytical functions like data mining or predictive analytics. Such functions require more complex statistics and analytics knowledge, so the need for user training is even more apparent. The research identifies the last level of self-service to be creation of information resources. This can mean combining different data assets and source systems to new datasets and possibly sharing them within the organization for wider use in analytics. The process of combining data sources can also be essential for creating personal reports. Tools like Power BI provide the concept of user made data sets, which can be used by different users to create reports that match their needs. (Alpar & Schulz, 2016)

3.2.4 Data visualization and dashboards

To follow the theme of self-service analytics, a more traditional and user-friendly way of reviewing and analysing business information independently is through various reporting tools and visualizations. Reporting tools are an essential piece of organizations analytics capabilities. Using reports and dashboards, the users have access to comprehensive amounts of prepared data that can be filtered and processed in numerous ways. This means the business users are not concerned with the technical aspects of the data assets, and they can focus solely on the business aspects like data analysis. While still promoting self-service analytics

approach, the reports are still dependent on the maintenance and development of “power users”. To sum up the essence of business data visualization Zheng (2017) describes it to be: “the visual and interactive exploration and graphic representation of data of any size, type (structured and unstructured) or origin”. The needs for data visualization can be varying. They point out that data visualization can be utilized to summarize, simplify or to better comprehend data. They also identify two main objectives of data visualization: 1) Visualising key metrics in an easier and faster manner, which directly aids decision making; 2) Providing an interactive way of data exploration for enhanced analysis. With these objectives in mind, it’s safe to say that there are great benefits in well executed data visualization. Elias & Bezerianos (2012) follow these topics by interviewing BI experts on the topic of dashboard design and BI annotations. According to them it is crucial to pay attention to annotating dashboards, which mean explaining the meaning and functionality of different dashboard elements. This will enhance user experience significantly, as the user does not have to research the meaning of data and visualizations used in dashboards as the report already enables it. The use of critical reports and dashboards can also be guided in user training and external manuals for use, which will be touched more later.

For a more practical view on the topic of creating enterprise data visualization through dashboards, we delve deeper into the topic of dashboard design. In their paper Bach et. al. (2022) points out that the main function of dashboards is to view vast amounts of data that has been processed and combined with different sources, in a timely manner. To create most value out of dashboards, they list different design guidelines to further improve user experience. It is also acknowledged that thanks to the self-service nature of analytics, nowadays many dashboards are also created by non-expert users, which underlines the importance of clear and straightforward guidelines for dashboard design. To start off, they gather some industry best practices and general guidelines for dashboard design: avoid visual clutter by limiting the number of objects presented, don’t overwhelm users with too much information, use a consistent design style on different pages and separate reports, limit the amount of objects through drill-down and filtering and lastly, use relevant and commonly defined KPI’s and metrics in your dashboards. In addition, they present a four-dimensional model on the trade-offs of different design aspects of dashboards. The model consists of screen space, number of pages, abstraction, and interaction. From a design perspective, all these elements should be minimized. When possible, an overall standard for dashboard design would have a single page, have as much information as possible, take as little screen space while still be easily readable and overall aim for little interaction required from the user to gain value. With this goal in mind, it is important to note that in practise this is not usually possible, and you must do trade-offs between these elements to create a fitting dashboard for the context of use. To follow the topic of non-expert users creating a sharing reports and dashboards, Lin et. al. (2018) review key design principles for self-service business intelligence users. At first, they highlight that all information presented should have a purpose. This is characterized in the data to ink ratio, which means

maximising the use of “ink” for displaying data assets and reducing unnecessary colours and clutter in data visualization. Generally, this means creating visualizations that are easy to read and have all the needed information. Another design principle is the organization of the dashboard, grouping relevant objects together and creating a natural, easy to read order for the visualization, generally starting from the most important metrics and KPI’s and going more in-depth when progressing the report. They also point out the importance of selection choices on reports through filters and drilling to review categories and dimensions that interest the user.

Overall, the amount of reports created by non-data specialists is constantly increasing, which improves data exploration and operation specific analytics in organizations. Dashboards and visualizations are a great way to swiftly gain insights on the data and further onboard new users to use the data assets of the organization. In modern BI environment, tools like Power BI are designed to aid non-expert users to promote self-service analysis. With the growth of AI tools, the bar for creating reports, will be even lower in the future as BI tools are able to give feedback and enhanced design ideas for the user.

3.2.5 End-users of BI

To conclude the lifecycle of data starting from the moment of creation, here at the end stands the end-user that aims to gain insight and create value with the information that they are presented. With the previously highlighted growth of self-service analytics, and BI being more prevalent than ever, it is vital to make sure that the end-users have the required skills and knowledge to work with the data and the tools they are given, as well as the will to explore and take advantage of the data in their daily tasks. While there are plenty of literature on the topic of IT-user training and technology acceptance, we should approach this topic through the lens of BI, which concerns both technical and business aspects. In addition, a lot of user-training in BI is very context dependent, as the nature of organizations data assets and the definitions for different metrics used can vary depending on the target organization.

To start of Gupta, Bostrom & Huber (2010) summarize the desire for end-user training effectively with the goal being: “producing a motivated user who has the skills needed to apply what has been learned to perform a job-related task”, which fits well into analytics context as well. In addition, when reviewing critical success factors for BI implementation Hung et. al. (2016) identifies end-user training to greatly improve the adaptability and satisfaction of users, which naturally leads to higher chance of success when implementing BI to an organization. In addition, they point out that familiarizing the users with BI systems before implementation, leads to better productivity when using BI. The actual process of training and familiarizing the users with BI can vary depending on the skill level of users. Specific tools like Power BI have their own guidelines and certifications found online, which can help in general use and performing individual tasks. In addition, the DMBOK (DAMA International, 2017) points out that organizations can maintain tools like business glossary and data models to

help users better understand the data assets available. It is also crucial that the end-users understand the restrictions and rules of data use to prevent misuse and faulty analysis. It is also noted that skills and knowledge management of BI is a persistent process, which also includes maintaining and improving overall data culture in the organization.

The modern self-service environment of business intelligence is all about the motivation of users to use the data and creating new insights. To follow up, Grublješič & Jaklič (2015) analyse the acceptance and motivation to use Business Intelligence systems. They identify the differences between traditional information systems and BI-systems, as the use of BI-systems tends to have higher degree of voluntariness, more focus on business performance management, and the value of use doesn't come directly from the use, but the decision making led from the data. This mean traditional IT-related models should be modified to better fit the BI-context. To follow up, they identify a plethora of user acceptance factors introduced in literature and apply them in the BI-system context. As a result, they introduce an alternative for the widely used technology acceptance model with BI acceptance model (BIAM). This model synthesises some key factors leading to the use of business intelligence, which is extremely relevant in the context of this thesis, as one of the main challenges of target organization is convincing the end-users on shifting to the use of the new system. As presented in figure 4, the model begins with the object-based beliefs and attitudes that lead to the use of BI. These include the mindset of the users and how innovative and change resistant they are, which is a crucial concern especially if the organization aims to be data driven. Another key factor is the quality of the technology, which concerns both data quality and system quality, meaning that the organization should maintain their data assets well and pay attention to reporting tools and dashboard quality. In addition, it is noted that organizational factors play a huge role in the acceptance of BI. Ensuring management support, change management and focusing on organizational culture are crucial management-based processes that directly impact the use of analytics. On the other hand, more practical aspects of the model include participating users in the design and implementation process of BI, setting a data-driven culture in the organization and adequate end-user training to further motivate the use of BI-systems. Finally, these factors are to lead into behavioural beliefs and attitudes, which include demonstrability of value of results through the use of BI, social influence as user identify other users gaining value from the use of BI and facilitating conditions.

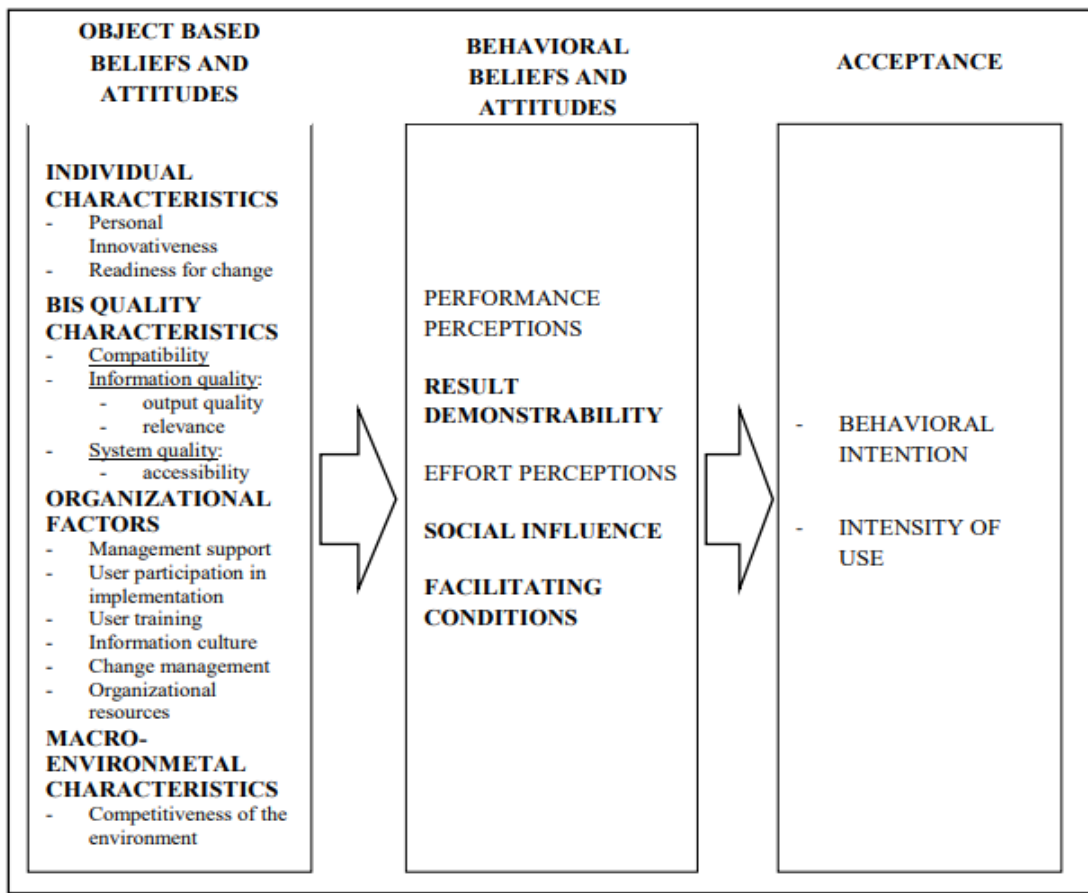


Figure 4 BI Acceptance Model Grublješič & Jaklič (2015)

Overall, the model presented by Grublješič & Jaklič (2015) successfully identifies some of the main aspects of the use of BI in modern data environment, which are extremely interesting for the context of this thesis as well. While as expected, such model should provide a high-level point of view to the topic, I aim to further examine some of these topics. The following list summarizes concerns highlighted in the BI acceptance model, which I believe are crucial for all organizations seeking to effectively improve and implement BI strategies and offer a great framework for reflecting the topic of this thesis.

- How can we create a data-driven culture to motivate and enable the use of data?
- How can we ensure the quality of data assets & systems and maintain information management processes?
- What change management processes are needed to implement BI and create a change positive environment?
- How can we participate and train end-users while implementing BI?

- How do we ensure management support and the resources need for implementation of BI?

3.3 The Data Driven Organization

3.3.1 Managing Information

Everyone wants to be data-driven these days, but what does that mean in practise? As stated previously, the goal of analytics is to provide information to support decision making, putting the data in the spotlight. A data driven organization treats data as an organizational asset. There are many concepts that are used by organizations to successfully leverage knowledge and data in their decision-making processes. In their comprehensive study, Laihonen et. al. (2013) review these concepts and their relationships to each other. They also acknowledge there is a lack of consistency in the literature and how some of this terminology is used differently in different context. Firstly, as a parent term they list Finnish term "tietojohtaminen", which does not have a direct translation and combines many overlapping organizational processes. This can be seen as an umbrella term for the following data and information management terminologies. The term is described as models and tools for describing information, ways of defining the form and role information in an organization, defining ways of management concerning information and lastly, defining tools and technologies related to information. Overall, the goal of this term can be summarized as forming a comprehensive view of the data assets of an organization and to utilize them in a sufficient manner. They also emphasize, how tietojohtaminen is a concept that affects all traditional business functions. This is conceptualized in Figure 5, as it visualized as a cross-sectional function between technology (data) and business functions (decision making) (Laihonen et. al., 2013). I think this concept is essential for my study as well, as it aims to answer similar questions and challenges that are present in middle ground between technology and business areas.

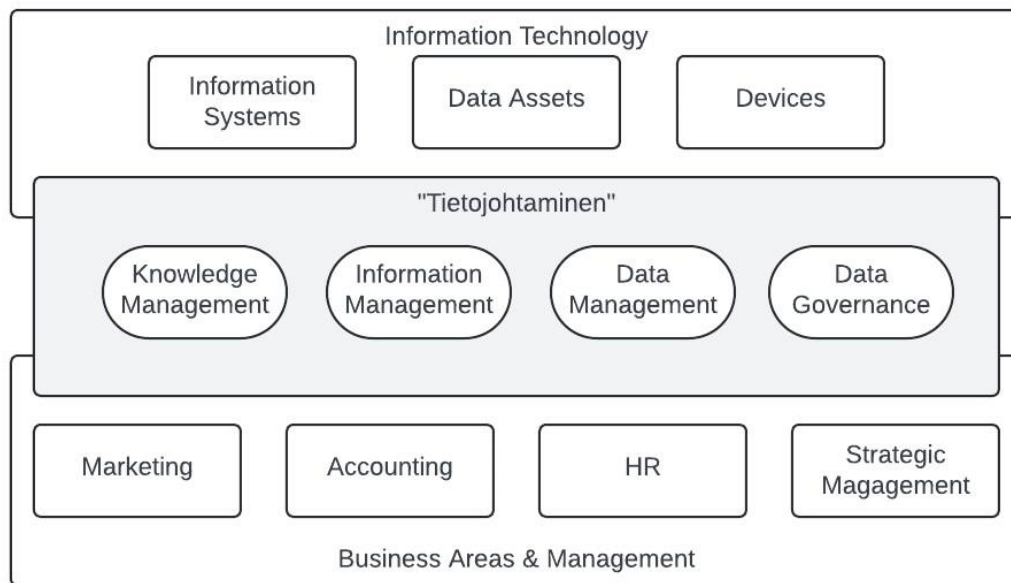


Figure 5 Tietojohdaminen, (Laihonen et. al. 2013)

The term of "Tietojohdaminen" includes many other concepts relevant to modern data environment and this study, one of these concepts being knowledge management (tietämyksen hallinta). According to Mårtensson (2000) knowledge management can be seen as the "management of intellectual capital controlled by company" and as a tool for "the creation, management and exploitation of knowledge". So, in essence, knowledge management is a more traditional concept that is often seen to focus on the knowledge and skills of individual workers, in addition to the information assets owned by the organization. Another relevant concept is information management (tiedon hallinta), which as defined by (Choo, 1995) as "to harness information resources and information capabilities to adapt to changing environment". They state this to consist of information creation, -acquisition, -storage, -analysis, and -use. They also emphasize the role of information users as a major factor focus of information management, in addition to the tools and technologies used. Another very similar concept is data management, which focus more on data assets and technologies, aiming answer to challenges of availability, quality, and usability of data. According to DMBOK data management framework (DAMA International, 2017) data management means the "the development, execution, and supervision of plans, policies, programs, and practices that deliver, control, protect, and enhance the value of data and information assets throughout their lifecycles". The guidebook also states that it is important to acknowledge that data management concerns professionals on different functionalities of an organisation from technical roles like database administration and data engineers to more business orientated roles like data stewards and responsible management. While the concepts of knowledge-, information- and data management are not new concepts, the significance of them is growing by the day as data capabilities of organizations evolve.

One way to approach data management is practising data governance methodology. According to Abraham, Schneider & Brocke (2019) the process of data governance can be described as “a cross-functional framework for managing data”. In practice this means selecting accountable people and defining processes to increase the value of data and reduce cost and risk related to data resources. They also add some key aspects of data governance to be cross functional nature and collaboration between different functions and data areas, strategic approach to data as an asset, defining a framework for data usage and lastly defining policies and procedures regarding data usage. In addition, the DMBOK (DAMA International, 2017) offers plethora of guidelines and framework for organizations aiming to implement data governance. DMBOK defines data governance to be: “the exercise of authority and control (planning, monitoring, and enforcement) over the management of data assets”. The guidebook also lists different domains that concern data governance such as: data modelling and architecture, data quality and metadata, data warehousing and BI, MDM, data storing and accessibility, and finally data security. The following Table 1 presents the nature of the presented processes of managing information as well as their main focuses.

Table 1 Different ways of managing information characterized.

Term	Focus	Objective
Knowledge management (KM)	Skills and expertise of individuals and assets	Taking advantage of knowledge and experience within the organization to enhance performance.
Information management (IM)	Tools and processes	Management of information collection, storing and distribution processes and making sure that information is available in an organization
Data management	Data assets	Assuring collection, storage, integrity, and security of organizations data assets.
Data Governance	Processes and policies of data assets	Making sure data is available, defined, consistent and trustworthy for those using it.
Master data management (MDM)	Critical data assets (Master data)	Linking organizations most crucial data assets and their management within an organization. Providing the means of handling such assets.

3.3.2 Data-driven Decision Making

But what’s the ultimate motivation behind all these different processes? With better and well organised data assets comes improved data analysis and

decision making. To base their decision making on the insights of analytics and data, organisations use knowledge-based decision making. This is one of the main motivations for data-and knowledge-driven organisations. Kosonen (2019) finds knowledge-based decision making (tiedolla johtaminen) to be a process of systematic analysis of information and basing business decisions on knowledge acquired from this analysis. They also add that this process can include both producing and capitalizing on the knowledge. Another similar term used more relevant to modern day environment is data-driven decision-making, which according to (Lai & Schildkamp, 2013) refers to: “the practice of basing decisions on the analysis of data rather than purely on intuition”. They also highlight how data-driven decision-making drastically increases productivity, in addition to accuracy and relevancy of decision-making. As a practical example they mention the use of big data in supply chain management by anticipating unusual spikes in demand caused by environment and reaction to them with proper stock management. Finally, in their study Brynjolfsson, Hitt & Kim (2011) showcase how companies practising data-driven decision making seem to be enjoying better productivity. After they compared firms practising data-driven decision making, they got into a conclusion that data-driven decision making seems to be connected to more efficient asset utilization and increased ROE.

3.3.3 The Change of Data Culture

The way organizations view data as a resource has changed in many ways recently. Just the sheer amount of it enables new level of analysis and decision making, which has also evolved analytics tools. Many organizations have been trying to turn their back to decade old excel sheets that have dictated their data use in the past and embrace proper data warehousing and analytics tools for real time analysis. In addition, relationship between data and end-users has changed dramatically. The traditional analytics process consists of collecting the data and presenting it to the management, the first part being mainly the responsibility of IT and decision-making done primarily on the executive-level. This does not apply anymore as harnessing data is more and more common on various levels of an organization.

In their blog data specialist Tommi Vihervaara (2022) constantly underlines how in modern data environment, organizations need to forget the ancient view of data being an IT-asset and shifting the focus to all levels of data supply chain. This means collaborating different business functions by forming a suitable organization and business roles around data, and most of all focusing on change management in data management context. He also constantly emphasized the role of organizational culture as a main reason for organizations failing to capitalize on their data assets. In addition, in their paper Wixom, Watson & Werner (2011) point out the importance of treating data as an enterprise asset and creating an open data culture. This means focusing on the availability and sharing of the data, sharing it widely in an organization. They also add that making data available can lead to new and interesting use cases of analytics. With this in mind,

we should not forget concepts like data governance and data democratization, aiming to make the data available to all levels of an organization, enhancing the data analysis capabilities of end users significantly. According to Awasthi & George (2020) the concept of data democratization means making data accessible for everybody in the organization, regardless of their technological background. The paper highlights the benefits of data democratization to be breaking silos inside organization thus enabling better information flow between units, enabling data analysis capabilities of workforce for more versatile business insights, and reducing the workload of more proficient users like data scientists by reducing the number of low-level tasks. This way of thinking also emphasizes on the concept of data quality, as open data culture requires well defined and cohesive data assets. As the environment shifts and the role of data is emphasized, it brings to light the discussion about how organizations change and how to manage those changes effectively.

4 MANAGING CHANGE AND TRANSFORMATION

4.1 Defining Change Management

The concept of change management has long roots in the disciplines of management and information systems. When it comes to change, it is always more comfortable to stay in your old habits and say, if it isn't broken, don't fix it! Yet the business environment is constantly evolving, and organizations must stay up to date with the current trends and rapidly evolving technologies. Clegg & Walsh (2004) think that it's somewhat of a cliché at this point to state that many organizations are facing change, as this has been the case for ages, and probably will be in the future as well. While being an umbrella term, consisting of a variety of different constructs used in different contexts, Lauer (2010) generalizes change management to be "the optimal management of corporate change". They characterize the nature of change management by dividing the state of an organization to the present and the desired future, where change management is the optimal design of the path that leads to this desired future. It is important to note that the change management does not concern the contents and qualities of the goal but consists of the steps and processes required to get there. Moran & Brightman (2001) present a little different approach by defining change management as "the process of continually renewing organization's direction, structure, and capabilities to serve the ever-changing needs of external and internal customers". This definition presents an opportunity to see the multidimensional nature of change management, as in different contexts, change management can be tied to specific projects where the scope and needs for change are well defined, yet it can also be seen as this constant state of reactivity in an organization.

To further examine the key elements of change management, Kerber & Buono (2005) present three approaches to change: Directed change, Planned change & Guided change. Directed change aka. top-down change comes from high-level management and is reliant on authority and compliance of employees.

In practice this means that the decision makers announce the desired change and aim to persuade organizational members to onboard with the new developments. Acceptance of this change is based on the persuasive communication between management and organization, usually based on business necessity like competition, logical arguments like cost savings, or emotion in general. This approach can be effective when forcing change, but emotions of resistance of employees can be overwhelming with such one-sided approach. The second and more systematic approach presented is planned change, where ultimately the change comes from the top, but it is performed in a more evaluative manner that involves the organization members in the process. Overall, the aspects and needs for change are identified at the start of the process, which is followed by the organization of the project and communicating with the relevant stakeholders to concern their emotions and issues. This is followed by the implementation, which is supported by further monitoring and sustaining of change, by involving the stakeholders in the implementation process. This approach enables significantly more flexible and diverse change process and mitigates typical resistance and productivity losses caused by directed change, yet the involvement of stakeholders can be time consuming and rise new concerns regarding the project, creating undesired complexity and further delays. Finally, the last approach that Kerber & Buono (2005) present is guided change which is more agile and iterative in nature compared to the previous ones. Guided change is stated to “emerge within the organization as a result of people’s commitment and contributions to the purpose of the organization”, meaning a high level of involvement and collaboration of stakeholders from start to the end of the change process. The overall nature of guided change is iterative and looping, where requirements of the change are defined and re-evaluated constantly during the process. The role of leadership is to be facilitating instead of directing, to encourage discussion and bringing new ideas to light as well as constantly supporting and empowering employees during the process. This can be done using change agents, that are in the middle of the change process encouraging learning and participation in the new initiatives. Overall, with sufficient communication and commitment, this approach can be very effective in on-boarding members of organisation to change and finding new insights to the subject, yet when poorly handled, it can create chaos and hinder down the process due to confusion and lack of common direction. To conclude, all these approaches characterize the nature of change management, as it is not a one-size-fits-all matter. Each of these approaches can be useful and effective in different projects and situations.

When looking at change through the lens of technology, it is often related to digitalization through the rise of new technologies and how users will adapt and accept them. In addition, most of the technology related change is of a project nature, whether it is through a new systems and software or completely market revolutionizing technologies like AI. Ziemba & Obłąk (2015) review the nature of change management in the field on information systems science, and define it to be “tools, and techniques to manage the people-side of change to achieve the required business outcome”. To add to this, they point out that change

management plays a crucial role in aiding individuals to make successful personal transitions to better prepare for change and realize the benefits of it. They also emphasize the project nature of change, as change management is a critical success factor for most projects concerning people. To follow up Legris & Collette (2006) review how one of the main reasons for the failure of information system implementation projects is the inadequate process- and change management. They point out that IT related change management approach is highly dependent on the attitudes and intentions of the end-users, which highlights the need of involvement of end-users throughout the whole project. To further dissect the process of change management, they start off with a comprehensive planning phase to set clear objectives and scope for the change, following with gathering and analysing user requirements before starting the design of the system. The development of the system should be an iterative process, involving the end-users and multiple testing phases and assessing their perceptions. Before and during the implementation, end-user training and support is essential for a smooth transition. In addition, stakeholders should be engaged and presented with benefits of the new system to promote use. For a long-term successful implementation, monitoring and final consolidation regarding the system should be performed to validate successful change and explore further development.

With these definitions of change management and more practical approaches to IT change management in mind, it is safe to say that change in an organizational environment is a challenging and gruelling subject to deal with, yet it is still crucial for all organizations that intent to flourish in modern business environment. Change management can revolve around a specific project or a scope or focus on general shift in business environment like with Corona or AI. When looking at change through the eyes of data analytics, we have been facing a lot of change recently with the uprise of big data technologies. Greater processing power and data storing capabilities in addition to machine learning and AI enable a whole new level analysis. Yet, as presented previously we are still left with the challenge whether to approach this data revolution from the perspective of technology or focus mainly on the change that business units and organizational structures are facing. Eventually, this also is dependent on the nature of the implementation and the project in question.

4.2 Successful Change Through Projects

Implementation of new technologies and renewing existing capabilities is usually executed through projects with a planned structure and desired set of outcomes. Oxford dictionary states projects to be “a planned piece of work that is designed to find information about something, to produce something new, or to improve something”. When something new is introduced or something old is being modified, change is always present. This is why it is consensus that project management and change management go hand in hand as carrying out a successful project requires in-depth understanding of members of an organization

and how the change affects them. In their paper Hornstein (2015) highlights the necessity of considering organizational change and its impact on a project implementations success or failure. He points out that many projects tend to overlook organizational change management as especially in smaller scale projects, there might be no one responsible for performing the required change management necessities. Many projects tend to lay the responsible on project managers, business analysts, and program managers, who might already have their hands full of other tasks. This also highlights why change management is a valuable skill for anyone steering or participating in project work these days. Hornstein also highlights that successful change in addition to communication, requires deep social and behavioural understanding of employees, and that employee engagement in a project is crucial for the success of the implementation. They also compare some of the more traditional change management models like Kotter's 8-step model and AKDAR and whether organizations should implement these in their project management. The papers also reference some of the key literature of project management discipline where the need for change management is universally recognized, yet still many projects to this date seem to encounter numerous challenges regarding the topic. Organizational change is hardly a one-size-fits-all subject and while there are some generally acknowledged best practices and frameworks, the essence of project change management lies in researching and knowing your own organization and its employees.

To follow this up Parker et. al. (2013) brings up the dramatic fact that up to 70 percent of change management initiatives fail, due to either insufficient or poorly directed change management practises. They also criticize the project- and change management literature for not offering more precise guidelines and practical approaches for handling change management. As a solution to this, they present project management methodologies that are useful for implementing and measuring the success of change. First, they point out the need for measuring change and capturing lessons learned to reference in future projects. They suggest the use of Prince2 methodologies to document the change process and to verify that the organization has reacted to the change according to the set objectives. Prince2 model also emphasizes the thorough documentation of different stages related to in this case change management, so that future projects of a similar nature can benefit from beneficial processes and avoid doing the same mistakes again. These documents include end project report, lessons log and closure report. They also suggest organizations to delegate the responsibility of change to various business units and naming several accountable personnel to combat that the change management responsibility is left exclusively to the project group. Lastly, they highlight the staged approach to change management. Like the project in question, change management can be divided to different stages related to the stage of the project. Analysing how change is involved in each stage of the project, aids bringing structure and practical objectives to each phase of the project. Combining the staged approach and risk management also ensures that the organisation is prepared to react to setbacks like change resistance in time. To sum up, Parker et. al. (2013) view change management as sort of a project within

a project and apply similar practises to it. This freshens up the traditional viewpoint of change management and bring more practical guidelines and tasks to the table. They even go out to criticize some of the gaps in change management literature to be a result of most professionals being of a social sciences background, thus lacking some of the more practical visions needed to carry out an IT-implementation per say. Comparing the studies made by Parker et. al. (2013) and Hornstein (2015) brings forward another interesting contrast in change management discipline, as some literature highlights the importance of managing humans and monitoring their behaviour, yet some papers express the desires for more practical guidelines and frameworks. In my opinion, acknowledging both of these dimensions is essential for carrying out successful transformation.

Another study made by Ibbs et. al. (2001) focuses more on practical guidelines and steps that organizations can take to assure successful transformation in project work. They present a framework called Change Management System that breaks the change management process into five principles:

1. Promote a balanced change culture.
2. Recognize change.
3. Evaluate change.
4. Implement change.
5. Continuously improve from lessons learned.

The first principle focuses on communication to establish a strong foundation for change. This means highlighting the benefits that the project implementation will bring to help the employees, promoting a more open reception for the change. A balanced change culture is built around the concept of beneficial change. Yet as many of the projects fail, people might have strong preconceptions regarding the incoming change, highlighting the need for careful examination of user beliefs and attitudes before starting the project. This is why it is important to acknowledge similar projects done in the past and reflect on possible failures that were present. The second principle aims to scope all the areas of the project that lead to change. This can include specific operations, personnel or capabilities like information systems related to the project. This principle also includes the documentation and categorization of possible change areas and their effects on the organization. It is also important to note that the requirements for change can alter throughout the project, so the capability to react during the project is also needed. The third principle of evaluation reviews the identified change areas and prioritizes them. Identifying impact areas and must-win-battles regarding change is vital for the success of the implementation. It is also noted that as the project goes on, the costs of implementing change increase, valuing thorough research and communication in the start of the project. The most important principle of the five is naturally the implementation phase. This is by far the most unstable and unpredictable part of the project. During this phase approval and feedback of employees is collected as the implementation progresses. Communication plays a major role in the implementation phase so that approval of the change can be ensured. Implementation with negative reception, might require

more development or stricter policies to successfully roll out. Finally after the roll out, substantial documentation and monitoring should be performed. This brings us to the last principle of improvement through lessons learned, where possible mistakes are documented for future reference. This is similar to previously presented Prince2 methodology that highlighted the need for documentation of mistakes and learning from them. The similarities in these two models highlight the recurring nature of challenges in change management, which also partly explains why so many people are uncertain and sceptical about change. (Ibbs et. al. 2001)

4.3 Common Change Management Frameworks

Over the years the change management literature has presented numerous methodologies to help organizations cope with change. Some of these methodologies have become universally accepted frameworks and best practises when facing different sorts of change. In this chapter I aim to summarize some of the commonly used change management frameworks, which can be useful and applied in BI implementation context as well.

4.3.1 ADKAR Model

One of the commonly used frameworks for change is the ADKAR model, originally published by Prosci Change management. Overall, the model approaches change from the perspective of an individual and how they will act in various stages of change. To back this up Calder (2013) highlights that the focus of ADKAR model is on people and how they are affected by the change. The model presents five key elements of change that represent the different stages of change process. These five elements presented in the ADKAR guidebook by Prosci (2024) are:

1. **Awareness** – Individuals awareness for business reasons for change, the result of early communication efforts related to change.
2. **Desire** – Individuals willingness to participate in the coming change, and the result of resistance management.
3. **Knowledge** – Having the required information about the change as a result of individual training and coaching.
4. **Ability** – The capability to realize and implement the change at required performance level.
5. **Reinforcement** – Ensuring the longevity of the change, result of adaptation measurement, corrective actions, and the confirmation of successful change.

By applying these elements into projects and processes facing change, ADKAR aims to combat employee resistance, helps with the transition, creates an action plan for individual advancement during a change initiative, and develops

a change management plan for employees. The guidebook further divides organizational change into two dimensions: organizational dimension of change and people dimension of change. The former focuses on the inhuman aspect of change like identifying the need or opportunity that leads to change, project planning, designing, and implementing the solutions and developing the new processes and systems related to the solution. The human dimension naturally focuses on individuals and their ways of dealing with and reacting to change, being the main focus of the ADKAR model.

To conceptualize the use of ADKAR model, Dana, Mukaj & Vishkurti (2016) present a workflow that reflects the stages of change in relation to the five elements of the ADKAR model. The start of the change process is identifying the business need for change. As we know, the first reaction to change is most of the time negative, as this part of the human nature. By applying the awareness through communication efforts, we aim to minimize the overall resistance before even announcing any specific areas of change. This also helps in identifying the business needs for change by creating a more open change environment. After identifying the need, the solution leading to change is designed and presented to employees. This is where desire of change plays a major role to make the idea more appealing to the employees. With the correct mindset of change established, next comes the implementation phase, where the solution is put into practice. This is where the need for knowledge on how the change happens and the ability to act accordingly are in the limelight. Having the required knowledge and ability is assured through adequate training and coaching of employees. It is important to note that after implementation phase the workflow highlights the transition from solution related issues into organization culture related to the change. This is the post implementation phase where the reinforcement element of ADKAR is present by confirming and maintaining successful change. To support the use of ADKAR Dana et. al. (2016) describe it to be a comprehensive approach with practical summary of the steps required for the change management of people. It also works as an “effective checklist for management” to rely on and offers ways to “measure the effectiveness of the change process.”

4.3.2 Kotter's 8-Step Change Model

Another well-known framework for change management is the Kotter's 8-Step Change Model. In comparison to the people and individual focused viewpoint of the ADKAR model, Kotter's 8-step model aims to provide a step-by-step approach to change management on an organizational level. It was originally published in J. P. Kotter's book *Leading Change* (1996) and has since been adapted and referenced numerous times. A comprehensive study made by Pollack, J. & Pollack, R. (2015) introduces the model and reviews its applicability in the finance sector. In the start of their study, they also point out the division of change management into the academic community and practical community, which was also recognized by other literature introduced in this thesis. Seems like the common critique in change management literature is the lack of practical implications and how these frameworks should be applied. Overall, the 8-step model consists of

eight stages of change with specific tasks and goals in each level. The researchers point out that while the steps may seem very linear, it is important to approach change in an incremental manner, as there might be need for reevaluation and specification when entering new stages of change. The eight steps and their explanations are provided in the following listing, combining Kotter's (1996) original model and subsequent study made by Pollack, J. & Pollack, R. (2015).

1. **Establishing a sense of urgency** – Examining the market and identifying potential crises and major opportunities in the market.
2. **Creating the guiding coalition** – Identifying and assembling the people who can lead the change effort.
3. **Develop a vision and strategy** – Creating a vision and strategy to direct the change effort.
4. **Communicating the change vision** – Using all available tools to communicate and teach the new vision and strategy.
5. **Empowering broad-based change** – Removing obstacles and modifying systems and processes that undermine the vision.
6. **Generating short-term wins** – Identifying and creating visible improvements and involving and rewarding related employees.
7. **Consolidating gains and producing more change** – Taking advantage of the gained credibility to further implement new projects and new people like change agents.
8. **Anchoring new approaches in the culture** – Highlighting the success caused by the change and maintaining the leadership.

By the application of these steps, organizations can have a structured process for implementing change. The 8-step model provides a comprehensive approach to change management, most of the steps focus on themes that concern the whole organization like strategy and vision. The model is very fitting for establishing large projects that require major adaptation and transformation on an organizational level, yet it might be a little ambitious for smaller scale projects. Another study made by Auguste (2013) aims to apply the 8-step model in digital transformation of a medical institute. They point out that that previous attempts of digitalizing a medical report system have failed due to lack of engagement and acceptance of end-users, thus leading to the application of the 8-step model. The model assisted in identifying and overcoming both individual and organizational barriers affecting the transformation. The research also highlights motivation as integral factor in facilitating organizational change yet achieving motivation requiring personalized strategies. Acknowledging this led the project into planning a program on raising awareness on the digital alternatives and onboarding different departments of workforce through customized motivational strategies, which eventually enabled the successful implementation of the system. All in all, Kotter's 8-step model offers a detailed and structured framework for organizations pursuing major transformation.

4.3.3 Lewin's Change Management Model

One of the oldest methodologies for implementing organizational change is the Lewin's Change Management Model. This widely used model was first introduced by psychologist Kurt Lewin in the 1940's and has since been adapted and enhanced by many researchers and practitioners, often regarded as a classic and fundamental approach to change management. The model's premise is that change is about moving from one static state to another, which is done through three stages of change: Unfreeze, Change and Refreeze. The model essentially assumes that people are the root of change, placing a heavy focus on reducing the resistance of change in an organization by amplifying driving forces and reducing restraining forces of change (Calder, 2013). This is started in the first stage of unfreezing, where an environment motivated to change is created through the amplification of driving forces by identifying and uncovering areas requiring change. This stage is highly dependent on communication and involving employees in the change. Hussain et. al. (2018) suggest that involving employees in the decision making and discussion both reduces uncertainty and resistance, and generates new ideas related to the change. They also point out that transparency of management during the unfreezing phase is essential creating the required environment of trust needed for the implementation of the change. When the workforce is onboarded to the change by the unfreezing phase, the actual implementation of the change is started. Hussain et. al. highlight the need for knowledge sharing before the change phase can start, as employees need to be up to date with the changing processes and systems, and how to use them. The implementation of change and achieving the desired state does not happen quickly and simultaneously, as the process requires further involvement and communication to succeed. Finally, when the change has been accepted and implemented, begins the refreezing stage where the change is reinforced, and the organization returns "back to normal" with the newly implemented solutions and processes. Calder (2013) suggest that feedback and rewarding patterns might be needed to solidify the change. The refreeze stage also often requires further support and training as more people adapt the change.

The Lewin's Change Management Model offers a simpler approach for implementing change, focusing on the state of the organizations and its employees during different stages of change. On its own, the model does not have many practical guidelines or tasks for implementing change management, but it works as a solid foundation for understanding organizational change. The model has also been criticised for oversimplifying the change process and presenting as it as a linear top-down process, which might not be suitable in the modern business environment. Cummings, Bridgman & Brown (2016) think this way and challenge the model for being too simplistic and plain to be applied by modern day organizations. They suggest that the model's top-down approach does not match the "today's complex world that requires flexibility and adaptation". Yet, they also notice that despite its simplicity, many of the models still follow a similar pattern of unfreezing, implementation, and refreezing. When examining previously introduced Kotter's model, we can see the similarities that start with

identifying the change and creating an environment supporting it, implementing the change through communication and demonstration, and finally creating the new norm through monitoring and support. So, over the time modern models have introduced more in-depth and iterative approaches to the change, yet the foundation remains the same, making the understanding of these three stages a necessity for any organization facing change.

4.3.4 Bridges' Transition Model

Another change model highlighting the emotional and psychological transition of individuals is the Bridges' Transition Model. Instead of focusing on organizational guidelines and steps leading to change, the model introduces phases that individuals go through when change is implemented. Bridges himself describes that the need for the model stems from transition, the state that people enter during change. While in the past managers could order change with authority, modern-day change requires deep understanding of emotions and intentions of workforce. While change is caused by external force, transition is an internal process of individuals. Many managers take transition for granted when change is needed, failing to realize that it happens more slowly than change (Bridges & Mitchell, 2000). As described by Bridges & Mitchell (2000) and William Bridges Associates (2024), the model consists of three different processes people undergo during transition:

Endings – The path of transition starts with an ending and letting go. People need to give up on the old ways to accept new ones. The main part of this process is realizing that when you are implementing change, you are essentially putting people out of their comfort zone. In this phase people determine what they are losing and what they are keeping, for example “relationships, processes, team members or locations”.

Neutral Zone – The neutral zone is when the old is gone, yet the new processes are not fully accepted and operational. This period usually feels confusing, and productivity is reduced, yet it forces exploration and innovation with the new process, making it necessary for the transition. This is where most of the shifts in attitude and intention occur. Due to its uncomfortable nature, people tend to head out of it swiftly, whether for good or worse direction.

New Beginnings – The last stage of moving forward with the change divides people. Some get through the transition, thus accepting the change, yet many might get stuck with the old or fail to accept the new norm. It is said that: “Well-managed transitions allow people to establish new roles with an understanding of their purpose”. Many people choose to hold back in the final phase, waiting to see how other people cope with the new beginning. In the end, the goal is for people to accept and embrace the change, marking the end of the transition process.

Understanding of these three phases is necessary any executive or project manager that is trying to offer new tools and alter the way people work, as it makes relating to the targets of the change much simpler. In addition to the phases, the model introduced by Bridges & Mitchell (2000) presents a theory that the higher a manager sits in an organization, the faster they move through the change process. This is due to having a better view for seeing and understanding the desired destination the organization aims to head to, grasping the necessity of the change. Furthermore, they provide a thorough methodology for managing transition process (William Bridged Associates 2024):

1. Describing and communicating why the change is needed.
2. Understanding who is going through the change and how it will affect them.
3. Help people through the neutral zone by explaining the change and demonstrating the benefits of it through a constant stream of information and communication.
4. Educate leaders of the change on how the transition affects individuals so they can manage it effectively.
5. Monitor and support individuals going through the three different stages of transition.
6. Help people to start the new beginning by supporting and rewarding new attitudes and behaviours regarding the change.

All in all, the bridges transition model brings a useful, yet different approach of change management to the table. Putting yourself in the shoes of the employees facing change can give new perspectives and make you realize what kind of actions implementing the change will need. In their research, Miller (2017) put the Bridges model into practice, using it in library renewal project. Outcomes that were projected and came true included: improved communication, adaptation of individual change styles to improve morale and an overall smooth transition process to the new solution. In addition to this, the model provided unanticipated result of generally improved decision making through balanced and well-defined change styles and better understanding of change subjects.

5 THE TRANSFORMATION OF DATA & BI

So far, we have examined the nature and structure of data analytics in the modern business environment as well as the nature of organizational change. It is safe to say that the significance of BI will be prevalent in the future as well. But what are the ways for organizations to ease the process of pursuing and adapting the use of these technologies into their daily activities. The concept of change management offers a variety of approaches to support organizations chasing new opportunities and helps employees and stakeholders to accept and adapt to the changes that these opportunities bring to the table. Yet, here lies the challenge: should the transformation and change related to BI and data be approached more from the technological standpoint or do the organizational and business aspects of BI outweigh the technology. Data professionals have identified that the key to successful adaptation of data analytics is more of organizational nature instead of technological nature, as the final decision-making and users of BI are traditionally focused entirely on the business aspects. Still, many frameworks and models focusing on the IT-aspects of data analytics can be widely useful when approaching the topic. In addition, as the value of BI systems is reliant on the perceived usefulness and acceptance of end-users, understanding these topic is crucial when it comes to successful BI implementations. To answer these dilemmas, we are going to examine the research questions:

How can organizations manage the transition process of adopting and upgrading data analytics?

What elements can reduce BI system acceptance and utilization?

5.1 Change Management and Acceptance of BI

The implementation of data analytics and data-driven decision making is a complex process consisting of various factors. In their paper Bogza & Zaharie (2008) review these elements and the benefits of adopting business intelligence from the

perspective of competitive advantage. They categorize different challenge areas for adopting BI to be technology, data, processes, strategy, end-users, and culture. To start off, they point out that the technical challenges are often related to tools and integrations. Different business areas might use heterogeneous tools that have a hard time communicating with each other. This also applies to many data sources, that might fall victims of a siloed organization, thus greatly reducing their usability. Another obvious data related challenge is the quality of the data and the management of it. Bogza and Zaharie concur with the previously explored themes of efficient information management processes and improving data quality as early in the data lifecycle as possible. While the management of tools and data remains essential for any organization harnessing modern analytics tools, the scope of this study is keen on the organizational and people aspects of adopting BI. Continuing, the paper highlights the cultural effects on the use of BI. It is stated that establishing data driven organization culture is “a great inhibitor” when it comes to adopting BI and that the essence of successful BI implementation is in aligning the tools and data with the organizational strategy. But as many organization structures are of a siloed- and of a decentralized nature, a suitable approach for managing BI would be of a cross-sectional processes similar to one presented in figure 5. A cross-sectional process of managing information unites different business units and creates new opportunities through greater data sharing and unified guidelines for data use throughout the organization. The study also emphasizes that BI should be approached as a process of people and knowledge, not as an individual software in the organization IT portfolio. The key for this successful process is to understand different audiences of BI and their information needs, skills, goals, and intentions. Thus, the importance of training and coaching of these audiences becomes even more apparent, as the end-goal of BI is to have a user who can drive the right conclusions in a timely manner, from valid data which is easy for them to access. This requires that the users have the will and skills to use the tools and data they are given, requiring the organization to have the confidence to give them responsibility and culture to create own conclusions and insights.

Even though AI is evolving in a rapid phase, business intelligence is still dependent on human-user to use the data and gain value through insight and decision-making. As stated previously, I would go to the length of saying that a business intelligence system is as useful as its users. It is easy to state the importance of concerning the end-users of BI in any implementation process and training them to use the system, yet the challenge remains: what does this mean in practice? A comprehensive study made by Fetzner & Freitas (2011) reviews business intelligence implementation from the perspective of individual change. The paper approaches the topic with both people and the technology in mind, highlighting the need for change in both individual and organizational levels. To start off they present some key elements driving and hindering individual change in BI & IT implementation projects:

- The experiences, perceptions, motivations, commitment, and the position of individuals in the organizational structure

- Degree of involvement in the initiatives, the context of the change
- The organizational context of the change process
- Interpretations of the effect of the changes on their own work and the organization
- The emotional reactions of the people in the face of technical systems

The study aims to examine these factors by interviewing BI end-users and reviewing their perceptions and intentions related to the BI implementation. To begin they highlight the “adaptation context”, identifying links between BI usage and the original technology acceptance model. Some key factors leading to the use of the system are acknowledged to be expected performance, expected effort and social influence of coworkers. An evolution of intention is also noticed, which means that as greater mastery with data and BI is established, perceived usefulness and usage is prone to grow in the future, highlighting the importance of training and knowledge management. It is also acknowledged that as BI systems are dependent on the insights of the end-user, the system use is highly voluntary, further emphasizing the role of user intentions and behaviour in relation to the value of the system. It was also noted that the individual change related to BI requires a strong sponsor, that drives the change of the implementation. This could be an internal data team or IT-department depending on the organizational structure. Overall, many users view BI as a valuable and beneficial tool to begin with, meaning the intention of use is dependent on the continuous support of the sponsor, which further highlights the importance of training the end-users to use the tool and helping them understand the data assets at hand. Some of the factors that lead to most resistance in BI context are the changes in existing workflows and overall introduction of a new technology. People that have used their spreadsheets for years, might see the new alternatives less appealing, underlining the role of the sponsor to communicate the benefits of BI. This is quite polarizing factor as one of the perceived strengths of BI adaptation was the customizability of it, as users can take advantage of the data using their own methods. (Fetzner & Freitas, 2011)

Following the topic of acceptance and perception of usability of BI, further examination of the Business intelligence acceptance model can give us better understanding of end-users and their intentions regarding BI. Returning to the previously introduced Figure 4 BI acceptance model (BIAM) conceptualized by Grublješič & Jaklič (2015) we can review some key factors affecting the resistance and use of new BI implementations. To start off, one of the main focusses of BI implementation should be “marketing” and convincing the end-users on its usefulness and benefits. In the model this is characterized as “result demonstrability”, which means that the advantages of the new system should be clearly and thoroughly communicated with the end-users. This is also related to another factor of the model, which is user participation in the implementation process, as this way the end-user can have a better understanding of the features and use of the system, and possibly point out possible flaws and limitations in the system. The concept of convincing the end-users on the usefulness of the system and the

importance of sufficient communication aligns with the reviewed change management literature as well. As stated by Ibbs et. al (2001) the lack of timely and effective communication is a pitfall for many projects, leaving the targets of the change unaware and unmotivated regarding the topics of the implementation. In addition, the first section of the ADKAR model focuses primarily on the awareness and communication regarding the usefulness and benefits of the change, making it applicable in BI context as well.

Returning to the BI acceptance model, another acknowledgement is the social influence of other end-users on each other. People talk about old and new systems all the time. This can have both positive and negative impacts. While many people like to share positive experiences with BI systems and encourage coworkers to use reports that they find useful, many also complain and share their frustrations on the flaws and shortcoming of BI. In addition, less experienced users of BI tend to dependent on the assistance of more seasoned users, further highlighting the impact of social influence and coworkers on the use of BI. In response to this matter, the role of change agents that facilitate the change and affect the perception of others becomes extremely valuable. When transitioning into the use of new systems, super users of BI should be identified and effectively onboarded to the implementation process. This creates change agents within the organization that have the capability to positively influence coworkers as well as train the end users to use the new system. While the need for widely coordinated and planned system training is apparent when implementing BI, the bar for asking advice is much lower among coworkers, increasing the probability of system use. In a best-case scenario, this can lead to a snowballing effect where the social influence aspect of the BI acceptance causes organization wide system use through positive feedback. Unfortunately, this can also work against the implementation as negative feedback amongst the users can hinder the process significantly.

Another major factor presented in the BIAM-model leading to the intention of use of BI systems, is the quality of the systems and data assets. The quality of the tools can be very varying depending on the nature of the implementation. Many BI tools are provided by major suppliers like Power BI by Microsoft or QlikSense, making in-house built BI systems are rare. Another factor is the utilization of the tool, as the quality and usability of individual reports can vary a lot depending on the internal development processes. This highlights the need for participating end-users in implementation and sufficient requirement analysis regarding the report development. When it comes to assuring data quality, several actions can be taken. As presented by previously reviewed information management and data governance practises, all data assets should be documented sufficiently. Frameworks like DMBOK (DAMA International, 2017) emphasize the role of data modelling of different levels in modern business environment. This enables BI system-use by reassuring both developers and end-users on the contents and relationships of the data. Another increasingly popular approach is using tools for metadata management like data catalogues and business glossaries, that provide ways for end-users to gain certainty on the definitions and

meanings of different data assets, as well as insights from their sources and structure. Such glossaries can also be done independently by business users that have the required knowledge, using for example spreadsheets to create a low effort method for knowledge sharing. In addition, the use of reporting tools and report contents should be comprehensively documented to provide end-users clear mapping on where different data assets can be accessed. One major factor reducing system use, especially in a large organization can be the unawareness of the tools available. While reporting tools can be accessible for many it is essential to effectively communicate their existence to the audiences, especially when implementing new tools. While the quality of the data is heavily dependent on the source systems and the data collection process, this can also be influenced by aligning the requirements of BI and reporting with the source system development. Overall, the BI implementation process is heavily dependent on the quality of the data, as the replacing systems need to match the quality and capabilities of the previous tools, as well as provide new means of analysis that can be trusted.

Following the BIAM framework to assure successful implementation and transition process of BI systems, the final concerns are of leadership and management. The implementation project should concern sufficient change management activities to reduce possible user resistance further. In addition, a large-scale BI implementation is reliant on the support of management, assuring that the implementation aligns with the organizational strategies and goals. In a literature review by El-Adaileh & Foster (2019) they highlight most influential BI implementation factor to be management support in the project. The alignment of strategy and vision of the company as well as change management initiatives are in the spotlight as well. Overall achieving organization wide commitment is found out to be most prominent factor when it comes to BI acceptance and implementation. The role of management is described to “promote, sponsor and champion the use” of BI, as well as allocate the resources of the project. In addition, they follow up emphasizing the identification of organizational vision and goals to assure the BI tools match the needs and objectives of the business, the process being highly dependent on the capabilities of management. Lastly, they also identify the importance of project- and change management in the implementation as allocating responsibilities within the implementation in terms of management and adaptation are needed to assure the execution of the implementation. Finally, to combat user resistance, El-Adaileh & Foster recommend naming “champions” for managing the transition process acting as change agents in the process, as well as establishing a well-defined change programme.

While the change management process of BI and data initiatives is identified by many researchers, individual programmes and processes for managing the transition of BI implementations are hard to come by. Blog post published by Eckerson group (2016) analyses the role of change management in BI projects. They begin by noting that many BI implementations overemphasize the features and quality of data and tools. While these elements are obviously essential, they are insufficient on their own. They break down the change management process of BI implementation into three focus areas: educate, incent and orchestrate. The

first phase of education focuses on “appealing peoples rational and logical side”, preparing them for the change at conscious level and providing the skills and knowledge needed to succeed in the new environment. This often requires a communication plan consisting of key messages and channels used to deliver all the information relevant to the implementation. The second focus area of incentive is based on the incentive to use the systems. Motivating the users to use the new systems can be difficult and in addition to benefits of the new system, might require systems for rewarding the use. One suggested method is an award programmes based on the success of the implementation. In addition, acknowledging and recognising early adopters can motivate users on using the system. The end goal of the transition process is affecting the habits of individuals. The last focus area of orchestration focuses on the role of change leaders and agents on implementing the change and establishing the culture of change in the organization. The importance of the culture is highlighted as people are prone to adopt their behavioural patterns from others around them. Affecting the culture requires motivated people that understand the needs of the people and “exhibit the values and characteristics” that fit to the environment of the new BI tool. A more practical example on the change management aspects of BI implementation is detailed in a case example by Microsoft (2023) where they applied the ADKAR model to facilitate change management in a launch of a new business intelligence platform. The case in question describes a similar situation of the Sokos chain with overlapping use of different reporting systems and data sources between businesses units as well as differences in key metrics and terminology of the analytics environment. The transition to the new platform required a change process consisting of “cycle of communications, training, and reinforcement of a new framework, process, or structure”, with the application of previously detailed Prosci ADKAR model for change. The project team was described to actively involve end-users in every stage of the change process, identifying user needs and possible change blockers as the development and implementation took place. The model provided a well-structured foundation for change in different stages of the project and how end-users should be involved in them. Overall, they describe that adopting the ADKAR process as well as keeping the shareholders close and well informed was one of the main reasons for the success of the project. They also highlight the role of tailored and consistent communication to shareholders throughout the project. While the start of the implementation was slow, desire for system use being low and accuracy of the data being questionable, the quality of the product, combined with the sufficient communication and careful requirement assessment during the implementation lead to a success story.

5.2 Critical Success Factors for Implementing BI

While the transition process and user acceptance of BI implementations is the focus of this study, there are plenty of other factors related to the successful implementation of business intelligence systems. Some of these success factors

might seem self-explanatory yet acknowledging them is essential for the success of such projects. Study published by Yeoh, Koronios & Kao (2008) reviews some of the critical success factors related to BI implementations related to shutdown of legacy systems. To start off they characterize the differences of BI implementations and other information system implementations by identifying BI implementations to be more of a cross-functional nature, having more focus on data quality and relevant source systems, and requiring attention to both technical issues as well as organizational policies and business aspects. After interviewing numerous BI professionals, the results implied that areas of management ended up being the most impactful ones. The most important critical success factor was identified to be committed management support and sponsorship. This was followed by factors like business user-oriented change management as well as clear business vision and sufficient project management. These success factors highlight the influence of management processes and leadership capabilities required to roll-out BI projects. The combination of technology and business aspects leads to complex projects, that are dependent on professionals that understand the business environment as well as the systems at hand. Lastly, the study also points out the role of data quality as a critical success factor, the quality of the source systems having a significant impact on the implementation process. The fact that the concerns of BI professionals align with most of the themes discussed in this thesis shows that the topic is relevant to many organizations targeting for implementing BI.

In another study by Hawking & Sellitto (2010) BI is observed from more IT focused point of view, yet still pointing out that the involvement of both business and technical areas is a critical success factor on its own. The study focuses on the integration of BI platforms as an extension to complex ERP-systems, hence the technical point of view. They also review the nature of critical success factors, describing them to be “areas ensuring competitive performance” and “areas that should receive constant attention of management”. In the categorization of success factors, similar areas like change management, management support as well as project- and team skills are emphasizing, concurring with the previous study by Yeoh et. al. Another impactful area of success factors concerned user participation and end-user training, highlighting the scope of this study. As identified by other literature as well, end-user involvement plays a major role in the success of the implementation. This also combats resistance and aids user acceptance in the long run. In addition, end-user training is critical for the success of the implementation, providing users with required knowledge and skills to use the new systems. Lastly, the importance of data quality as a critical success factor is ranked even higher than in Yeoh’s categorization, further proving the effect of unreliable data to implementation success.

Finally, a third more recent study by Villamarín & Pinzon (2017) broadens the categorization of key success factors for BI solution implementation. The researchers performed a literature review on the topic, creating seven areas of key success factors. The first area focuses of directive and top management success factors such as developing a project and naming responsibilities regarding it. The

second area of business linking focuses on identifying business areas affected and establishing a roadmap for the project. This is followed up by success area of project leader or “champion”, who has understanding in technical, operational, and personal levels of the project. The fourth area of success factors focuses on establishing a business strategy and aligning business intelligence capabilities with it. The fifth area is dedicated to change management and building an organizational culture that can adapt quickly and is open to new tools. The sixth theme of key success factors revolves around the actual deployment of the new BI system and enrolment of the project. Factors such as user involvement and end-user training are touched, as well as the importance of recognizing and staying in the project scope. The last area describes people and human talent team success factors like knowledge building and -management, collaboration, communication, and engagement. All these areas are relevant in different stages of BI implementations. Overall, all of the three studies reviewed explored a similar set of critical success factors, most of them already discussed within the scope of this thesis as well, meaning the research is on the right tracks. While studies reviewed on the success factors of BI implementation discuss the topic on very high and broad level, identifying such factors when planning is essential for the success of such projects.

5.3 Establishing Data Centred Environment

The usage of data and the benefits that it can provide are dependent on the capabilities and opportunities an organization builds around it. Modern organizations have realized the value of their data assets and have established entire business units dedicated to the management and harnessing of these assets. Organizational culture is a major factor when it comes to the use and value gained from data analytics. Data driven organizations thrive from creating open environments, where data assets are well documented, easily accessible and of good quality, which enables new opportunities created by the end-users of analytics.

A popular practise for achieving this is by thriving to create a data mesh. According to Goedegebuure et. al. (2023) data mesh is “an emerging domain-driven decentralized data architecture that aims to minimize or avoid operational bottlenecks associated with centralized, monolithic data architectures in enterprises”. In essence, data mesh aims to treat data domains individually, dividing its use cases and systems into specific business contexts. While the data is usually stored in the same warehouse or data lake, the assets and applications of it are managed separately by different business units. The research points out that this divides responsibility from a single point of data management, into different business areas and aids in reducing the gap between the business and the technology. One of the core principles of data mesh is the productization of data. The paper describes that a data product to consist of data, metadata, code, interfaces, and infrastructure. A data product is basically a prepared and transformed data source that is easily used and accessed by business users. This combined with the

domain divided nature of data mesh, significantly enhances the organization wide capabilities to implement analytics into people's daily activities. The study describes the main attributes of data productization to be easily discoverable, which assures that the users easily find the data, as well as interoperability, lowering the bar for integrations and combining different data sources without significant technical skills. In addition, productization is described to make the data natively accessible, providing an easy endpoint for accessing data. Lastly, the study emphasizes self-describing nature of data products. The products ought to be clearly documented, making understanding them effortless for end-users.

In their blog Johannes Hovi (2021) argues that data mesh might be just another buzzword in the market yet acknowledges the apparent benefits of it. They point out that the essence of data mesh is not dependent on the technologies used but rather on organisation of work and architecture. The concept of data mesh stems from the modern centralized data architectures, where majority of organizations data assets are stored in same data platform. This creates a gap between business users and technological users, as the communication between people working with source systems like ERPs are hardly involved in the final utilization of the data and all the responsibility falls to the middle hand, the data professionals working with the data platform. The domain specific principle of data mesh aims to combat this phenomenon by shifting data challenges to different business areas, the domains. The technological aspects stay centralized, but the pipelines and use-cases are built around domains. Hovi also highlights the relationship between data mesh and the productization of data. According to them, a data product should answer the following questions: "What are the needs of the customers (users of data)? How can we market this product? Are the current customers satisfied?". Finally, the importance of data governance and managing the mesh is essential, as the products and domains should all be in-line with each other, highlighting the needs for establishing clear principles and workflows. The pitfall of establishing a data mesh or similar process is the siloing, which ironically is what it aims to prevent. While the data products should remain in their own domains, the centralized platform and the data professionals should work together assuring that quality and processes of the domains match each other. When it comes to the scope of this study, the S-group has already established a distinguished architecture around data products. Yet, from the perspective of the Sokos chain, the results seem to fall short as the previously mentioned gap between business users and data sources and -professionals seems to be large, hindering the communication. This comes more apparent in the interview findings. Yet, the large scale and widespread nature of business in the S-group makes it prone to siloing. Resolving such issues should be one of the focuses to assure the success of the BI tool implementation in progress.

Finally, one of the factors affecting the data capabilities of an organization is identified to be the data culture, defining the role of data in the business. In their study Dubey et. al. (2019) reviews the nature of modern big data culture. In essence, big data culture is described to consist of the strategies and policies established around the utilization of data. The organizational culture of data usage

consists of various factors like user behaviour, motivation, knowledge transferring, teamwork and collaboration as well as leadership and management. While the benefits of the utilization of data and data-driven decision making, are apparent, establishing organizational culture around them is described to increase operational performance, cost effectiveness as well as the adaptiveness related to data analytics. Following this, another blog post by Johannes Hovi (2022) describes a study for measuring data culture consisting of three main factors: “data discoverability, data literacy and data governance” and the degree on which these practises are applied to the culture of data usage within an organisation. Overall, the study points out that the degree of data culture seems to be directly related to economic growth of organisations. Overall, the blog describes the technology-oriented point of view of the field to be major factor limiting the data cultures, enlarging the gap between business requirements and development. The study also points out that establishments where the ownership of data is done mostly by business units, seem to have increased performance and benefits from data utilization. Overall, while the importance of data culture is not to be underestimated, questions of organizational culture are usually dependent on the business context and operational environments of the organization, meaning that the responsibility of discovering and enrolling such capabilities comes down to the motivations and goals of the organization.

6 RESEARCH METHODOLOGY

6.1 Background and Planning

The background of the study stems from conceptualizing the nature of data analytics in the ever-changing modern business environment. Great motivators for the topics of this research were the challenges I had encountered as a part of my work and hot topics presented by modern day data professionals. Yet, it felt like while many people acknowledged the difficult nature of change and transforming analytics to this modern era, there was no clear practical guidelines or frameworks focusing on the topic, which is why I was eager to dig deeper into it. At first, I reviewed a large amount of literature focusing on analytics, BI, change management and user acceptance to better understand the current state of research and how it approaches the new age of data analytics. Multiple databases like Google Scholar and IEEE were used to find scientific literature with emphasis on search terms like “Business intelligence, Data analytics, Change management, BI acceptance, Data management and BI success factors”. In addition, multiple blogs and white papers related to the field were reviewed to gather a broader view on the modern data environment, as many consulting firms and practitioners release blog post regarding contemporary data themes. To follow the literature review, I needed a deeper understanding of the target organization, which required communication with the shareholders to plan the research structure. Naturally a qualitative approach was optimal for the research, as understanding change and perceptions of individuals is essential for the results and implications of the study. As stated by (Hirsjärvi et. al., 2009) qualitative methods aim to form a comprehensive perspective on the research target and provide new insights instead of confirming existing statement. Qualitative methodologies offer possibility of capturing subjective experiences from research target group to better understand the relationship between analytics and its end users. The obvious choice for data collection was conducting interviews in the target organization, to

understand the relationship between end-users and the reporting systems, as well as possible factors limiting the utilization and transition to the new system. As many of the interviewees worked in different co-ops around Finland, video interviews were mainly used to perform them.

6.2 Interviews

The focus of the research is centred around different end-users of analytics in the Sokos chain. The interviewees were picked to focus on managers that are heavily involved in analytics use and play a major role in the implementation of the new BI tool. The research methodology aimed for qualitative semi-structured interviews with a foundation of 12 questions (Appendix 1) related to different topics of change, acceptance, and transition of BI tools. The predefined question served as a baseline for the interviews, but open environment of discussion was also promoted to get better insights on challenges interviewees had encountered on individual level. The interviews were done primarily one on one, but one focus group interview was also done with three category managers, who were preliminary identified as super users of the BI system.

The interview structure was split into four focus areas with few questions each related to research problems of the study. The first area focused on the background and role of the interviewees to better understand their relationship with analytics & BI use. The background section also aimed to understand the perceived state of the current analytics architecture in the organization. The following focus area was the transition process of BI and implementation of new tools. This area focused on the transition process and possible resistance regarding the implementation as well as possible reasons and resolutions regarding it. The next focus area was the training and support of end-users. The area aimed to better understand the actions already taken to provide user training and what types of support the interviewees considered useful regarding the implementation. Last focus area brought up environmental factors regarding the implementation like organizational culture, influence of coworkers in analytics use, and the role of communication the implementation.

6.3 Analysis of the Interviews

After the conduction of the interviews, the research materials were analysed to reflect the discoveries and approaches presented in the literature. Overall, the nature of the interviews was discussion promoting, and all the interviewees were very open and intrigued by the topic. The standard length of the interviews was set to 30 minutes, but all of them lasted longer than that, up to one hour. The topic was also considered meaningful and important for the Sokos chain as well as universally topical in modern business environment. The interviews were

recorded and transcribed by Microsoft Teams' transcription feature, which aided in revising the materials. Conventional content analysis methodologies presented by Hsieh & Shannon (2005) were adapted to reflect the interview results in order to create categorization of factors related to BI acceptance as well as BI implementation support. This was identified to be appropriate approach as the research questions seemed to have a variety of different factors that required systematic categorization. Content analysis also provided some needed flexibility and depth to the revision of the results, as many of the interview materials were scattered and all over the place. Conventional content analysis provided a clear way to summarize contents of different interviews while also providing a suitable way of addressing the topic of the research problems.

7 FINDINGS

7.1 Summarization of the Results

The interviews provided a plethora of interesting views and analyses on the state of analytics in the chain as well as valuable insights on the implementation of the BI tool from the perspective of end-users and managers onboarding their coworkers. The essence of the results is summarized in the following tables where the research problems are answered with the factors of BI acceptance and end-user support categorized in individual tables. After the summarization of the results, interview insights and citations are analysed to conceptualize the perceptions and opinions of the interviewees. Later the results are further discussed and reflected to literature, followed up by practical guidelines to help the organization deal with the implementation.

7.1.1 Factors Reducing BI Acceptance and System Utilization.

This is the first categorization of results done by the application of Conventional content analysis methodologies to the interview results. The following table 2 aims to answer the research question:

What elements can reduce BI system acceptance and utilization?

Table 2 Factors reducing BI Acceptance and Utilization

Elements affecting the acceptance and use of the new BI tool	Acceptance reducing factor	Description
System & Data Issues	Data quality is varying	Many interviewees deemed some of the in the current systems unreliable and faulty. Different systems give different numbers on similar data.
	Performance issues	The new reporting was identified to be slow and unresponsive at times.
	New terminologies and hierarchies	New terminologies and hierarchies are not clarified sufficiently.
	Missing data	Some of the critical data regarding for example online sales has not been present in new reporting
User attitudes and behaviour	Habit of using the old system	The long lifespan of the old system has resulted in strong habits and traditions that are hard to overcome.
	Fear of misuse	People are afraid to use the new system in case they use it incorrectly, thus resulting in faulty analyses.
	Lack of time and motivation	Users don't have enough time to familiarize them with the new system and overall don't consider adopting new BI tool to be worth the time investment.
Management and communication	No clear policies on report and data use	There are no strict guidelines and policies on which reports and data should be used, resulting in overlapping use of systems in similar tasks between people.
	Insufficient communication	Some of the end-users have been unaware of the launch of new report capabilities resulting in the use of the old system.
	User requirements not acknowledged	Some of the business-critical features are still missing from the new BI system, forcing users to use the old system.
Organizational structure	Not enough focus on business area relevant aspects	Both the end-user training and report development of the new BI tool were deemed to not match the needs of Sokos specific users, as they are heavily influenced by market business area.
	Lack of communication between co-ops	Some of the interviewees identified inconsistency in data as some reports and systems enable cross co-op filtering, while others don't.

	Distance between the field and development	Long development chain and distance between end-users and development teams seems to limit the communication and specification of user requirements.
Social influence	Negative feedback	Issues of past implementations seem to negatively impact the onboarding related to the reports of the BI tool.
	Different workflows	Different members of the organization use the reporting tools differently, resulting in differences in numbers and analyzed results.

7.1.2 Types of support in BI implementation

The second categorization in Table 3 focused on the types of support interviewees identified meaningful and useful for the implementation. The research question focusing on these means of support was:

What types of support do end-users need when implementing or renewing analytics & BI?

Table 3 Types of Support End-users Need Regarding the Implementation

Areas of support end-users need regarding the implementation	Support focus	Description
Training sessions	Report specific training sessions	Assisting the implementation of new reports by hosting sessions for training the use and features of the reports
	Training of the features of the tool	Hosting more comprehensive training sessions including various reports and the focus on the use of the tool itself in the business environment
	Training on the contents of data assets	Educating the end-users on the available data assets and introducing possible use-cases.
Communication	Newsletter	Regularly published information regarding the development of new reports and transition of the tool
	Report specific announcements	Introduction of new reports and their features when they are ready for implementation.
	Definition of policies on data & report use	Communicating the specific reports and data sources that are recommended or enforced to be used.

Different support channels	Official support channels	Channels like service desk that assist specifically with technical problems and features of the tool itself.
	Contacting data centred people	People who understand both business context as well as the structure of data assets and reporting tools available.
	Getting assistance from colleagues	Promoting open environment where analytics is discussed and the threshold for asking help is low.
	Dedicated superusers	Naming dedicated superusers that act as change agents and offer support for colleagues on use cases that they are familiar with.
Documentation and guidelines	Report specific instructions	Written documentation of report contents and use.
	Documentation of the contents of data assets	Descriptions of data assets like glossaries or data models. Explaining the formulas and logics of different metrics.
	Tool specific guidelines	Written guides on using different features of the BI tool.

7.2 Background of the Interviewees

The first focus area of the interviews aimed to gather background information to better understand the interviewees and their relationship with analytics and the BI implementation in progress. To answer this, the following interview questions were asked:

1. What is your role in the organization?
2. How do you utilize data and analytics in your work? How would you assess your own data & analytics capability?
3. How would you evaluate the current state of analytics in the S-group (Sokos chain)?

The first two questions were quite straightforward, and the answers were mostly of a similar nature. The interview included end-users of manager roles that were known to use analytics often in their work and possibly affect the analytics-use of others. The users were mostly mid-level managers of different business areas that used BI to analyse and plan their work with, for example sales numbers. In the department store business, campaigns and seasons play a major role in daily sales operations, making relevant sales developments exceptionally valuable data for the managers. Many described taking advantage of all reporting given

to them that they find reliable and useful. Overall, the analytics capabilities of the interviewees were good and many of them considered to be above the average users of the organization, though some pointing out the limited time and skills for analytics within other analytics users of the organization. Many of the interviewees were identified as superusers of analytics that train and influence the use of reporting done by others as well. The following table 4 sums up the results of the first questions among the interviewees:

Table 4 List of Interviewees

	Role in the organization	Perception of personal data & analytics capabilities
Interviewee 1	Category manager	Good, superuser
Interviewee 2	Category manager	Good, superuser
Interviewee 3	Category manager	Excellent, superuser
Interviewee 4	Sales Support Manager	Good
Interviewee 5	Group manager: department store business	Excellent, strong IT background
Interviewee 6	Group manager: department store and hair salon business	Good
Interviewee 7	Department store manager	Adequate, considers to be less data-oriented

The third question regarding the current state of analytics in the chain promoted particularly large amounts of discussion. Many had vocal opinions on the current state of the systems and expressed their dissatisfaction of the current environment. The overlapping use of legacy systems and the sheer amount of reporting tools currently in use was described to be “confusing”, “divided” and “chaotic”. It was consensus among the interviewees that the implementation of new reporting tools was direly needed, making the overall reception for the new analytics tool mainly positive. Yet, the differences in the new system and old reporting systems and the amount of currently available reports were the main factors leading to the dissatisfaction and confusion of the users. Another major concern among the interviewees was the current state of data quality and reliability. With the implementation of replacing reports, many have identified differences in the metrics and data of old and new reporting systems. This significantly increases the uncertainty and confusion regarding the system use. In addition, some of the interviewees pointed out that the new system uses different formulas to calculate different metrics and uses different terminology compared to previous systems. Without clear documentation on the matter, this has also raised concerns on the validity of the data, and whether the new reporting will eventually cover all business-critical features of the old system. Many hoped for direct guidelines and more straightforward communication regarding the implementation. The following statements sum up the challenges of the current environment:

The current state is confusing. We have too many overlapping systems and the quality of the data is varying. Different systems give different numbers and there are no policies on which ones should be used. (Interviewee 3)

It is a good thing that there's a plethora of reporting available for those who seek for them, but overall, I feel like most of them are hard to find and lack clear guidelines on which of them should be used. (Interviewee 6)

I would describe the current state with one word: chaos. Different people are using different systems and there's a lot of uncertainty regarding the reporting. I feel like the communication regarding the new system could have been better. (Interviewee 4)

The faster we can do the transition the better. The differences in the data between the systems as well as the new terminology and metrics introduced increase complexity and require too much effort and knowledge from workers who don't have that much time to begin with. (Interviewee 5)

The old reporting system was good for its time and has deep roots in the Sokos chain, but it simply does not meet the requirements of modern business environment and overall, I feel like I can't even trust the data these days. (Interviewee 2)

7.3 The Implementation and Resistance of New Analytics Capabilities

With the confusing limbo-like state currently present in the chain, it is no wonder that the current state of analytics was deemed confusing and unreliable. While many of the challenges are data- or system related, leadership and management of the transition process play a critical role in the success of the implementation. The following set of questions aimed to clarify the transition process of the interviewees when adopting the new tool and provide solutions to minimize resistance among other end users in the chain:

4. Have you recently switched to using new analytics tools (e.g., Power BI)?
5. How did the transition to using a new tool go from your perspective? Were there challenges or successes?
6. Have you noticed resistance to adopting new tools? How do you perceive the general reaction to adopting new tools?
7. What is the possible reason for resistance? How do you think this could be reduced from your point of view?

All interviewees had started to use and adopt the new BI tool to some degree. Some of them even used it daily and even preferred its features over the old

system. Still, as the transition process was still in progress for many and the old reports are still widely used, the transition was described to be still “partial” and “lacking”. As many of the interviewees were seasoned analytics users, the adoption of the tool itself has gone smoothly, but it was also acknowledged that less analytics-oriented users might have challenges with the tool. When it comes to challenges and successes of the new implementation, the new system was considered to give new possibilities and higher customization in terms of data processing. Many of the interviewees were also pleased with the drill-in feature and product specific views possible in the new tool. However, it was also noted that there were some challenges of data validity and in the report development process. Many interviewees described that the tool and reports were too similar with the reporting used in the Market business of the S-group, lacking some of the Sokos specific business needs. This is understandable as the development teams responsible for the development work on reports concerning all business areas of the S-group, highlighting the lack of tailored solutions present in the old system. Another issue hindering the transition has been another data issue related the nature of online sales in both old and new system, which was noted by many. Here are some of the challenges and issues interviewees had identified:

I am worried that the transition to new tools might lead to faulty analysis if the tools are not used properly. (Interviewee 7)

Referring to a prior analytics initiative: major challenge in the past transition has been the lacking contents of the replacing system, highlighting the need for communication between end-users and development to assure all necessary functionality (Interviewee 1)

I think the new reports create more opportunities for using data, but I’m concerned that without sufficient and timely communication and training the transition will be slow. (Interviewee 4)

Acknowledging and separating the requirements of Sokos chain is vital for the longevity of the system. Previous challenges regarding the validity of online sales have created uncertainty that will eventually hinder the transition of this tool as well. (Interviewee 5)

The transition process is dependent on understanding the difference of market and department store businesses as well as the different skills and capabilities of the end-users. Many prefer to have prepared views with as little filtering and adjusting as possible, while others require very specific product-level views. (Interviewee 3)

When discussing the current state of analytics in the chain, many pointed out the overlapping use of old and new systems. This is mostly since the new BI system still lacks some of the data and features of the old system, requiring the end-users to use both systems to gather the data that they need. The interviewees analysed possible reasons for resistance regarding the use of the new system and possible factors leading to resistance. While only some had actively encountered

resistance to the use, all the interviewees were able to identify themes that slow down adoption of the new system. Many noted that without clear policy of which systems should be used, many people tend to choose the old system they have been using for ages. In addition, as the Sokos chain tends to have many long-term employees, meaning the old habits and perceptions are harder to overcome. Also, in general end-users tend to be uncertain on the validity of new systems, as there have been challenges with implementations in the past.

As long as the data is available from the legacy systems, they will be used. People don't have the time or the motivation to learn new tools, highlighting the importance of "marketing" the benefits of the new to the end-users. (Interviewee 3)

We have previously had resistance with such implementations, but nowadays I feel like people are more open to change and I try to set an example by my own adoption and use of the system. The implementation will depend on successful communication and highlighting the benefits of the new system. (Interviewee 6)

There is no strict policy on which reporting should be used and no clear understanding on the data and the functionality of the reporting, thus creating friction in use (Interviewee 2)

Our workforce tends to change slowly, leading into decade old habits and traditions that slow down change. (Interviewee 7)

The role of change management is highlighted in this implementation as the reporting in this chain has a very long history. The old system is liked and trusted, while the new system has had some issues regarding load times and online sales. (Interviewee 5)

7.4 Supporting the Transition Process

With the previously introduced challenges of the implementation in mind, it is vital to acknowledge the role of training and support regarding the new system. Users of different skill levels that might not have enough time to introduce themselves with the new system are dependent on efficient training and support channels to start using the new tool in their daily tasks. Multiple end-user trainings have already been launched and the reception for them has been mostly positive. The following interview questions were asked to better understand the support process and further requirements for support functions to assure the successful implementation of the new BI tool.

8. What kind of support did you receive during the adoption of the new tool?

9. What kind of support do you feel you need related to analytics and the use of new tools?

One reoccurring theme regarding the training sessions was the need to adjust them to match the use cases and skill levels of the department store personnel. Some issues with previous trainings have been that they were focusing mainly on the BI tool itself, making it hard for the audience to relate to the use of the system. In addition, it was acknowledged that trainings held by IT and system-oriented people seemed to be more challenging to follow, as the essence of the system is in the business opportunities rather technical capabilities. In terms of support, many interviewees were happy with the recent addition of data centred role of Product Owner in the analytics environment, which has enabled the interviewees to communicate their requirements better and ask for assistance in analytics related issues. Many also acknowledged the role of themselves as superusers to provide support and “marketing” the new system to their coworkers. Finally, while the need for report and tool specific support channels was apparent, many acknowledged that their issues were mostly about the quality and contents of the data, highlighting the need for roles that know both the lifecycle of the data and the business context it is used for. These were some of the feedback and areas of focus regarding the support of the implementation:

Technical and generalizing trainings without the business point of view are useless. We need training that matches use cases of Sokos personnel. (Interviewee 2)

I have received support from our analytics product owner whenever needed. Overall, the questions I often find myself asking are: where can I have this information, what is the meaning of this data, and which reports should I use? (Interviewee 5)

I have often received help from (Analytics PO), and I find such people valuable. Overall differences of terminology and metrics should be clearly documented and defined when moving to the new tool. We should also have more low threshold support channels like support groups or superusers. (Interviewee 5)

When the developers are training the tool, they might miss some of the business context. Overall, I feel like live, or video call training sessions are much more effective in comparison to documented support as people don't have time to explore guides. (Interviewee 3)

7.5 The Effect of Organizational Culture and Work Environment to the Use of Analytics

The last area of interview questions focused organizational culture and the environment where analytics are used, and whether the interviewees considered such themes meaningful in terms of analytics use and BI implementation. The last three interview questions were:

10. Do you feel that organizational culture has an impact on the utilization of analytics and data?
11. Do your colleagues affect your analytics use? How?
12. Have you encountered communication related to the use of data and analytics? Do you find this significant?

Most of the employees had strong opinions on the organizational culture of the firm, as some of them have been in the firm for a decade or two. The topic of organizational culture encouraged discussion on both the role of organizational culture in a transition process, as well as about the relationship between analytics use and organizational culture. The interviewees acknowledged that the chain had a strong culture settled with the use of the old system that was custom built to the needs of the chain and has been considered reliable for a long time. Many also highlighted the vast amount of data in the whole S-group, and the meaning of data in the S-group. Yet, it was also noted that all of that data might not be utilized effectively, especially when it comes to the department store business. There was also discrepancy as the importance of data was apparent in the S-group, but many considered some of the data was available for higher level management, while it could be extremely useful for operational reporting as well.

The use of data and analytics is recognized and encouraged in the S-group, but some of these capabilities might not always spread to the Sokos chain. Sometimes management might have access to information that would have been critical for operational functions as well. (Interviewee 3)

We have a lot of data, but the complex structure of the organization hinders data availability among co-ops and different chains. The Sokos chain has a strong analytics culture that has deep roots in the use of the legacy system. The challenge lies in fitting the new system and modern analytics in our way of doing things. (Interviewee 5)

I find organizational culture to have a major role in analytics use, which explain the wide spectrum of analytics tool in use at the moment. Even though data driven culture is necessary nowadays, I still think analytics should be approached with the everyday essential tasks in mind, as many don't have the time or the need to become data experts. (Interviewee 7)

We have a lot of capabilities in the S-group that are not available in the Sokos business area. How can I even request the right data or features if I do not know what is available. In an organization like our, analytics should provide information that is available for everyone. (Interviewee 1)

I find the organizational culture of data usage to be divided. While obviously reporting and data can provide a valuable tool, especially with the history of ours, it should be approached with a certain level of scepticism due to data quality and overall environmental factors that can affect the numbers. (Interviewee 4)

While the organizational culture was identified to have an impact on the use of analytics, a much more influential factor was the influence of colleagues. Many of the interviewees were in a role of management, they considered to have a tremendous influence on the analytics use of others. In addition, some of the interviewees were tasked to be superusers in terms of reporting tools, highlighting their role in the implementation of the new system. Their role was to act both as a change agent to influence and encourage the use of the system, as well as a low threshold support channel to tackle problems and answer questions regarding the new system. One of the interviewees described to arrange monthly sessions regarding the use of reporting systems. Many also acknowledged that tips and recommendations from others play a major role in the system use. Someone even said that it's common for people to find new reports and capabilities through the recommendations of others. The impact of the Product owner role was also praised in terms of influence of others, as they had received a lot of support and communication regarding analytics from them.

I communicate and assist others in the implementation of new reporting. Experts like (Product Owner) are the core of the implementation. (Interviewee 5)

I aim to influence others by creating an environment open for new tools and change. I appreciate when the reports and tools are openly discussed and the bar for asking help is low. (Interviewee 6)

As a superuser I try to market new tools and aid my colleagues with reporting related issues. I like to give some of the reports and analyses I use for others to use as well. The role of (Product owner) is particularly important when it comes to analytics use in the chain. (Interviewee 3)

The influence goes both ways. I get recommendations from others, while I like to hold sessions for my team regarding the use of reporting. (Interviewee 1)

Yes, I affect my colleagues and they affect me. As a somewhat of a superuser, it is my responsibility to support others, but it's common to discuss the reporting openly and get tips from others as well. I think that it is important that we have experts that understand the business aspects of Sokos as well as the analytics environment, that can influence both people and the systems. (Interviewee 4)

Finally, the last topic of the interview was communication regarding the use of analytics and the implementation of the new BI system. Overall communication was identified to be one of the major themes of successful implementation of the new BI tool. In terms of communication, many of the superusers acknowledged their role to communicate and convince other users on the features and reports of the new tool. It was also noted that the communication should be suitable for the users working in the field. In terms of influence and credibility, the communication should come from within the chain, and from people who work around the same themes as the end-users of BI. It was also noted that in addition on communicating about new reports and tools, information about data contents and on

which reports should be used would be welcome as well. While direct communication channels like Teams or e-mail provide a good foundation for affecting user perceptions, the communication done by managers and coworkers seem to be even more impactful in terms of system use.

Communication about the reporting and new tools is meaningful, but it should be reasonable to match the time requirements and capabilities of the field. (Interviewee 7)

Communicating and proving the usefulness of the new tools is important to assure system use. It is also important to communicate on which data should be used and where it is available. (Interviewee 3)

So far, I feel like some of the communication goes under the radar and people have had to ask implementation related questions on their own. Considering the perspective of the field in communication is important for the implementation of reporting. (Interviewee 6)

The superusers should be utilized to “sell” and communicate about new reporting and analytics. (Interviewee 1)

The current communication has been meaningful, but I would like to get more personalized communication from the analytics themes of the Sokos chain. We have had disconnects on report releases, where sometimes might not be aware that the reports even existed. I would like to know things like why each report is created and how they are supposed to be used. (Interviewee 4)

I think a FAQ could be useful for communicating as many of the issues are of similar nature. I hope we would have more information on the contents of the data and where different information can be found. (Interviewee 5)

That concludes the topics discussed in the interviews. Overall, while many participants brought up a wide variety of concerns related to the implementation of the BI tool and analytics use in the chain in general, all of them agreed that the direction is correct and had high hopes for future. Such a major transition process will require consideration of capabilities in different areas like management, data quality and communication. There’s a long way to pulling the plug on the old system but addressing these issues can help easing and accelerating the transition process.

8 DISCUSSION AND CONCLUDING REMARKS

8.1 BI Acceptance Reducing Factors

The interviews conducted in the target organization provided a wide variety of factors that have and will affect the implementation of the new BI tool. While many of the issues at hand were already acknowledged, interviewing some of the key-users of analytics provided more in-depth understanding of the current state of the analytics environment, as well as possible solutions on how to implementation process should be further supported and carried out. Overall, the current state of analytics was deemed confusing, chaotic, and unreliable, highlighting the need for urgent and successful transition. To answer this, two research problems were identified to better categorize the current issues. The first question aimed to recognize factors that have reduced the acceptance and usage of the new BI system.

What elements can reduce BI system acceptance and utilization?

Many of the interviewees were in managerial positions, requiring the oversee the reporting use of subordinates and coworkers. They pointed out issues of the current environment and organizational factors that have hindered the usage of the system from the perspective of their own work area and experience of coworkers. The Table 2 previously presented in summarization of the results aims to identify and categorize these issues to help on determining solutions and actions to combat them in the future, which are further discussed below.

This comprehensive taxonomy of acceptance reducing factors provides a clear and detailed list of issues limiting the BI transition in the Sokos chain. As stated by both the BIAM model of Grublješič & Jaklič (2015) as well as BI implementation factors described by El-Adaileh & Foster (2019) the importance of data and system quality can't be overexaggerated when it comes to BI acceptance. Data validity issues and differencing metrics and sources used by different business units were major issues described by the interviewees, leading into confusion and inconsistency within the business area. Another system related issues described were the differences in metrics and terminology, which will increase the complexity of the learning process of the new system, making it less appealing to new users. Another major area related to BI utilization mentioned by both papers was the role of management in the transition process. Many interviewees deemed that there are not enough policies or guidelines on which reports and data should be used, resulting in further inconsistencies in analytics use within the chain. Some also considered that the communication they had received had felt short on informing about the implementation of new reports and overall transition of the new tool, leading into reduced utilization due to uncertainty.

When it comes to psychological aspects of the transition, it was commonly acknowledged that many employees might not use the new system due to old habits and being accustomed to the decade old system. As stated by Fetzner & Freitas (2011) individual change of perception and behaviour is necessary for BI adoption, as most BI system use is of a voluntary nature. This makes transitioning the old habits of legacy reporting use even harder, as the use of the system is heavily linked to user preferences to begin with. It does not help the situation that many of the users are not that invested in analytics use to begin with, as their main focus remains on the daily activities of the department stores and analytics is a minor tool in the grand scheme of things. Interviewees pointed out that many members of the organization have limited time and motivation to put into learning new systems. However, it is not to be forgotten that data driven decision making and organization wide analytics use is heavily encouraged, meaning that fitting the new BI platform to the everyday tasks of department stores will be necessary in the long run. This is also a concern of organizational culture. Many of the interviewees acknowledged the correlation between organizational culture and analytics use, but approached the topic with a grain of salt, as the data does not always give you all the answers. One major organizational issue hindering the BI transition was the relationship between market and department store business areas. The old system was heavily tailored to match the needs of department store business, while new reporting has more similarities and development background stemming from the market business, which leads to conflicting results. Many also considered that the development cycle is too complex and the distance between the end-users and developers was too long, making requirement assessment and communication challenging. A consensus within research was that successful BI implementations are heavily dependent on user participation in all

stages of the development. Clarke et. al. (2017) summarizes this by stating that gaps in communication go both ways in these scenarios. While developers need to understand the requirements and business contexts of the applications, end-users need to understand the limitations and restrictions of the data and systems at hand as well, stressing the need of data professionals that act between the technology and the business in modern data environments.

8.2 End-user Support in BI implementations

While the factors reducing BI system acceptance have major contribution regarding the usage of the new BI tool, the process can be streamlined by supporting the end-users in the use of the system and managing the transition process. Another focus area of the interviews was to scope areas of support that the interviewees found useful in the implementation process. The third research question aimed to analyse and categorize these issues, focusing on the different types of support interviewees considered useful regarding the system:

What types of support do end-users need when implementing or renewing analytics & BI?

Generally, the interviewees considered different support channels to be essential for the implementation of the new tool. Different interviewees had own preferences and needs in terms of support. One universally acknowledged and needed form of support is end-user training. There had already been some training sessions hosted online regarding the new BI tool, so the interviews gave some reflection on the success of these sessions and suggestions for future training. In addition, there were also many other means of support that were identified to be useful. The categorization table presented in the summarization of the results aims to further characterize various support channels that should be recognized in the implementation process.

While some of these support channels are self-explanatory, there was also interesting remarks on the personal preferences of the workers in the chain. While the need for training sessions is apparent, there were many good points on the qualities that the sessions should have. As identified by Hung et. al. (2016) end-user training has impact on the satisfaction and motivation of end-users, directly affecting system use. The end-user training of BI use can be divided into three main categories: training the use of the BI tool, training of individual reports and training of data contents and use. Interviewees agreed that the training had been sufficient so far, especially when it had recently been done by someone coming from within the chain, making the sessions more relatable and generally easier to follow. Some of the criticism was targeted towards prior system implementations, where training sessions that were done by highly technical trainers had mostly gone to waste due to them being too hard to understand. Overall, this proves the importance of the training context

and understanding the skills and needs of the target audience when performing end-user training. Another training related issue that was highlighted by many interviewees was the guidance related to the use of data assets. As more seasoned and diverse analytics users, many of the interviewees considered understanding the logic and meanings of metrics and data assets as an important feature, highlighting the need for documentation and high-level support channels. Overall documentation of the report portfolio and definition of available metrics in a glossary manner can increase the productivity and usability of the data assets. While glossaries can concern data directly from the physical model, a lighter version that focuses on listing the terminology and their definitions would be beneficial in this case (DMBOK, 2017).

With the organization wide implementation of new BI tool and new reporting, the very nature of analytics use within the chain is evolving. The legacy system has long history within the chain, basically defining the analytics culture of the organization in the past. The challenge lies in fitting the new system to match the capabilities of the old system as well provide new means of analytics that fit the requirements of modern business environment. This change of culture was excellently summarized in the interviews: "The Sokos chain has a strong analytics culture that has deep roots in the use of the legacy system. The challenge lies in fitting the new system and modern analytics in our way of doing things" (Interviewee 5). Supporting this transition will be challenging and require efforts from all levels of the chain. The BIAM model by Grublješič & Jaklič (2015) as well as the insights provided by interviewees include some of the factors that will facilitate such organizational shift. Both the model and interviewees identified the need for change management regarding the implementation of the new tool as well as shutdown of the legacy system. Some of the interviewees even identified themselves as the change agents of the transition, having major influence on the perceptions and acceptance of coworkers. Another commonly identified theme was the need for management support and establishment of policies regarding BI use. When the time for shutdown comes, direct policies should be implemented to manage the transition process. Lastly, while some change resistance was identified regarding the adoption of new systems, interviewees identified that people are committed to change and acknowledge the evolution of the industry, which reflects with the macro environmental characteristics of the BIAM model like competitiveness of the environment.

Another theme of analytics culture that was actively discussed during the interviews was the support of colleagues and open environment regarding analytics use. Many of the interviewees were either assigned or found themselves in a role of a superuser, marketing the system and aiding colleagues with new reports. The role of the superusers is essential for the implementation, as they act both change agents as well as a support channel to other users. Many interviewees considered getting help from colleagues to be an important aspect of supporting the BI adoption. It was also pointed out that people working in similar environments have better understanding of the use cases and challenges

their colleagues might face. The assignment of superuser was identified to be successful, and further superusers are to be assigned on department store level as well, creating a support channel that is easily accessible and has low threshold to contact. There are also official support channels, offered by the organisation, but the reaction times of those might be too slow, as most of the issues need swift resolution for employees to carry out their daily analytics related tasks. Such official support channels like service desks are often more suitable for tool related issues, while support within the organization focuses usually on business related matters like report contents and metrics at hand.

8.3 Next Steps for the Chain

With the categorisation of factors reducing BI acceptance and utilization and areas of support identified to be useful in mind, we can provide some possible actions to be taken in order to facilitate the transition process in the future. Interview results and the literature reviewed showcased high priority areas that should be addressed as further reporting is shifted to the new BI tool. The following statements are my personal summarizations deducted from literature and findings for the chain and data practitioners facing challenges in implementing BI capabilities.

1. Data sources should be valid and considered reliable by the users.

As identified by literature and highlighted by the interviewees, the quality and reliability of the data has a major impact on the perceived usefulness and utilization of the system. If the data is not considered valid, it hurts the overall usability of analytics systems, and should be resolved as soon as possible. In addition to reduction in use, faulty data can lead to wrong conclusions that can be harmful for the business. After a discussion with the Analytics Product Owner of the chain, they pointed out that resolutions for these issues had already been deployed and are currently in progress as well.

2. Data centred people that understand the business aspects as well as the analytics environment are essential in such a complex organization.

The importance of the Product Owner in question in the BI implementation and for the whole organization became apparent in the interviews. The widespread nature of the organization limits the business knowledge of the development teams, which highlights the need for people that can work with both business users and developers and enhance the communication of end-user needs and requirements.

3. The culture of the analytics use promotes open discussion and assisting colleagues, highlighting the need for communication of the implementation.

While the analytics culture is not ready for intensive self-service analytics, reporting and BI are considered valuable and are openly discussed around the chain. This means the communication about the implementation needs to be active and meaningful to bring attention to the new reports and onboard people into integrating the new tools in their daily routines. Communication will be the main form of change management during the implementation, and the success is dependent on the management of the process, especially when the time to shut down the legacy systems comes. Strict policies of system use might be necessary when the plug is pulled.

4. Figuring the role of the BI in the chain's way of working is essential for the replacement of the old system.

As stated by one of the interviewees, the old system defined the analytics use within the chain. Fitting the new system to fill those shoes and bring out more capabilities will be the long-term goal of the implementation. However, the long history of the legacies should not be forgotten and when the ramp down begins, all reports and data should be available through new channels.

5. End-user requirements need to be acknowledged, despite the distance between business users and development.

One of the cornerstones of information systems study has always been the analysis of end-user requirements and implementing them. In the context of this study, it means discussing the new reporting around the organization to find out what people need in terms of data capabilities and support. While the time and resources of the development are limited, it doesn't mean active communication between shareholders should be undermined.

8.4 Limitations and Threats to Validity

While the study has provided a comprehensive overview on the nature of BI implementations and provided a plethora of factors related to the end-users of BI, there are some limitations and questions of validity and applicability of the study. The first and most impactful question of validity is related to the relationship between me and the target organization. With a past including several data-related roles in the organization and personal experience working in the focus area of the study, the possibility of biases increases, and authenticity of the results may be altered. The shared history can work both ways, resulting in personal frustrations exaggerating the issues, or on the other hand personal interests leading into favouring desired outcomes over negative ones. As recognized by Hsieh and Shannon (2005), content analysis is a method subject to researcher bias. Even though the applied method of conventional content analysis strives to approach the data without preconceptions, this is often difficult or even impossible due to the

researcher's prior involvement with the target organization. Due to the nature of this thesis, it was not possible to validate the results with additional researchers. However, the impact of this concern of validity has become reduced as I am no longer employed by the target organisation.

Another limitation of the research was the chosen research group, which was relatively small and homogenous. While all the interviewees are heavily involved in analytics transition of the chain, they were all of resembling background, which provided rather similar and predictable results. It should not be undermined though that the interviewees expertise was proven extremely useful with the insights and opinions they voiced matching the recommendations and topics discussed in the literature. In addition, as argued for by Siponen, Klaavuniemi & Xiao (2023), focusing on a narrow scope is not inherently a limitation of a study, but may be beneficial in understanding phenomena in detail. To address the saturation of manager role interviewees, the discussion was steered towards the issues and perceptions of the team members and subordinates as well. Many of the interviewees described their relationship between coworkers and the effects of others on their analytics use, which widened the perspective regarding the results of the study. In addition, most of the interviewees highlighted the needs of "the field", referring to lower lever department store workers that are involved in the daily tasks of running the department stores, emphasizing the requirement and perceptions of other staff as well.

Another question of validity and practical applicability of the study is related to the organizational structure of the target organization. As a case study, the results reflect well on the current situation of the organization, which might not make them applicable in other BI implementation with different backgrounds and contexts. In addition, the nature of case studies makes them somewhat distant from the literature as many of the issues at hand are learned by studying the organization, instead of research papers. In addition, when it comes to the structure of the study, the scope of the study is quite broad which limits the applicability of the study. The research discusses themes within the whole lifecycle of data, resulting in the findings consisting of a wide variety of topic, instead of a clear and precise research problem. However, I still consider many of the findings of the study to be relevant to the field of BI and relevant for various organizations implementing or renewing their analytics capabilities. Another validity related question is the general role of the S-group in Finland. As the largest player in the retail business as well as having major branches in other business areas and an unusual organizational structure with the co-ops, other organizations are likely to have different kinds of business organization with designated data teams, analytics specialists etc. that focus on the issues of the entire company. The widespread nature and scale of the S-group can lead to organizational siloing and creates long distances between business units, which might not be the case in smaller organizations.

8.5 Conclusions

The objective of the thesis was to explore the shift in modern analytics environment and the challenges organizations are facing in implementing and adopting new tools to their analytics arsenal. The study reviewed a plethora of both older and more recent literature to discuss these topics, reviewing some of the key characteristics present in data driven organizations operating in the data revolution of 2020s. While many of the concepts are still evolving and not yet universally recognized by the academic community, the study presented many key concepts like management of information assets, the nature of organizational change in analytics initiatives and means for organizations to manage the projects and shifts into new age of analytics. In addition, another goal of the thesis was to examine the state of target organization and provide insight and solutions for future endeavours. Interviews done in the target organization proved to be extremely valuable, providing a wide taxonomy of factors affecting BI acceptance and utilization, as well as a plethora of means of support relevant to BI implementation projects. While the research pointed out many flaws in the current state of analytics present in the target organization, overall things are progressing well and, in the end, the new BI platform is just another tool among others. The overall attitude among end-users is hoping, and results of success are shown by the day, paving way for the eventual shutdown of the legacy system.

The contributions of this study are relevant to the field of business intelligence study as well as the theme of modern data environments and are not limited entirely to the context of the target organisation. While the findings are focused on the case study, the categorization works as an effective checklist for other organisations planning or experiencing BI implementation projects of similar nature. The thesis also heavily contributes to the modern way of data thinking, emphasizing the significance of treating data as a business asset, separating it from the technological tunnel vision that has been present in many organizations in the past, highlighting the end-users of BI, an often-overlooked factor. While the tools and storing of the data are dependent on technology and talented IT professionals, leaving the management of data assets entirely to such departments usually leads to shortcomings. The study puts end-users of BI to limelight, as like pointed out previously, the value of BI is dependant not entirely on system use, but how the end-users use it and what they do with the data they are given. In addition, the thesis contributed by evaluating some of the terminology of the field, creating distinctions between overlapping and similar terms related to managing information.

For future research, the topics of this study can be further explored. The categorization of BI acceptance and -support could be ranked and prioritized, offering a value based on which factors users identified as most relevant ones. In addition, many of the factors listed could be dug deeper, limiting the scope of the study to provide more thorough results. From the academic community studying BI and modern data environment, I would like to see more focus on

productization of data and overall, how these new architectures fit into business environment. Many organizations have just started to adapt the modern data centred structures, making it interesting topic to study and review whether they provide value and effectiveness in target organizations. I would also love to see a large-scale literature review similar to Laihonon et. al. (2013) done in English, to create unified and academically acknowledged terminology for managing information assets.

To conclude, such BI implementations explored in this thesis will probably be present in the future as well as the golden age of data continues. Like most technologies, analytics and BI are constantly evolving, meaning every system has an expiration date. While the big data hype has been around for many years, I still concur with my interviewees that data analytics, while being extremely valuable, needs to be approached with a hint of scepticism. Analytics must be connected to the core business and the use cases must stem from the needs of actual users that need the information to perform their tasks better. Following up, data quality is a matter that needs to be addressed when adopting analytics. If your data sources are not reliable, your analyses are worthless. In addition, if people cannot trust the data in the first place, they probably won't even try to use the systems at hand. Nevertheless, with the rapid evolution of AI, the validation of data assets and support of using data can probably be done by technology itself. AI tools can also provide users with information of the organizations data assets as well as ways of using the data and help them using analytics tools and SQL per say, increasing the possibilities enabled by data. Furthermore, maybe somewhere in the future the analysis is done entirely by technology, giving direct suggestions for organization to improve their business, eliminating the need for business users to even learn data skills. However, for now organizations and end-users should thrive for shifting to 2020-century and starting to embrace the data driven environment and capabilities at hand.

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APPENDIX 1

1. Mikä on roolisi organisaatiossa?
 2. Kuinka hyödynnät dataa ja analytiikkaa työssäsi? Kuinka arvioisit oman data & analytiikka kyvykkyytesi?
 3. Kuinka arvioisit analytiikan nykytilan S-ryhmässä (Sokos ketjussa)?
 4. Oletko lähiaikoina (tai joskus) siirtynyt käyttämään uusia analytiikkatyökaluja (esim. Power BI)?
 5. Kuinka siirtyminen uuden työkalun käyttöön sujui omasta näkökulmasta? Oliko haasteita tai onnistumisia?
 6. Oletko havainnut vastarintaa uusien työkalujen käyttöönotossa? Miten koet yleisen reaktion uusia työkaluja käyttöönotettaessa?
 7. Mikä on mahdollisin vastarinnan syy? Kuinka tätä voitaisiin vähentää omasta mielestäsi?
 8. Millaista tukea sait uuden työkalun käyttöönoton yhteydessä?
 9. Millaista tukea koet tarvitsevasi analytiikan ja uusien työkalujen käyttöön liittyen?
 10. Koetko yrityskulttuurilla olevan vaikutusta analytiikan ja datan hyödyntämiseen?
 11. Oletko kohdannut viestintää data:n ja analytiikan käyttöön liittyen? Koetko tämän merkittäväksi?
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1. What is your role in the organization?
 2. How do you utilize data and analytics in your work? How would you assess your own data & analytics capability?
 3. How would you evaluate the current state of analytics in the S-group (Sokos chain)?
 4. Have you recently (or ever) switched to using new analytics tools (e.g., Power BI)?
 5. How did the transition to using a new tool go from your perspective? Were there challenges or successes?
 6. Have you noticed resistance to adopting new tools? How do you perceive the general reaction to adopting new tools?
 7. What is the possible reason for resistance? How do you think this could be reduced from your point of view?
 8. What kind of support did you receive during the adoption of the new tool?
 9. What kind of support do you feel you need related to analytics and the use of new tools?
 10. Do you feel that corporate culture has an impact on the utilization of analytics and data?
 11. Have you encountered communication related to the use of data and analytics? Do you find this significant?