

# SUCCESS FACTORS TOWARDS A DATA-DRIVEN CULTURE AT SMALL AND MEDIUM-SIZED ENTERPRISES

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### **Abstract**

Data-driven culture has frequently been mentioned in the literature as a clear success factor for large enterprises (LEs) creating competitive advantages in the market. As enterprises can make strategic decisions based on large amounts of data anchored in reality, decisions are based on gut feeling, thus leading to optimization of enterprises. However, small and medium-sized enterprises (SMEs) have fallen behind in development as the enterprises often lack resources and knowledge to enable a data-driven culture.

The purpose of the research is to identify success factors specifically focused on SMEs and create a compilation of which SMEs can adopt to create a data-driven culture. The primary data collection was conducted with a qualitative approach carrying out a case study with semi-structured interviews focused on the IT industry within SMEs that are obsessed with relevant knowledge in the subject area. The interviewees' responses have been analyzed in comparison with previous literature to generate success factors that enable a data-driven culture in SMEs.

The results of the research have generated a compilation of a total of four confirmed main categories and sixteen confirmed subcategories, of which eight enriching subcategories are new success factors that have emerged from the interviews. The identified success factors can be adopted by SMEs to enable the digital transformation towards a data-driven culture. The results of the research illustrates that SMEs have great opportunities to increase in competitive advantages, business value and productivity by applying the success factors within SMEs and that the data-driven culture is not limited to LE.

**Keywords:** Success factors, SMEs, data-driven culture, Big Data, Business Intelligence, Data-driven business models

## Sammanfattning

Datadriven kultur har flitigt nämnts i litteraturen som en tydlig framgångsfaktor för stora verksamheter för att skapa konkurrenskraft på marknaden. Genom att verksamheter kan ta strategiska beslut baserat på stora mängder data förankrad i verkligheten undviks beslut som tas på magkänsla, således leder till optimering av verksamheter. Dock har små och medelstora företag (SMFs) halkat efter i utvecklingen då verksamheterna ofta saknar resurser och kompetens för att möjliggöra en datadriven kultur.

Syftet med forskningen är att identifiera framgångsfaktorer speciellt inriktade på SMFs och skapa en sammanställning som SMF kan ta del av för att skapa en datadriven kultur. Den primära datainsamlingen genomfördes genom en kvalitativa ansats och fallstudie som forskningsmetod med semi-strukturerade intervjuer inriktade mot IT-branschen inom SMF som besatt på relevant kunskap inom ämnesområdet. Respondenternas svar har analyserats i jämförelse med tidigare litteratur för att generera framgångsfaktorer som möjliggör en datadriven kultur hos SMFs.

Resultatet av forskningen har genererat en sammanställning på totalt fyra bekräftade huvudkategorier och sexton bekräftade underkategorier varav åtta berikande underkategorier är nya framgångsfaktorer som uppkommit från intervjuerna. De identifierade framgångsfaktorerna kan anammas av SMF för att möjliggöra den digitala transformationen mot en datadriven kultur. Resultatet av forskningen illustrerar att SMFs har stora möjligheter att öka sin konkurrenskraft, affärsvärde och produktivitet genom att tillämpa framgångsfaktorerna inom SMF och att en datadriven kultur inte är begränsade till stora verksamheter.

**Nyckelord:** Framgångsfaktorer, SMFs, datadriven kultur, Big Data, Business intelligence, Datadrivna verksamhetsmodeller

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# Table of content

<b>1. Introduction</b>	<b>7</b>
1.1 Related research	8
1.2 Problem discussion	9
1.3 Purpose & research question	11
1.4 Scope	11
<b>2. Methodology</b>	<b>12</b>
2.1 Research strategy & design	12
2.2 Systematic literature review	12
2.3 Research methodology	13
2.4 Target audience & selection of participants	14
2.4.1 Target population	14
2.4.2 Selection of participants and enterprises	14
2.5 Design of the interview guide	15
2.6 Analysis of collected data	16
2.7 Quality criteria	18
2.8 Ethical aspects	19
2.9 Reflection of chosen methodology	19
<b>3. Theoretical framework</b>	<b>22</b>
3.1 Small and Medium-sized Enterprises	22
3.2 Data-Driven culture	23
3.3 Big Data	25
3.4 Business Intelligence	27
3.5 Data-driven Business Models	30
3.6 Summarized literature	32
3.6.1 Success factors	33
<b>4. Analysis</b>	<b>34</b>
4.1 Analysis of theoretical framework	34
4.2 Analysis of empirical findings	35
4.3 Advantages with a data-driven culture at SMEs	35
4.4 Risks with data-driven culture at SMEs	36
4.5 Success factors in a data-driven culture at SMEs	37
4.6. Comparison between theoretical & empirical findings	53
4.6.1 Confirmed success factors	53
4.6.2 Enriching success factors	57
4.6.3 Comparison model between theoretical & empirical findings	60
<b>5. Enabling a data-driven culture at SMEs</b>	<b>61</b>
<b>6. Conclusion</b>	<b>63</b>
<b>6.1 Future research</b>	<b>63</b>

# 1. Introduction

A data culture refers to the expectation that data ought to be used to make decisions and optimize the organization, which makes an enterprise data-driven. A data-driven culture has become essential for organizations when using data to become competitive and continuously updated in today's business environment. Today, SMEs tend to go towards a data-driven culture, which is necessary to make critical decisions (Mittal, Khan, Purohit, Menon, Romero & Wuest, 2020). Shokri & Osman (2016) states data-driven culture at SMEs is where actions are based on data, tools and abilities. Berndtsson, Forsberg, Stein & Svahn (2018) claims that organizations need a road map to become data-driven. To establish data-driven culture in the organizations, management, data, tools, organization, decision process are success factors that need to be taken into consideration. Different aspects of data-driven culture are constantly evolving where small and medium-sized enterprises (SMEs) need to identify current trends where the organization can hold the latest innovations (Shokri & Osman, 2016).

The data-driven culture has emerged as a necessary factor within the organization (Pozzo, 2018). According to Ross, Beath & Quaadgras (2013), enterprises that have a culture where decision making are evidence-based, enterprises can experience business improvements and tend to have higher profitability than enterprises who lack the culture. Many organizations strive for transforming the enterprise into a data-driven culture. It offers higher productivity, greater business value and opportunities to make quick and better decisions. When organizations have enough grounds for making the right decisions, it generates satisfaction, mainly when the profitability is linked to the performance through analyzing it in connection to others (Watson, 2016).

There are plenty of identified theories and approaches on identifying enablers for a successful data-driven culture. Although, organizations experience a fear and lack of understanding when it comes to a data-driven culture. McShea, Oakley & Mazzei (2016) argue that there are risks in changing the organization when management prevents cultural development. Organizations therefore need to embrace change to become data-driven. The research that exists about data-driven culture in an organization is fragmented, which means many different researches identify advantages and disadvantages from different quarters and are cohesive. The data in the literature is highly scattered, where the fragmentation is putting a break on creating a data-driven culture. Fragmented literature is keeping organizations from making the most of the value from the collected data (Kitchenham & Charters, 2007; Berndtsson, Lennerholt, Svahn & Larsson, 2020; Talaoui & Kohtamäki, 2021). By ending the fragmentation age, the research has found that a proper compilation on success factors on how SMEs transform into a data-driven culture is missing. The purpose of the research lies in finding how SMEs work towards enabling a data-driven culture. A literature review and interviews were carried out to identify success factors towards a data-driven culture at SMEs. Interviews were conducted with representatives previously and currently working with data-driven culture to increase the knowledge within the area. The execution of the research is further described in chapter 2.

## 1.1 Related research

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*The purpose of the chapter is to provide an overview of previous literature related to organizations enabling a data-driven culture. The chapter also aims to discover the gap in previous research. A thorough review of the theoretical literature can be found under chapter 3. Theoretical framework.*

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According to Berntsson, Svensson & Taghavianfar (2020) a data-driven culture is characterized by data, analysis tools, people, management and processes. A data-driven culture indicates growth. Enterprises have been introduced to the importance of establishing a digital environment, where popular analytical tools have emerged as a vital driver (Chaudhuri, Chatterjee, Vrontis & Thrassou, 2021). A data-driven culture provides support to increase business value by improving the overall performance of enterprises, due to low impact on process improvement and product innovation (Chaudhuri et al., 2021). Yu, Wong, Chavez & Jacobs (2021) claims a data-driven culture together with data analysis can support integration of the financial supply chain. In turn, it raises business survival in an uncertain data-rich environment, which is the reality of many organizations today. Lawton (2021) claims however that becoming a data-driven culture is not always easy, logical or adapted when transforming the organization from a traditional intuition decision-making model into a data-driven model.

Today, the use of data to make strategic decisions is a great competitive advantage for the enterprises (Medeiros, Munhoz de & Antônio, 2022; Ramadan, Shuqo, Qtaishat, Asmar & Salah, 2020). Iqbal, Kazmi, Manzoor, Soomrani, Butt & Shaikh (2018) mentions SMEs have discovered a significant change in using Big Data (large data volumes) for business growth and improving business processes. Big Data provides SMEs insights on needs and it is considered a necessity for SMEs to adopt Big Data. By SME embracing Big Data into the organization, cultural changes in decision-making processes and data-handling makes a difference and opens up for possibilities. SMEs often operate in specialized areas, the staff consists largely of specialists while the management function is low. The situation leads to SMEs more often missing new opportunities like Big Data that can generate competitive advantages. Specialized SMEs rarely have any interest in the new modern development in management and an infrastructure that supports data analytics.

Big Data and Business Intelligence (BI) are requirements for realizing a data-driven business model (DDBM) in a data-driven culture (Muhtaroglu, Demir, Obali & Girgin, 2013; Hartmann, Zaki, Feldmann & Neely, 2014). BI is an umbrella term of several categories that improve decision-making (Watson & Wixom, 2010). Collecting and analyzing data to get insights is essential for the enterprise's value proposition. Enterprises evolve a business model around facilitated collected data that allows the business to improve the maintenance of products or services. Using BI-tools to analyze data increases profit from Big Data offering a data-driven value proposition. A DDBM suggests understanding the generated data with tools to analyze and visualize insights. It also defines a business strategy where changing the organizational structure and processes strives towards success. DDBM offers a data-driven value proposition due to the potential of applying collected data and needed resources (Muhtaroglu, Demir, Obali & Girgin, 2013; Hartmann, Zaki, Feldmann & Neely, 2014). DDBB is however a new field where only few empirical researchers have been conducted so far (Chen, Kazman, Schütz, & Matthes, 2017;

Wiener, Saunder & Marabell, 2020; Fruhwirth, Ropposch & Pammer, 2020; Rashed & Drews (2021).

Nasrollahi, Ramezani, & Sadraei (2021) states that there is a lack of empirical research on what value the business generates with adopting Big Data at SMEs. Previous research is missing investigations on the impacts of Big Data's performance, in especially SMEs, since publications have previously only stated success factors with Big Data adoption concerning large enterprises (LE). Nasrollahi et al. (2021) mentions adopting Big Data has the potential to improve the performance and decision-making of SMEs in environments where innovation and competitiveness play key factors. By organizations making fundamental changes, better decision-making based on information can be made as well as modeling. Nasrollahi et al. (2021) thus claims that Big Data is crucial for value creation, generating knowledge, products and processes for SMEs. The framework that Nasrollahi et al. (2021) has developed for decision-making of Big Data for SMEs is, however, one of the first to be developed.

Scholz, Schieder, Kurze, Gluchowski, & Böhringer (2010) states that researchers have identified BI success factors. However, the researchers have previously not investigated the connection between BI adoption at SMEs. Scholz et al. (2010) mentions Big Data and BI as key success factors in creating a data-driven culture. Adopting BI at SMEs provides potential benefits and can result in creating value to the SME. BI plays an important role in becoming data-driven. Scholz et al. (2010) also mentions discovering technical personnel, education and business issues as success factors within SMEs. Some factors may not be adoptable for all SMEs. Top management providing support is considered as a significant success factor. However, since SMEs already are small, the IT-related issues are decided by the top management. There is no doubt of top management providing support at SMEs, but instead on how to integrate BI into the organization (Scholz et al., 2010).

Barann, Hermann, Cordes, Chasin & Becker (2019) mentions that SMEs are threatened by LE constantly being on the frontline in digital transformation with successful business models. SMEs are missing guidance with success factors on digital transformation due to limited resources. Against the background, Barann et al. (2019) has therefore developed a procedure model for SMEs to help in understanding and structuring the potentials of digital and data-driven innovation. Data as key resource and analytics as key activity enables new business models. Improving existing processes and changing business models are also beneficial in a digital transformation. Business models enable data-driven transformation and can effectively support units. According to Barann et al. (2019) further mentions utilizing digital potentials creating digital value offering opportunities. The impact of business models includes efficiency and novelty in a data-driven innovation.

## **1.2 Problem discussion**

A data-driven culture where decision making is evidence based, enterprises can expect higher profitability and business improvements (Ross, Beath & Quaadgras, 2013). Chaudhuri et al. (2021) states that it is important for enterprises to grow successively, where analytical tools such as, e.g. AI has emerged as a vital driving force that enables a data-driven culture. Lawton (2021) states however that it can be challenging for enterprises to transform towards a data-driven culture.

Berndtsson et al. (2018) mentions success enablers for a data-driven culture. Big Data adoption at SMEs increases innovation where the SMEs performance and decisions are success indicators. Changing the organizational culture towards a more data-driven one generates value, knowledge and processes. The huge amount of data that is generated daily can help enterprises to make strategic decisions (Medeiros, Munhoz de & Antônio, 2022, Ramadan et al., 2020). Big Data is therefore a crucial factor of the data-driven culture at SMEs, whereas the SMEs can obtain valuable information with data and analytics based on business data (Iqbal et al., 2018). However, SMEs do not have sufficient knowledge and ability to make use of Big Data and analytics, which results in a lack of investments in right techniques and right analytical tools due to massive fear of failure (Liu et al., 2020).

Scholz et al. (2010) have discovered several success factors with implementing BI at SMEs. Sustainable competitive advantages can be achieved by integrating BI into the culture (Ramadan et al., 2020), which also increases profitability (Ross, Beath & Quaadgras, 2013), however, instead of SMEs detecting *what-to-do* rather than *how-to-do-it* when integrating BI in the enterprise is challenging for SMEs. BI and Big Data are significant success factors in a data-driven culture creating business value. Although, the beneficial factor is not a “one size fits all” solution for all SMEs (Scholz et al., 2010).

Big Data is a key resource and BI is a key activity and considered as enablers in a digital transformation. A strong DDBM that enables digital transformation opens up potential new avenues and can also improve existing process models, which bring value to the business. Impact of DDBM generates efficiency and novelty, which is critical for SMEs when staying competitive on the market against LE with leading and successful business models (Barann et al., 2019). The lack of established processes that SMEs possess for the digital transformations does not make things easier for SMEs and has caused SMEs to fall behind in the digital transformation, meaning that the process of digital transformation appears different for SMEs compared to LE (Barann et al., 2019). Enterprises that establish a data-driven culture with DDBMs, receive in turn insights based on data and strategies, which in turn leads to business success (Muhtaroglu et al., 2013; Hartmann et al., 2014). Furthermore, Hartmann et al. (2014) states that DDBM facilitates maintenance of services and products. DDBM is however a new research area in the context of data-driven culture, i.e. there are few publications on the subject and have not yet been explored (Chen et al, 2017; Wiener, Saunder & Marabell, 2020; Fruhwirth, Ropposch & Pammer, 2020; Rashed & Drews (2021).

There are principles around success factors in a data-driven culture. Enabling a data-driven culture within SMEs has proven to be difficult and there is a significant need of identifying success factors at SMEs. Data-driven culture is a relatively new concept within organizations and there are few organizations and publications, which describe how to enable a data-driven culture. However, the concept of data-driven culture has become increasingly demanding and utilizing data at SMEs is a better process than previously been made. Introducing a data-driven culture for SMEs may be the solution to the problems that SMEs are experiencing when making use of data. Talaoui & Kohtamäki (2021) mentioned the existing literature on data-driven culture being fragmented and there is missing a compilation on how SMEs ought to work to enable a data-driven culture. Several researchers have attempted to publish success factors with digital transformation within SMEs enabling a data-driven culture, however, the publications are considered to be generally broad on providing high levels of conceptual research (Scholz et al., 2010; Barann et al., 2019; Nasrollahi, Ramezani, & Sadraei, 2021; Seseni & Mbohwa, 2021).

In conclusion;

- The literature is fragmented
- Selective enablers are only mentioned in data-driven culture at SMEs
- There is no profound compilation of success factors for SMEs

### **1.3 Purpose & research question**

It is essential for organizations to become data-driven. A data-driven culture is yet a youth field of area within SMEs where few organizations in fact can describe how a data-driven culture is established. Previous literature neither speaks highly about how SMEs can successfully and effectively enable a data-driven culture. During recent years, several researchers have singly discovered the success factors of being able to utilize data in simplified and better ways (Scholz et al., 2010; Barann et al., 2019; Nasrollahi, Ramezani, & Sadraei, 2021), yet there is no research on how SMEs transform to a data-driven culture.

The purpose of the research is to identify success factors on how SMEs work towards enabling a data-driven culture. There may arise challenges when enabling a data-driven culture, therefore it is important to find the success factors specifically for SMEs. The purpose lies in developing a compilation of success factors enabling a data-driven culture at SMEs. The available literature usually describes what it is and what it means to have a data-driven culture (Anderson, 2015).

To get insight and broaden the understanding of what success factors are considered a necessity to enable a data-driven culture within SMEs, the research aims to answer the following research question from the above problem specification:

- ❖ *What are the success factors enabling a data-driven culture in small-medium enterprises?*

### **1.4 Scope**

The research is limited to SMEs in Sweden, since the data collection is based on experience and knowledge from the Swedish organizations. Furthermore, the research includes SMEs with between 10-249 employees, which excludes micro-enterprises. The basis for the research takes the success factors that exist into account when transforming SMEs into a data-driven culture. The examined group consists of individuals working in the IT/tech industry that possess great knowledge in data-driven organizations. Although, no limitations were included in the context of work titles, since the purpose was to get a broad and nuanced perspective. A consensus was reached on conducting the interviews through video conference calls due to practical reasons, since the respondents were spread throughout Sweden. The digital meetings also provided the opportunity to include a larger area to the research field, which was not limited to a specific area of Sweden.

## 2. Methodology

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*The methodology chapter begins with introducing the selected method that is relevant for the research. The method has been selected to investigate the research area based on the purpose of the research and research question. The chapter further mentions how data was collected and analyzed. A background of selected respondents is presented and the research also considers ethical aspects that the research has adhered to. The chapter ends with a reflection of the selected method. To conduct the research and fulfill its purpose, the research follows a qualitative approach.*

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### 2.1 Research strategy & design

Constructivism is selected as the research paradigm and qualitative research is selected as a research strategy. Constructivism is a way of setting perspective on the research by understanding the context through meaningful experiences (Weber, 2004; Goldkuhl, 2012; Creswell & Creswell, 2018). The research relies on focusing on the participants' views of becoming a data-driven culture, through open-ended questions collecting historical and cultural norms. The constructivist paradigm further provides a focus on finding patterns in meanings, rather than developing and testing a theory (Creswell & Creswell, 2018). Knowledge can be renewed, where constructivism includes attributes of fixed interpretations. There is a significant difference between a realistic view and a human perspective where the claim refers to the research cannot possibly be seen from a realistic point of view since it cannot be separated from the human perspective (Hansen & Hammann, 2017). Constructivism is typically associated with qualitative research demanding qualitative methods. The phenomenon of ontology and epistemology are intertwined as a basis of the paradigm (Goldkuhl, 2012). Ontology refers to a conjunction of reality and the researcher and epistemology refers to assumptions of someone's creations. There is a common ground for researchers to strive after interpreting the context of the area (Weber, 2004).

Qualitative research aims to provide in-depth understanding of areas of interest, based on the researcher's own interpretation of detailed and information-rich data. Qualitative research is characterized by supporting the researcher to understand people and contexts. Qualitative data can create great nuances of the respondents' own perceptions where interpretations emerge. In order to identify the previous research arguments, it is necessary to gain deeper knowledge in the research field. With a qualitative approach, it becomes possible to investigate the phenomena from the "inside" by gaining a deeper and more complete understanding, which contributes to the possibility of understanding the reasons behind the arguments and the success factors that enable a data-driven culture within SMEs (Creswell & Creswell, 2018).

### 2.2 Systematic literature review

Secondary data were collected by conducting a systematic literature review (*see chapter 3. Theoretical framework*). A systematic literature review aims to identify, evaluate and interpret available research as is relevant to a research question, area or phenomenon (Kitchenham, 2004). According to Webster and Watson (2002) it is a substantial element to establish a good understanding for the selected subject and is a necessity independent of the

research conducted. In order to perform a good systematic literature review, it is important to define a search strategy (Kitchenham, 2004).

The purpose was to identify the state of the art concerning what previously has been done with respect to identifying success factors enabling a data-driven culture at SMEs. The theoretical framework was built on secondary data that was generated by the academic databases Google Scholar, Primo, IEEE Xplore, ResearchGate and ScienceDirect. The aim was to use relevant peer reviewed articles published within the last fifteen years. Additionally, relevant books around the research area were used for gaining a deeper understanding of the research term.

To find pertinent literature that was associated to the research area, the following search terms was used;

- *Data-driven culture*
- *Data-driven fact based*
- *Data-driven decisions*
- *Data-driven organizations*
- *Data-driven culture AND SMEs*
- *Data-driven culture AND success factors*
- *Data-driven culture AND fact-based decision-making*

All filters resulted further in some articles whose title was clearly not relevant to the research. Due to the scientific articles possibly not mentioning success factors or containing essential information, the publications were therefore excluded in the research. The articles that were considered relevant to the research remained in order to identify the success factors that enable a data-driven culture within SMEs.

## **2.3 Research methodology**

Primary data refers to information collected directly by researchers. Qualitative research describes data collection through documents, observations, interviews (Patton, 2015; Creswell & Creswell, 2018). The primary data were collected through semi-structured interviews. To discuss qualitative data collection techniques, Recker (2013) explains that the most common form is interviews. In addition, interviews provide the advantage of being targeted in that way and focus directly on the subject at hand and insight into how it can provide causal conclusions perceived by respondents (Recker, 2013). Interviews have the potential to capture qualitative and explored data, in addition to being flexible during the collection process.

A case study is a research strategy that is used to create an in-depth and diverse understanding of a complex research question with the assistance of collecting data (Patton, 2015). A case study is an established research design, which is widely used within a variety of disciplines, e.g. organizations (Patton, 2015). A case study can be defined in different ways, where the central principle is the need to explore an event or phenomenon in depth and in its natural context. When it comes to conducting case studies, it is important to provide as detailed information as possible by finding the key individuals who can contribute with deep insight into the current problem. A case study also helps the researcher when the research should be well analyzed (Patton, 2015).

A case study with semi-structured interviews was applied to research due to the selected phenomenon: data-driven culture at SMEs. According to Recker (2013) the studied phenomenon is examined in detail in one or a few units. The selected method provides the opportunity to study several variables, the relationships and impacts. Case study is further limited to a sustained period of time and bounded to activity (Creswell & Creswell, 2018).

Semi-structured interviews refers to a combination of structured and unstructured interview questions. The interview questions were initially structured and thereafter unstructured due to additional interview questions sometimes arising during the interviews (Recker, 2013). Open-ended questions are one of the characteristics of unstructured interviews (Patton, 2015; Creswell & Creswell, 2018), whereas the unusuality lies to give the opportunity of yes and no questions since the interview questions are mainly unstructured. Semi-structured interviews are efficient when providing balance between structure and answering the research question. By interviewing respondents who possess competence on how SMEs can transform into enabling a data-driven culture, interviews can collect both current and more in-depth data that previous research has not generated, which in return can add value to answer the research question (Patton, 2015).

## **2.4 Target audience & selection of participants**

### **2.4.1 Target population**

The research aims to increase the knowledge and to provide a fundamental ground of a data-driven culture at SMEs for professionals and researchers. The research strives to create competitive advantages by enabling a data-driven culture at SMEs. The research is of relevance to start-up enterprises or businesses offering services to SMEs transforming into data-driven culture. Since the respondents come with different backgrounds and experiences from the IT industry as well as working with a large variety of SMEs, the scope of the research is broadened. The result can thus be used by a broader audience of enterprises, even though the focus is directed towards SMEs.

### **2.4.2 Selection of participants and enterprises**

The case study provides answers to the research question by selecting different SMEs as in the current situation has either previously applied or is in a transitional phase of enabling a data-driven culture. The selective participants are further SMEs that are in need of additional information regarding the success factors that enable a successful data-driven culture. The purpose of a case study at different SMEs is to focus on obtaining information from the respondents to investigate the research question and how the information can be used so that SMEs can benefit from it as well to present new unexplored data. To identify the success factors creating a compilation of enablers for a data-driven culture at SMEs, it is suitable to identify key respondents such as;

- Been involved in establishing a data-driven culture
- Possesses experience from data-driven cultures
- Actively working with transformation of a data-driven culture

The selection of respondents can provide grounded and detailed information about success factors in enabling a data-driven culture at SMEs. The advantage is also to be able to collect a nuanced and broader perspective on the research problem area. However, the selection of participants was quite challenging to find since it can be hard to assess whether an enterprise

possesses a data-driven culture or not. The starting point was therefore to try and reach out to IT-related SMEs due to a greater chance of the business possessing a data-driven culture. In total, approximately 80 SMEs were contacted of which resulted in eight interviews within eight different SMEs.

The number of interviews has been decided by achieving satiety. After the eighth interview, saturation was achieved as the answers to the interview questions increasingly began to resemble each other and new perspectives diminished.

The eight participating respondents are listed below where professional role, area of responsibility and how many years the respondent have worked in the organization are presented. Several of the respondents had previously worked in LEs and possessed more experience than shown in the table (*see Table 1. Respondents*).

Respondent	Work title	Area of responsibility	Experience(years)
R1	CEO	IT-consulting	7
R2	Sales Manager	Computer support & services	1
R3	SMEs connections	Business center	5
R4	Marketing manager	Software	1
R5	CEO	Management	2
R6	Sales Executive	Digital tools for customer service	2
R7	BI Business Chief	Business systems & BI	1,5
R8	CEO	Data and analysis	11

*Table 1. Respondents.*

## 2.5 Design of the interview guide

The interview guide were designed with inspiration from previous research (*see 3. Theoretical framework*). To see the entire interview guide and what research is the basis for each question (*see Appendix 1*). The aim of the interview guide is to discover success factors that are specific for SMEs in enabling a data-driven culture.

Interviews are one of the most common ways of collecting qualitative data and the questions can either be descriptive, exploratory, or explanatory (Recker, 2013). A combination of descriptive and explanatory questions were selected for the interview guide. Descriptive

questions were the majority of the questions and chosen to create a subjective understanding of how the phenomenon of data-driven culture at SMEs could be achieved. Furthermore, some explanatory questions were formed with the purpose of explaining what the reasons were that SMEs rarely possess a data-driven culture. The aim was to gather several perspectives of different respondents to create a compilation as a fundamental ground for enabling a data-driven culture at SMEs.

All interviews were conducted based on the same interview guide that had predefined questions in a specific order. The guide asked open-ended questions, yet also leading questions were necessary. The interviews began with the respondent describing the organization and the respondents role in the enterprise. Secondly, the interviewees described what each of the respondents' perceptions of a data driven culture were. The aim of the questions was to clarify and come to a consensus on the definition of the term data-driven culture and what success factors were included. The following questions focused on understanding whether the SME had enabled a data driven culture, which brought up different success factors and challenges. Depending on the respondents' knowledge, the situation of the SME as well as the provided answers, the interviews took different pathways where the order of questions were in unchronological order and supplementary questions arose. The process is typical for semi-structured interviews and is one of the most common ways of interviewing (Recker, 2013). Based on the first interviews, some questions were slightly changed to clarify and ensure that the correct information was collected. After the transcription, selected respondents received optional questions that were sent by email for further collection of relevant data that could strengthen the research.

The interviews were held digitally via video conference call due to the respondents being spread all over Sweden. For information on the respondents position in the SME (*see 2.5.2 Selection of participants & enterprises*). Since several of the respondents worked in IT consulting companies, the research provided both intern and extern aspects on how to enable a data-driven culture at SMEs. All interviews were recorded with the respondent's permission and transcribed in order to gain as much data as possible from the interviews as well as to avoid missing out on important information.

## **2.6 Analysis of collected data**

There are three different methodological approaches to use in a research; deductive, inductive and abductive. The deductive method involves how the researcher perceives reality and examines whether it agrees with theory. It can be accomplished with a hypothetical deductive method, where a hypothesis is set up to then confirmed or rejected after information has been collected and analyzed. The inductive method means that the researcher perceives reality and generalizes it in order to create new theories. The abductive method has emerged as a combination of the deductive and the inductive method and can be described as the researcher combining both theory and reality to find solutions to a problem (Bryman, Bell & Harley, 2019). An abductive approach has been selected where the abductive approach contributes to how the research relates between empiricism and theory, when it is applied to applicants for causation. With an abductive approach as a way of working, the researcher moves continuously between already existing theories and knowledge as well as empiricism, to search for patterns through to interpret and compare (Fejes & Thornberg, 2016). The abductive mode does not lock researchers, but has its weaknesses in that all researchers are colored by experience or also previous research, which means that the research does not start unconditionally (Patel & Davidson, 2011).

Researchers have to be far-sighted, which has also been taken into consideration in the research.

Grounded theory (GT) is a method based on a qualitative method for generating knowledge and theory. GT is further a method of interpretation and structure. The theory consists of structured guidelines for collecting and analyzing qualitative data. GT is useful in smaller research where a qualitative method is used for research of people's experiences. The theory is based on real life and the empirical findings (Wolfswinkel, Furtmueller & Wilderom, 2011). The research is based on Wolfswinkel, Furtmueller & Wilderom (2011) grounded theory literature-review method (GTLRM) where the novelty method was founded in the original grounded theory method by Glaser & Strauss (1967) and literature review method by Webster & Watson (2002). Wolfswinkel, Furtmueller & Wilderom (2011) states that "*In terms of the myth of the researcher as a blank slate (Urquhart & Fernandez, 2006), we concur that it is impossible to not be influenced by the background knowledge that one has; it is vital to be aware of what one knows and inclined to believe while being aware of alternative biases other people may and do hold*" (Wolfswinkel, Furtmueller & Wilderom, 2011).

A deductive grounded theory analysis, which means that categories are already predefined by the researcher (Thomas, 2006) is suitable for the research when compiling the literature review. The predefined categories emerge from the literature review based on patterns and categories that are sought after in enabling a data-driven culture. Inductive grounded theory analysis does not have predefined categories (Thomas, 2006), however, instead searches for new patterns and categories in the context of the area. Inductive grounded theory analysis is used as an analysis of the interviews to be able to see the connection between the deductive categorization when generating new theoretical categorizations. The purpose of a deductive grounded theory analysis and an inductive grounded theory analysis is to be able to compare the results from the interviews with previous research and see similarities and differences as well as identifying success factors within a data-driven culture at SMEs.

When data and results are presented from a systematic literature review, it is central to reflect on the purpose and it must always be at the frontline when presenting the result (Berndtsson et al., 2008). There are several different ways to present and analyze data in a systematic literature review, however, based on the research problem, Wolfswinkel, Furtmueller & Wilderom (2011) framework has been applied to the systematic literature review with a deductive approach on GTLRM as an analysis method due to providing the research the opportunity to categorize and get a clear overview of the literature when the analysis of the result in the systematic literature review is generated. The systematic literature review was therefore based on applying all the steps in the framework.

The GTLRM by Wolfswinkel, Furtmueller & Wilderom, (2011) builds on a total of five steps and can be used iteratively. The steps are define, search, select, analyze and present. The first stage the inclusion criteria shall be established and determine which databases to be used to search in and define the search terms that to be used to find relevant literature. The second stage refers to the selected search terms and databases must be used to search relevant literature. The third stage mentions the selected literature based on after determined inclusion criteria and redundant literature are filtered out. Selecting articles is most easily achieved in the first step of the headings and what the article refers to through a snowball effect. The fourth stage includes three steps of analysis through open coding, axial coding and selective coding. By open coding is meant with data being examined to find patterns in

the form of concepts on one high level of abstraction. Based on patterns and relationships, variables are then selected and must be in line with the issue. During axial coding, the variables begin to develop to main categories and divided into different subcategories. By selective coding, the categories should be strengthened by reviewing and structuring the existing categories further. The fifth stage presents the analysis of the results in a categorical and structured way (Wolfswinkel, Furtmueller & Wilderom, 2011).

To analyze the interviews, an inductive approach on GTLRM by Wolfswinkel, Furtmueller & Wilderom (2011) has also been used. It is the same analysis method used in the analysis of the systematic literature review. However, the first steps in GTLRM were not used. The analysis used open, axial and selective coding to categorize and identify the concepts raised in the interviews. Due to the interviews were conducted after the literature review had been conducted as such literature review had created categories and concepts that formed the basis for the analysis of the interviewer. In conclusion, conducting the both analyzes with an abductive approach on GTLRM provides a compilation of categories that emerged from the literature review and new categories that emerged based on respondents' answers.

A constant comparative approach is an analysis method conducted in an attempt to reach saturation. Saturation refers to researchers understanding whether to end collecting data or further data is still needed to be collected to achieve a data saturation. By making constant comparisons when searching for instances that represent categories, categories become saturated when there are no new codes or relevant data emerges and does not provide further insight. For the purpose of clarifying the data collection and data analysis, success factors were collected and analyzed from the theoretical literature review and the empirical findings.

## **2.7 Quality criteria**

The reflections of rigor in qualitative research differs from quantitative since it is an interpretive analysis. Recker (2013) states four principles; dependability, credibility, confirmability and transferability, thus can be used instead of validity and reliability and in which cases is more suitable for quantitative research.

Dependability and reliability possess the same signification, which states resembling conclusions shall be possibly drawn by any researcher that conducts the same research. By documenting all steps of the research in the method chapter such as data collection, selection of respondents and the interview guide, indicates that the chance for dependability increases. However, the research relies on personal opinions, which can affect the result.

Credibility or internal validity refers to whether the provided substantiated evidence is enough for the interpretation of the findings in the data analysis. The research achieves credibility or internal validity by not drawing any conclusions if only one respondent forwards a statement that is an important component, which is not enough evidence to draw a credible conclusion.

Confirmability refers to whether outsiders independently can confirm the findings (measurement validity). The conclusion and the summaries therefore lied on clearly building on the rest of the research. It was also possible for the respondents to obtain the transcript of the interviews on request.

Transferability or external validity refers to whether the finding of the study is generalized in other contexts and how much. The research context of the study will for that reason be as rich and detailed as possible so that outsiders can determine whether the generated process model can be set into several contexts of SMEs.

## 2.8 Ethical aspects

When conducting research, it is important to follow ethical aspects. Ethics defines the principles of right and wrong behavior in a society or profession. Ethical considerations need to be taken into account when empirical data is collected and analyzed (Recker, 2013). The research was based on Vetenskapsrådet (2002) ethical aspects. The aspects that have been taken into account mentions four requirements that must be followed by the researcher and claims to protect the individuals participating in the research. To be able to conduct new research, it was required that the participants feel safe and want to participate voluntarily. The aspects that must be followed are *information requirement*, *consent requirement*, *confidentiality requirement* and the *use requirement* (Vetenskapsrådet, 2002).

The information requirement mentions that the researcher must inform and narrate to the participants how the interviews will be conducted, why the research is carried out and what the purpose of the research is. It is important that the participant understands the purpose of the participation in the research. The participant must be informed that the participation is voluntary and the respondent has the right to cancel at any time (Vetenskapsrådet, 2002).

The consent requirement refers to all participants in the research having the right to cancel participation at any time preferably during the ongoing interview. The interviewee who has been asked for an interview has the choice of participating or not. Thus, there is no requirement for the interviewee to be present if the respondent has said yes first and then regrets the participation. The information requirement also means that the interviewer must not influence the participant's participation and thus there should be no position of dependence between the researcher and the participant (Vetenskapsrådet, 2002).

The requirement of confidentiality states that all information about the participants must be provided with the utmost confidentiality, which is characterized in all sensitive information about, e.g., the participant's or information about an organization should not be passed on to unauthorized individuals. Therefore no notes are made in protocols that can identify individuals of outsiders in the research. However, it should be possible for outsiders of research to take part of the interview material (Vetenskapsrådet, 2002).

The use requirement mentions that all collected data should only be used for the purpose of the research. The information may therefore not be provided to others for commercial purposes. Information that can affect the individual can only be disclosed if the respondent has given a special consent, otherwise it is strictly forbidden within the use requirement (Vetenskapsrådet, 2002).

## 2.9 Reflection of chosen methodology

There are different types of methods where there are advantages and disadvantages, likewise with the selected qualitative method for the research. The research aims to identify what the success factors are that enable a data-driven culture at SMEs. Interviews as a data collecting technique offers as well the opportunity to clarify questions if needed as well as ask further

questions based on the answer of the respondent. A further challenge that concerns interviews is that the interviewer can affect the respondents answer without purpose. Based on the research question a qualitative approach was seen as the most suitable option since it was a need to understand the challenges and needs of SMEs today to develop a suitable process model. A qualitative method based on eight interviews can never be fully generalized. A quantitative approach would probably have generated a higher generalizability, but since the subject is quite youth and unexplored, the qualitative approach is more suitable for future research. One could argue that a mixed method would solve the problems. However, due to limited time construction, it was decided to rather distribute the time to have good quality of the research than to make the research more generalizable. Since the research included interviews, it was possible to make sure that all the respondents understood the concepts and could give more accurate answers.

A quantitative research approach with e.g. questionnaires could have been used to answer the research question. One possible approach could have been to ask a large number of respondents which success factors that are considered for SMEs in particular and thus produce a result that is in isolation from other sizes of enterprises. However, a quantitative approach limits the ability to explain the success factors based on its practicality implementation, which is the main incentive of the research.

Research on success factors in a data-driven culture for SMEs has led to general conclusions. The previous research that is mostly quantitative provides a stable basis for further research on success factors within a data-driven culture and if it applies to SMEs. In order to thus counteract the generalization of success factors that previous research suffers from, the method for the research is therefore consequently of a qualitative approach. It should also be highlighted that as research builds on previous research through the use of already established success factors in a data-driven culture, there is a lot of quantitative research behind the identified factors. Thus, the answer to the research question is inevitably indirectly influenced by quantitative results. The sample of respondents together possess such a large amount of experience and knowledge that the conclusions can to some extent be generalized for success factors that enable a data-driven culture within SMEs. In combination with the fact that the research is based on previous research further strengthens the conclusions possibility of generalization for SMEs.

As a result of the choice of a qualitative method, there is also the risk of subjectivity in research. A quantitative method reduces the risk of subjectivity significantly as the same space is not allowed for interpretation (Lazar, Feng & Hochheiser, 2017). In contrast to qualitative methods with focus on interviews where subjectivity is present on two fronts. The first front consists of the respondents who must be assumed to have self-thought interpretations of reality and thus in front answers based on personal experience, meaning that the respondents' experience and the legitimacy of the answer are directly related to how credible the answers are. The human aspect is that respondents can e.g. remember wrong, experience situations in a distorted way or also misunderstand the question posed (Hjerm et al., 2014). Thus a certain degree of subjectivity is always present when conducting interviews. The other side of subjectivity comes from the researchers and it is therefore important to possess an understanding that researchers are an important tool in research, since it is the researchers who collect and interpret the data (Hjerm et al., 2014). From the design of the questions to the interpretation of respondents' responses pose a risk of misinterpretation (Lazar, Feng & Hochheiser, 2017). In order to counteract

misinterpretations, subjectivity needs to be kept in mind throughout the research and most importantly when analyzing the material collected from the interviews.

One challenge with the research method is the case study. The disadvantage of a case study is that normally it is not possible to generalize the results as only a part of an event or phenomenon examined. In the research, however, the goal is not to draw general conclusions on how to enable a data-driven culture at SMEs, but instead confirm existing theories and generate new theories. With the limitations of the case study in mind, the research has been structured to build on the existing knowledge and while the research is not strictly limited to an individual case.

### 3. Theoretical framework

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*The theoretical framework presents initially a detailed description of SMEs. The concept of data-driven culture is described as what is meant by being data-driven. The previous literature claims there are basic elements considered as success factors to enable a data-driven culture in general. To understand the context of enablers in a data-driven culture, it is important to discuss the basic elements. The basic elements that have emerged have been compiled into categories. Big Data, BI and DDBM are concepts that have emerged as success factors for organizations to become data-driven. Since the literature usually focuses on LEs, the research has shifted its focus to provide each subchapter a sectioning with LEs and SMEs based on the field of literature for clarification sake. The chapter concludes with a compilation of success factors enabling a data-driven culture in the form of concept matrix (see table 2).*

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#### 3.1 Small and Medium-sized Enterprises

According to the European Commission (2021) a medium sized enterprise consists of 50-249 employees and has an annual sales of a maximum of 50 million euros. Small enterprises in turn have 10-49 employees and have an annual sales of a maximum of 10 million euros. Less than 10 employees are called micro-enterprises or sole proprietorship if the enterprise only consists of one person. European Commission (2021) also claims that SMEs correspond to more than 99% of the enterprises in Sweden 2019 and are an important part of the economy of Europe.

The biggest strength of SMEs possesses also the biggest weakness: that SMEs are small. SMEs are often sensitive to competition from LEs, where LEs adopt SMEs. Except in the cases where the SMEs demonstrate significant intelligence in combination with its built-in superiority in flexibility and take advantage of the fact that SMEs can quickly change the business and evolve to meet emerging needs and trends. SMEs are a perfect match with the rapidly changing and knowledge-intensive society. For the realization of the advantage, SMEs need one holistic and dynamic set of tools that enable competitive intelligence to act from the outside (Ponis & Christou, 2013).

SMEs have a major role in the economics of today. Ulas (2019) claims that SMEs should start the digital transformation to increase productivity, innovation and improvement and lower the cost. Digital transformation refers to that period where universities, entities, employees and public transforms and novel business practices and business models are created (Ulas, 2019). The customer's demands affect the speed of the transformation, which has resulted in a more flexible business model. Ulas (2019) have therefore listed six points for SMEs to perform digital transformation; 1. The transformation needs to be led by a manager or owner, 2. Adopt a learning culture, 3. Create a basic roadmap for digital transformation or business goals, 4. Introduce a supportive and conscious digital environment, 5. Use the help of experts in the field, 6. Governments that support SMEs that want to embrace digital transformation.

In connection with the ever-increasing globalization and the COVID-19 pandemic, the uncertainty in the market for modern operations has reached new heights. Teerasoponpong

& Sopadang (2022) have therefore developed a decision support system (DSS) for SMEs regarding purchasing and inventory management. The DSS was formed to help managers to make flexible decisions. The proposed DSS consisted mainly of two highlights; First, the system was designed to make maximum use of the already existing data and knowledge that SMEs possess to support management decisions. Secondly, the parameters in the mathematical model were based on real systems, which meant that no extra expertise was needed as the terms used were generally known. Teerasoponpong & Sopadang (2022) also claims that techniques like analytical tools further can improve information and data visibility and since the system uses simulation-optimization approach should a combination of techniques be used to improve optimization time and performance.

## **3.2 Data-Driven culture**

### **Large Enterprises**

The characteristics of a data-driven culture consists of processes, facts, systems and individuals in the organization. Organizations ought to have well-defined data collection processes enabling advanced analytics (Wixom & Watson, 2010, p. 14-15; Busse, 2012; Anderson, 2015). Well-defined processes enable and provide the organization with an approach to work on and be able to make decisions based on data. The analyzes should be available to the right people within the organization, where the reports describe descriptive actions about what has happened and predictive scenarios of what the future looks like (Busse, 2012; Watson, 2016). The organizations need the management support and BI to create a data-driven culture (Busse, 2012; Watson, 2016; Berndtsson et al., 2018).

Anderson (2015) mentions data collection as an important and primary asset when creating a data-driven culture. Anderson (2015) also mentions that organizations without data are just another business that make decisions based on gut feeling and opinions. Pape (2016) claims collecting data can be difficult due to three reasons; 1. Data is valid and consistent when collected, 2. Collecting data can be time consuming and 3. Data collection may demand new software and training. Organizations involving an expert within the business can reduce issues and support the IT-department by providing collection techniques that can drive the organization forward (Busse, 2012). The collected data also needs to be current and reliable (Anderson, 2015), although, it is not enough for the organization to call itself data-driven. The importance of becoming a data-driven culture is when the organization uses appropriate analysis tools to see trends and find discrepancies that may exist (Busse, 2012). Data must be able to be shared with other departments within the organization when data is available and accessible, which is important in a data-driven culture (Anderson, 2015).

In order to become a model-driven culture, organizations need clearly set goals with clear guidelines and work processes to achieve the goals (Anderson, 2015; Berndtsson et al., 2018). An important statement is that decisions are made on fact-based data from the analysis reports and that management does not go on a gut feeling (Berndtsson et al., 2018). Another important element is also where organizations tend to achieve good investments built on reports that are created from the collected data. Based on the organizations clearly set goals, investments can therefore be made on the right time for further development. Organizations set standardizations and requirements within all departments, workgroups and down to each individual employee. The standards and requirements refer to each employee knowing the individual work tasks and the individual business goals. If the value cycle is followed from the management all the way down to each individual employee and knows

what the organization strives after regarding the set goals, it tends to result in the organization being led toward great success (Pozzo, 2018).

A data-driven organization is characterized by data and decision-making in order to improve the outcome of the decisions. Through data and analysis, higher productivity, reduction of costs, minimizing risks and improvement of the financial situation generate faster and better decision-making. Although analytics tools are implemented in organizations, the majority of decisions are based on gut feeling instead of making fact-based decisions. Thus, it is required that organizations include different types of skills and be prepared to change the way of working. It is stated to be anchored at the core of the organization (Storm & Borgman, 2020).

Storm & Borgman (2020) states that there are identified success factors in becoming a data-driven culture. The management is one of the most important factors for a change to be favorable including a shared vision. The management is the factor that ultimately decides how data-driven the organization can be and sets clear goals and defines how the organization must act to be successful. Organizations should have a clear organizational strategy, which shifts the focus towards internal rather than external processes creating awareness around the need for change. Building capabilities and analytics tools are important for acting on data in decision-making to see valuable benefits from investments in successful data and analytics. Using Big Data and BI-tools goes in line with involving the employees in the transformation. The core of everyday tasks must be supported by different technical competencies, expertise and skill sets of employees in the field. By providing a test environment where the management and the employees can experiment with data, innovative initiatives and new ways of working are created. Enabling safe failure and learning opportunities results in better decision making (Storm & Borgman, 2020).

To be able to transform into more data-driven and get a more centered data thinking, the organization should change how the projects develop. In a data-driven culture, Anderson (2015) mentions leadership with important roles empowers organizations by data-driven actions based on data and analytics. Leaders achieve new opportunities strategically using Big Data and BI. Furthermore, Anderson (2015) states that organizations having a strong data leadership provides comprehension, support and value to the business. Anderson (2015, p. 183) quotes Bernhardt who claims “ *True data-driven decision making is only partly about data. A clear and shared vision and leadership play major roles in data-decision making.* ”.

There are numerous ingredients creating a data-driven culture. Simplified process models, data and analytics are needed to drive better decision-making, however, many organizations that successfully transform into data-driven stays low due to the complexity. Becoming data-driven refers to influencing data innovation, value creation and increasing productivity among employees. Engaging the management with the employees in a digital environment is needed in order to truly become data-driven. Bringing success in data-driven innovation, success factors such as business strategy, management, data, analytics and right people are equally important (Lawton, 2021). On the contrary, Chatterjee, Chaudhuri & Vrontis (2021) mentions products and process innovation influences a great impact on data-driven cultures providing organizations better competitive advantages and improves the enterprises performance. Data and information plays a vital role and asset in the success of an organization and helps the enterprise with improving the performance by leveraging BI and making accurate decisions on data-based insights. Analytics is always viewed as data-driven and has shown to enhance the enterprise productivity, innovation and value.

Embracing BI and analyzing data accurately, organizations succeed with an appropriate business strategy obtaining a smooth transformation to a data-driven culture. Management's support is a success factor, where without a top management support, the enterprise cannot improve its performance due to knowledge not being shared among the organization. The managers are also considered the successful data-driven decision-makers assisting the remaining organization towards creating a data-driven culture (Chatterjee, Chaudhuri & Vrontis, 2021).

### **Small and Medium-sized Enterprises**

Tuukkanen, Wolgsjö & Rusu (2022) states that previous publications have found the importance of cultural changes to successfully become data-driven, however despite the fact that researchers managed to realize the importance of cultural changes at SMEs, the publications are quite limited with explicitly focusing on what value cultural aspects of data-driven transformations at SMEs yield. SMEs are characterized as much faster, flexible and less constrained than LE, however, limited resources and knowledge hinders opportunities in implementing data-driven. SMEs have a greater flexibility and lower bureaucracy than LE tending SMEs to have a more straightforward decision-making processes with quicker responses brings important value in digital transformation at SMEs. Automating processes in the organization, consolidating and generating business value (Tuukkanen, Wolgsjö & Rusu, 2022).

## **3.3 Big Data**

### **Large Enterprises**

Data can be defined as structured and unstructured (Halaweh & Massry, 2015; Olszak & Zurada, 2019). Data in itself gives no power; instead, it is the use of data that can add value to the business. Data can be turned into meaningful input in two ways; Firstly, data can be transformed to information that is used to generate valuable information to create business strategies. Secondly value can be generated by transforming data into processes or products. The phenomenon occurs when implementing data analysis in physical location (Monino, 2016). The rapidly increasing data has evoked Big Data in organizations, where the role of Big Data in organizations refers to gaining value and providing assistance in achieving competitiveness advantages (Halaweh & Massry, 2015; Olszak & Zurada, 2019). Big data is seen as one of the most important driving forces and generates significant value creation and business development. Today, enterprises can both establish and develop with data as a foundation. During 2009, Big Data became a recognized concept and revolutionary entered the market. Big Data is exactly what the concept suggests: large data volumes that overwhelm high-speed operations on many different fronts (Whitelock, 2018).

Olszak & Zurada (2019) claims; it is not enough for businesses to only have access to information. Big Data can be seen as subjective and depend on the enterprise's view of it. It has been proven that in business processes where the risk and uncertainty is higher, BDA is useful for informed decision-making. Big Data recognition was introduced to the world of BDA, which is an analysis together with Big Data for the purpose of gaining valuable insights. Ramadan et al. (2020) describe BDA as the use of analytical approaches for handling complex and large-scale data for extracting results that improve the enterprises performance. BDA has been proven to affect the organization's performance and that BDA capabilities in combination with high data availability can enhance innovation capabilities. In turn, it can lead to more sustainable competitive advantages (Whitelock, 2018; Ramadan et al., 2020). In particular, it has been shown that the business innovation process can benefit

greatly from BDA. The reason is that the quality of generated information is higher, which in turn can create new digital services and products (Niebel, Rasel & Viete, 2019).

Identifying correct data can generate a positive growth for enterprises while a distinction of incorrect data can jeopardize the organizations future in the form of high costs and incorrect decisions based on shortcomings in the analysis of data. Enterprises need to invest in infrastructure that enables a strategic business value to be able to succeed (Grover, Chiang, Liang and Zhang, 2018). It is crucial that businesses invest in competent personnel, software that enables data collection, data interpretation and data access to external Big Data that must be combined with the enterprises internal data to enable value creation and become data-driven. Then follows a value path where the infrastructure enables the enterprises functions. The functions in turn enable how value-creating and data-driven mechanisms can work to maintain one of the organizations defined value goals. One fulfilled value later results in a desired effect, which can be anything from increased profitability or a symbolic value (Grover et al., 2018).

### **Small and Medium-sized Enterprises**

Paul, Parthasarathy & Gupta (2017) states that SMEs are generally flexible and good at making quick decisions, however, SMEs lack the technical and financial resources that LE have access to. Direction (2021) claims that data is more accessible than ever, especially data generated from social-media. A problem for SMEs is how to decide what data should be used and what needs to be discovered in large data volumes. If a qualitative analysis is not performed, unnecessary resources could be spent which is critical for SMEs. To gain competitive advantages SMEs should therefore invest in right data analysis practitioners or systems that are highly competent (Direction, 2021).

The COVID-19 pandemic has affected enterprises all over the world. SMEs tend to be more fragile and vulnerable than LE due to the limited financial resources, which has led SMEs to be hit the hardest. Several researches have presented devastating effects on SMEs due to turbulence such as the COVID-19 pandemic. In the destructive situations as the COVID-19 pandemic, the techno-functional capability and data-driven innovation at SMEs suffered and been affected the most due to the SMEs size and various resource constraints. In turn, the effects of how the post COVID-19 performance of SMEs is shown. The management has an important role to play in developing the infrastructure for SMEs. Improving the technical capacity of e.g, BDA can improve SMEs in a post COVID-19 scenario (Chatterjee, Chaudhuri, Shah & Maheshwari, 2022). SMEs has an interest in using Big Data analytics (BDA) to obtain customer insights, however, due to the low knowledge in the field, there is a fear of investing in the wrong analytical tools and techniques, which can result in a need to change systems and additional resources (Liu, Soroka, Han, Jian, & Tang, 2020).

Vitale, Cupertino & Riccaboni (2020) claims Big Data is a key success factor where it ensures improvements in both flexibility and productivity, also identifying needs and trends as well as inducing important changes. Big Data also helps SMEs by providing managers technical skills with accessing what previously could not be accessed. SMEs taking advantage of Big Data shows that it supports business management and Big Data's performance and functions impact has shown to lead to significant positive changes in various areas. Operational planning functions, strategic planning, decision-making processes and data value and data management is enabled with revolutionizing Big Data, however, light has been shed on the critical issues where lack of managerial and technical skills as well as financial constraints is not available for investment. Adopting Big Data at SMEs

improves models and management in decision-making processes having big potentials in operational process levels (Vitale, Cupertino & Riccaboni, 2020).

Seseni & Mbohwa (2021) states three keywords that defines Big Data; volume (high volume – number of data), velocity (high velocity – the speed of data), and variety (variety – different data generated), which means that Big Data can be generated in high volume over high speed in various ways. SMEs can gain leverage on adopting Big Data in the sense of remaining competitive, but to do so, SMEs need training and distribution skills among the organization, which helps SMEs to have a clear overview of needs and trends. SMEs adopting Big Data have shown to be innovative, flexible, productive and profitable and efficient and therefore seen as a success factor as SMEs remain competitive, relevant, and responsive. Establishing an agile and proactive way of operating with Big Data leads to successful SMEs. High quality data is a must, which enables SMEs to improve strategies and performance. Big Data adoption further leads SMEs to prosperity when data is incorporated with analytics as a strategy for growth. Big Data itself is insufficient, however, there is potential growth with technology and innovation improving performance and creating new knowledge. Using appropriate technology creates efficiency and innovation where SMEs have a larger chance to become efficient in what if required (Seseni & Mbohwa, 2021).

Big Data is very important for SMEs. Big Data enhances the opportunity to alter business models, government, human resources, and science and is defined as a new approach to manage data developing performance and sustaining competitive advantages creating an actionable vision. Accessibility to data is about creating strong control and easily accessible access to good quality data. The usage of Big Data at SMEs can be fruitful and tackles key problems in the organization. Although Big Data possibilities at SMEs are not fully explored, researchers are continuously trying to find ways to discover the benefits (Benyahia, 2021). Benyahia (2021) have therefore found four key ways where SMEs can benefit from using Big Data; 1. It Helps Solving Problem, 2. Helps in Finding Gaps in the Market, 3. It Tends to Add More Efficiency and 4. It Gives Added Flexibility. The first way mentions data collection among processes to gain new perspectives on improvements and right or wrong things and further a problem-solver. Problems can be solved by SMEs conducting in-depth analysis before obtaining insights. The second way states that small enterprises can become medium enterprises with Big Data discovering new opportunities in operations and assessing the risks. The third way points out that SMEs can take advantage when using Big Data in the right way, hence reducing the organizational costs. SMEs have valid reasons to gain more advantages from its efficiency benefits. The fourth way is the guiding star where SMEs gain competitive advantage through new opportunities. There is a high demand for using Big Data, however, SMEs usually cannot afford to invest in it. On the contrary, Big Data can be suitable for SMEs in all ways when it's flexible enough.

### **3.4 Business Intelligence**

#### **Large Enterprises**

Data and analytics have been shown to generate large opportunities, which has increased interest in BI and analytics (Chen, Chiang, & Storey, 2012). BI has its origins in DSS that are developed to support decision making. BI is significant more than a technological "thing", but BI also refers to a holistic view of both organizations and its business processes (Watson & Wixom, 2007). When it comes to sustainable competitive advantages, BI is considered to be the one and only real true source that particularly offers that (Ramadan et

al., 2020). BI allows an organization to understand its existing capabilities. Abilities can include modernization of the organization, what trends to follow as well as futuristic instructions which the organization should take in the environment, markets and technology of competition rules (Božič & Dimovski, 2019). However, Cosic, Shanks & Maynard (2015) and Bordeleau, Mosconi & de Santa-Eulalia (2020) claim that data needs to be available and easily accessed for decision-making. The organizations must understand the benefits of using data and create awareness of how to build and anchor analytical skills.

Pape (2016) states BI to be efficient in providing businesses with descriptive, predictive and prescriptive analytical statistics where the results are presented on attractive dashboards. Optimization is considered an important role in BI (Anderson, 2015; Pape, 2016). Different analytical methods such as forecasting, scenario analysis and simulation have been included in BI to enhance organizations business analytic capabilities. BI systems can be successful with available data. Previous research claims BI to be very costly and resource-intensive to utilize BI, which has limited organizations to be provided with strategic evidence. It is a complex and extensive process that usually extends over a longer period of time and thus sets high demands on resources and a suitable infrastructure. Due to organizations' finances often being directly related to its size, it is mainly LE that have succeeded to utilize BI (Olszak & Ziemba, 2012; Yeoh & Popovic, 2016). However, BI has over time become both affordable and convenient to use, which opens up a new way for SMEs to benefit from BI. It is required that businesses can analyze data and generate value from it (Yeoh & Popovic, 2016).

### **Small and Medium-sized Enterprises**

*Data and business intelligence (BI) solutions are recognized as a driving force behind not only contemporary global organizations – but for small/medium-sized enterprises and startups as well* (Marcinkowski, & Gawin, 2020, p. 131). English (2018) investigated the possibility SMEs have to embrace BI's opportunities as it can be difficult to correctly and quickly collect relevant market information. Research today is limited in the field, English (2018) believes that there is great relevance in investigating how agility and BI can generate dynamic opportunities for SMEs, even despite the fact that owning available structured data does not guarantee success. As previous literature focuses on LE, financial constraints have not been investigated to any great extent, but there has been evidence that even a small adoption of BI leads to competitive advantages for SMEs. English (2018) also mentions that third-party cloud-based suppliers have a significant role to play in facilitating and creating competitive advantages for SMEs. The advantages are that SMEs can compete with companies of all sizes. BI should also not be seen as a fad, but is predicted to be the new paradigm shift for all activities. The value of BI is not only achieved by making predictive analyzes or identifying hidden patterns. SMEs must also possess the knowledge required to make the right interpretations and thereby be able to offer a unique customer offering, which increases competitiveness (English, 2018).

BI tools are most often associated with enterprises that can afford larger investment and analytics and consulting services are expensive and adapted for LE (Magoma, Khumalo & Du Plessis, 2021). To transform an organization into a data-driven culture in a well-developed market, SMEs generally have limited financial resources and conditions as well as lack of skills and infrastructure, which result in SMEs falling behind in development (Mayeng & Van Vuuren, 2017; Scholz et al., 2010). Magoma, Khumalo & Du Plessis (2021) has investigated IBM Cognos since it has the advantage that it is more affordable and thus therefore suitable for SMEs. The key factors that the BI tool possessed that SMEs could

utilize for decision-making included an intuitive interface, cost-effectiveness, reduced impulsivity, clear visualizations and available information. The innovative interface is considered to be the most important function for SMEs to generate value. The innovative interface facilitates the work of creating reliable reports that help SMEs decision-making, which is relevant as there is a connection between improved decision-making and BI tools. Before SMEs introduce BI tools, however, Magoma Khumalo & Du Plessis (2021) believe that SMEs must examine the value the tool is expected and can generate.

Hamidinava, Ebrahimi, Samiee & Didekhani (2021) notes that the new technology makes operations more productive as processes can be automated. Automation leads to a reduced need for resources and increases quality without major investments and shortens the time for delivery to customers and can therefore take on more customers. SMEs that want to use BI to predict growth should, according to Hamidinava et al. (2021) focus on scalable Cloud BI solutions. The advantage of Cloud BI solutions is that it can be adapted and expanded according to the needs of SMEs. The Cloud BI solution does not require any major changes in either software or hardware or transfers or changes in data, only the capacity of the Cloud BI resource needs to be changed. All activities at SMEs can be integrated with Cloud BI and increase performance, help with decision-making and control, lead to strategic goals being achieved and can generate future forecasts of both external and internal data.

Ranasinghe & Madushanka (2021) investigate the adoption of BI-system at SMEs in Sri Lanka. The relevance of BI adoption of SMEs is high as SMEs have a crucial role for the country's economy. As SMEs adoption of BI systems is low, SMEs fail to use its advantages as better decision-making, which is the key point of SMEs being competitive and flexible. Relative advantages that were identified were organizational resource availability, complexity, and competitive pressure. Ranasinghe & Madushanka (2021) state that an increased adoption of BI systems occurs when SMEs experience strong competitive pressure. Only when the pressure increases and the rivals increasingly use BI systems, can a higher adoption of SMEs be executed. The reason is due to the benefits of BI systems that can be considered to be among the most valuable.

Llave, Hustad & Olsen (2018) highlights three aspects that SMEs need to consider when utilizing BI and analytics (BI&A). 1. SMEs should think big, but start small. The strategy generates both long-term assets and impacts as well as quick gains. SMEs should at the beginning address more simple-use cases and thereafter, when the benefits have been identified, further invest in a new iteration. The aim of the approach is to learn by doing, which simplifies future investments. Eventual organizational skepticism of BI&A projects is also more easily overcome by early successes. BI&A systems should never be seen as completed and should instead continuously evolve with the SME. 2. Avoid implementing traditional data warehouses when investing in BI&A. As data warehouses are usually both costly and complex, SMEs should avoid the system. Instead, should SMEs focus on BI&A tools such as Tableau, PowerBI, and QlikView. Today, there are several alternatives to the market that enable analysis even for SMEs that have limited resources and therefore there is not a need for implementing a data warehouse. 3. SMEs can consider using an automated data warehouse approach. The alternative also means that SMEs avoid using the traditional data warehouse. Llave, Hustad & Olsen (2018) claim that the third alternative may be suitable for SMEs, however, there is a lack of research on whether the alternative is more or less profitable than the traditional data warehouses.

### 3.5 Data-driven Business Models

#### Large Enterprises

“*Business models matter. A better business model often will beat a better idea or technology*” (Chesbrough, 2007, p. 12). Data is an important enabler for innovation, streamlining, the emergence of new enterprises and DDBM, etc. Data can be seen as a cornerstone of a modern knowledge society. There is a need for models and practices regarding the valuation of data as well as mechanisms for sharing data safely and efficiently (Lange, Drews & Höft, 2021). There are various processes that influence organizations to succeed or fail with becoming a data-driven culture. To understand the processes of a data-driven culture at SMEs, important concepts need to be identified. As the current organizations undergo constant change and development, it is important that organizations can benefit from Big Data and BI (Watson, 2016).

Lawton (2021) mentions using strategic data when implementing a framework with a data-driven culture model (DDCM) empowers and enables strategies and initiatives creating success. Pape (2016) mentions a novel framework that can be used to prioritize data when using organizational analyzes. The framework is applied to demonstrate how it works. Furthermore, a framework is proposed that captures the organization's core business in a model that ensures that all decisions are based on an analysis, which in turn is based on data. Pape (2016) thus believes that data needs to be analyzed and understood in order to be able to transform into insights when it comes to making data-driven decisions.

#### Small and Medium-sized Enterprises

Brownlow, Zaki, Neely & Urmutzer (2015) states data as a fundamental aspect to DDBM. Implementing DDBM has become an important area and necessity for SMEs survival and to remain competitive. SMEs increase in productivity as more data-driven it becomes. Enterprises that embrace DDBM, result in gaining productivity with 5-6 %. Knowledgeable and experienced personnel who possess good competencies and understand the fundamental principles in the implementation of a DDBM is important due to it reducing the effect of severe inhibitors. Desired outcomes, organization dynamics, analytical tools, resources and skills are other mentioned factors increasing a data-enabled SME. To be able to create a data-driven SME, implementing and incorporating a DDBM minimizes losing competitiveness, market share and ultimately revenue. Since data has become invaluable for SMEs, businesses aspire for growth and long-term survival constructing a uniquely DDBM adapted to its SME.

Li, Su, Zhang & Mao (2018) have developed a process model for SMEs that have limited resources and capacity, using the platform service provider Alibaba to drive digital transformation. By using third-party digital platform service when performing cross-border e-commerce (CBEC), SMEs could overcome barriers such as culture, language and laws even if SMEs knowledge and resources were limited. The process model by Li et al. (2018) consists of four parts; *Managerial cognition renewal* (breaking old mental models and cognitions), *Managerial social capital development* (gaining knowledge by collaborating between others and creating social networks), *Business team building* (builds a bridge between the self-transformation of the entrepreneurs and the transformation of the business) and *Organizational capability building* (Develop the capacity the business possesses in carrying out an activity in a satisfactory and reliable manner). The steps facilitate the ability of SMEs to make the digital transformation and services provided by third party digital platforms. Li et al. (2018) further states that digital platform service providers develop

SMEs organizational capacity and management capacity in CBEC, which creates new insights with incorporating data and analytics making SMEs competitive.

Parviainen, Tihinen, Kääriäinen & Teppola (2017) has created a model in digital transformation as it emerged in research that there was no established general model, including any specific tools, methods or processes adapted by SMEs to develop DDBM. Furthermore, Parviainen et al. (2017) believes that the model is a first guide model and that it is too general and has not been tested to the extent that it can be defined as correct or complete. To plan for digital transformation at SMEs, resources, skills or expertise are needed for becoming data-driven.

A procedure model has been created by Barann et al. (2019). The process builds on the Parviainen et al. (2017) process model as developed for digital transformation, which is not specifically focused on all SMEs. The process is based on two phases, where the first phase is a planning and orientation phase, while the second phase is a more practical implementation phase. The two phases are then divided into five steps, namely; 1. Position the company, 2. Create a digitization plan, 3. Create supportive environment, 4. Prepare digitization projects and 5. Implement solution. In short, the model is based on establishing one in the first phase planning team, analyze the current situation and the digital maturity and review current ones digitization subjects. The second phase aims to generate ideas, connect ideas to strategic goals, evaluate ideas and finally create a digitization plan. The third step is based on creating awareness, involving employees and creating a data transformation culture. The fourth step involves goal creation, analysis of opportunities, resource and project planning and building expertise. The fifth and final step goes to design, adjust, realize and monitor the solution. What makes the process not applicable to all SMEs is that it is adapted to use an external state support. Thus, the process involves an external support team and external capital, which not all SMEs have access to (Barann et al., 2019). Barann et al. (2019) claims that business models create potential innovation, which is something that SMEs find cumbersome. It can be difficult to prioritize the right goals, what data and analytical tools should be used and organizational changes such as skills and roles (Barann et al., 2019). Previous literature has identified various aspects that demonstrate general process steps over how a DDBM is created. There are only a few developed models for how organizations create a data-driven culture with DDBM within SMEs, however, the models are aimed at business model innovation or specific industries (Barann et al., 2019).

Szopa & Cyplik (2020) notes that a model for digital transformation that is adapted for SMEs needs to contain both an analysis of the business's current digitization level and how the digital transformation can be achieved. The first phase of the model is to assess the level of digitalisation the business possesses. The efficiency of the work regarding transformation of business models and digitization of processes is measured through a digitization index. The second phase aims to provide suggestions for how an implementation of the digital transformation could be done and consist of four stages to facilitate the formulation of long-term strategies that can generate competitive advantages with analytics. Stage one aims to increase the efficiency of the business's IT architecture, which can be implemented by, among other things, modernizing modern digital assets, which in turn can lead to increased information flow and data. Stage two contains ideas on how the business's processes can be automated. The third stage aims to transform the current model of the supply chain and manage it through digital technology, such as the Internet of Things and Cloud Computing. The fourth stage mentions that the entire supply chain should be digital. Szopa & Cyplik

(2020) state that by increasing the use of digital resources and new technologies, efficiency can be increased.

### **3.6 Summarized literature**

In an attempt to better understand and provide more detailed insights to the phenomenon of data-driven culture at SMEs, the research has come to the conclusion that identifying enablers for a data-driven culture is difficult and there is insufficient research on the area. Few researches combine the two terms SMEs and data-driven in the same context. The theoretical framework has raised success factors for all types of enterprise sizes and it has been a necessity to include all types of enterprise sizes mentioned in the literature in order to arrive at the success factors that SMEs could conceivably use to create a data-driven culture. There are numbers of publications on success factors establishing a data-driven culture and the reason for the wide selection of literature is to point out the that previous literature is fragmented (Talaoui & Kohtamäki, 2021), which also indicates that there is a gap in research identifying success factors to enable data-driven culture at SMEs. The gap refers to a lack of compiling the necessary success factors in data-driven culture, which to the research knowledge, the literature has not yet established specifically for SMEs. The purpose of the research is highly relevant for current and future SMEs developments and has yet not been previously answered. Based on the literature analysis, a compilation of mentioned success factors has emerged from the theoretical framework. The analysis of the success factors yields a total of four categories and ten subcategories. To provide a comprehensive overview of the arrangement of the categories, the categories are presented in a concept matrix (*see table 2*).

### 3.6.1 Success factors

Authors	Data-driven culture	Processes	Management support	Data collection	Experts	Accessible data	Clear set goals	Technical knowledge	Business strategy	Big Data	Business Intelligence	Data-driven Business Model
<b>Large Enterprises</b>												
Anderson (2015)	X	X	X	X	X	X	X	X	X	X	X	X
Berndtsson et al. (2018)	X	X	X			X			X	X	X	X
Bordeleau et al. (2020)					X	X			X	X		
Božič & Dimovski (2019)											X	
Busse (2012)	X	X	X	X	X	X	X		X	X		
Chatterjee et al. (2021)	X	X	X				X	X	X	X		
Chen et al. (2012)									X	X		
Chesbrough (2007)												X
Cosic et al. (2015)						X	X		X	X		
Grover et al. (2018)	X			X	X	X	X	X	X	X		
Halaweh & Massry (2015)									X			
Lange et al. (2021)									X			X
Lawton (2021)	X		X				X	X	X	X	X	X
Marcinkowski & Gawin (2020)									X	X		
Monino (2016)		X						X	X	X		
Niebel et al. (2019)		X							X	X		
Olszak & Zurada (2019)		X							X	X		
Pape (2016)					X				X	X	X	
Pozzo (2018)	X		X	X		X						
Ramadan et al. (2020)					X				X	X		
Storm & Borgman (2020)	X	X	X		X	X	X	X	X	X		
Watson & Wixom (2007)										X		
Watson (2016)	X	X	X						X	X	X	
Whitelock (2018)									X	X		
Wixom & Watson (2010)	X	X		X			X		X	X		
Yeoh & Popovic (2016)									X	X		
<b>Small and Medium-sized Enterprises</b>												
Barann et al. (2019)	X	X		X		X	X	X	X	X	X	X
Benyahia (2021)	X		X		X		X		X	X	X	X
Brownlow et al. (2015)							X		X	X	X	X
Chatterjee et al. (2022)		X							X	X		
Direction (2021)						X			X	X		
English (2018)							X			X		
Hamidinava et al. (2021)	X					X		X	X	X		
Llave et al. (2018)								X		X		
Li et al. (2018)	X						X		X	X	X	
Liu et al. (2020)									X	X		
Magoma et al. (2021)					X					X		
Parviainen (2017)	X			X			X			X	X	
Ponis & Christou (2013)										X		
Ranasinghe & Madushanka (2021)										X		
Seseni & Mbohwa (2021)							X	X	X	X		
Szopa & Cyplik (2020)	X							X	X	X	X	X
Teerasoponpong & Sopadang (2022)			X				X	X	X	X	X	X
Tuukkanen et al. (2022)	X	X								X		
Ulas (2019)	X	X		X		X	X					X
Vitale et al. (2020)	X	X			X		X	X	X	X	X	X
<b>Total identified success factors</b>	<b>15</b>	<b>19</b>	<b>13</b>	<b>6</b>	<b>6</b>	<b>10</b>	<b>9</b>	<b>19</b>	<b>13</b>	<b>34</b>	<b>41</b>	<b>16</b>

Table 2. Concept matrix of success factors in LEs and SMEs.

## 4. Analysis

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*The chapter has been divided into sub-chapter initiating with clarifying how the analysis of the theoretical framework and the empirical findings has been conducted and why the analysis method has been selected. The chapter's sub-sections highlight what the advantages, risk, and success factors are towards enabling a data-driven culture at SMEs. The sub-chapters also include a comparative analysis of the confirmed success factors from the theoretical framework and the enriching success factors from the empirical findings. At the end of the analysis chapter, a comparison model is introduced to answer the research question of what success factors enable a data-driven culture at SMEs.*

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### 4.1 Analysis of theoretical framework

In the initial analysis, it was discovered that scientific articles raised the conditions to be able to enable a data-driven culture and described several important steps in how organizations should approach to enable a data-driven culture. However, the scientific articles were aimed at data-driven culture at organizations in general, which is relevant to be able to answer the question. To the knowledge of the research, the literature does not mention highly of a data-driven culture at SMEs. Although, articles were found on identifying success factors at SMEs in general. The articles have been based on a lot of the publications as described in chapter 3. theoretical framework(*see chapter 3. Theoretical framework*).

The analysis of the literature was conducted with the fourth stage of Wolfswinkel, Furtmueller & Wilderom (2011) GTLRM framework, which was based on the three steps of GT. The first step in GT was the open coding of the publications. The open coding concerned reading and searching through articles and marking the publications that were relevant to answer the research question. The result of the open coding led to four main categories, where the main categories were data-driven culture, Big Data, Business Intelligence and data-driven business model.

The second step in GT was the result of the axial coding. Axial coding was where one of the main categories, data-driven culture, was divided into eight sub-categories, which facilitated further discover patterns in the publications and to be able to answer the research question. At the second step, the labored analysis created a contribution of more clarity on the matter of how SMEs enable a data-driven culture. The sub-categories were presented under the main category data-driven culture and can also be found under chapter 3. theoretical framework(*see chapter 3. Theoretical framework*).

In the last and third step in GT was the selective coding where the categories were shaped even more through additionally analyzing the publications. How SMEs work towards enabling a data-driven culture was discovered to include several different success factors, the research sought to find the major and most significant success factors based on the selected publications. It also turned out that the articles that have been selected for the final analysis has been published from 2007 and later, however, the articles are regarding LEs and for SMEs the final analysis was published from 2013, indicating that data-driven culture is

yet a new area within SMEs and where there is a lack of previous and more reliable publications specifically on the matter.

## 4.2 Analysis of empirical findings

The analysis of the empirical findings is conducted as the same analysis method GT in the literature. Due to the analysis of the literature previously conducted before the empirical analysis, four main categories such as data-driven culture, Big Data, Business Intelligence and data-driven business model have been used as a starting point for further categorization. The analysis of the empirical findings is based on the transcript of the interviews for further coding with the mentioned analysis method GT.

Each sub-chapter is presenting a summary of what the respondents have emphasized during the interviews. Prominent quotes have been highlighted from the transcripts to illustrate what the respondents have mentioned. The sub-chapters headings are a result of the axial and selective coding of the transcripts, which is based on the results of the open coding of the main headings from the theoretical framework and the respondents' interviews.

## 4.3 Advantages with a data-driven culture at SMEs

R8 believes SMEs with constricted resources must realize the value SMEs can gain in enabling a data-driven culture, since being data-driven is an efficient way of strengthening time-savings and also gaining more time to conduct other operations. SMEs benefit from good quality data and good quality of follow-up reports due to the overwhelming accessible time. *“...it's extra important for SMEs with limited resources to actually spend more time on this. To actually ensure that you have good data flows and good follow-up reports so that you do not have to spend time on it.”* (R8).

R6, R5 and R3 also mentions a data-driven culture opens up for time-savings where SMEs gain in more accessible time and therefore SMEs can further afford large savings. *“What this is purely about for the business can be a saving, that you obtain much more available time and can in that way make big savings.”* (R6).

R8 states that SMEs must have regards to the time-savings in the preparatory work, which must be done before the analysis can begin. *“What we actually do is that we look at the people who are to make decisions and get them more time for analysis, to be able to make their decisions...”* (R8).

R7 argues SMEs enabling a data-driven culture requires resources to be distributed in an optimized way making it easier and effortless to plan for the future. R7 also mentions an aspect where SMEs need to have an open mind and courage to invest to be able to successfully enable a data-driven culture at SMEs. *“If we could get this better data-driven, then we could know where the personnel should work today. It will be an optimization and more forward-looking.”* (R7).

R8 and R5 claim SMEs can succeed in enabling a data-driven culture even if SMEs are constricted with the resources. SMEs can benefit from introducing the organization with planning- and forecasting tools which consist of distributing the resources in a high-quality manner. R8 and R5 further mentions the planning- and forecasting tools in Planacy and

Visma are a winning concept for SMEs in analyzing how to distribute the resources correctly without losing resources on inessentials.

R2 mentions a data-driven culture drives SMEs towards constant change creating a corporate culture, since SMEs collect new data continuously. The corporate culture refers to SMEs requiring to be more agile, also affording SMEs to be more flexible for novel changes. *“I would say that it increases on a kind of constant change in a company because you have so much data, and data is constantly updated, it also means that you live in a constant change in the company and not least in the corporate culture. You have to be a little more flexible and agile and keep up with the turns based on the data collected.”* (R2).

R8 notes SMEs can benefit from the size of the enterprise. Due to limited size, the decision paths are often shorter, which leads to SMEs that are more flexible than LE. Selected people at SMEs can have different responsibility roles where decisions can be made more quickly on the data. *“The advantage of SME, unlike large ones, is that you are small or medium-sized, that you have short decision paths, or can have it if you want. So it is probably in some way that you should perhaps use it to your advantage that you are small and medium-sized and can be more fast-paced than a large company and again again it may come to people who have responsibility roles that you have a mandate, so that you can also act on what you see in your data and that the management is sensitive to change.”* (R8).

R2, R3 and R4 mentions a data-driven culture brings business value for SMEs. R3 enforces SMEs to understand the importance and value of a data-driven culture. Enabling a data-driven culture opens up for new possibilities and a new strategy of working. R3 mentions the benefit of a data-driven culture is a key asset where SMEs can identify the source data increasing value, discover business goals and how a data-driven culture also helps SMEs to stand out in the market. *“One must well understand this whole thing, that it can provide value and make these decisions on real data. Understand the benefits and values of a data-driven culture. Potential profits! In what way is it a source of new businesses or to increase what I want to increase, e.g., type of customer value, what is my goal and why as an enterprise it can be different things. If the data-driven culture helps me achieve it and I understand it must be such a key.”* (R3).

R4 states SMEs always have to keep a close eye on the changes the competitors make and follow the market *“We must keep a close eye on our competitors, we must always do competitive intelligence around us.”* (R4).

R2 asserts that the market structure can be distinguished in various ways depending on the size of the enterprise, either small or medium, however, SMEs benefit immensely from implementing and operating SMEs according to a data-driven culture. *“..it depends a bit on what business you have and what decision support you need and what the market situation looks like for SMEs, because they have a hell of a lot to gain from running a data-driven culture, to run their business after that.”* (R2).

#### **4.4 Risks with data-driven culture at SMEs**

There are potential risks with a data-driven culture worth mentioning. R2 mentions if the value cannot be identified, there might be a risk. R2 further mentions the data-driven culture does not generate value if SMEs have no goals, yet only initiates the transformation due to other enterprises having generated good results. *“Sometimes I think you might just kick*

*something off without knowing why, everyone else does this so then we have to do this. So you kick something off and buy a lot of stuff and then it goes wrong because you do not know what to do or how to use it.” (R2).*

R8 states an disorganized data-driven culture could result in several truths. If key figures are interpreted in different ways by different people, there is a risk that decisions are made on false grounds. If the data quality and knowledge is low, the result could result in decisions based on incorrect data. *“Everyone has their key figures, everyone has defined them in different ways, so you need to have this truth as well, that there is one truth, that there can not be several truths and not to compare apples and pears. So it's more about that, a risk of being too data-driven, if you were to say so, is probably in that case there may be risks in data quality and ignorance about what can make you make wrong decisions because you may not be looking at the right data.” (R8).*

R8 notes unstructured and poor quality data is a risk for SMEs. If the structure is poor, there is a risk that several truths can be presented and that there is a superstition regarding data if the structure is poorly constructed. *“...relies far too much on data, there may be risks that you do not have the quality assured of your data properly or that it is too scattered.” (R8).*

R8 mentions SMEs could save time for the moment when continuing to use Excel, since the tool can be effective at generating quick reports. *“...if you are a small company that you need things very quickly and that it may be faster to do that extract and paste in an Excel because you need to get something right there and then.” (R8).* If SMEs continue to do as SMEs have always conducted, it can thus save time for the moment, but not in the long run. (R8). *“It's probably where there are challenges, that you splice the corners a bit because it goes faster here and there, but you do not win in the long run.” (R8).*

R2 illuminates that regardless of the sizes of the enterprises, all enterprises experience similar risks. Although, SMEs differ from an economic and technical aspect where the resources are usually more limited.

## **4.5 Success factors in a data-driven culture at SMEs**

### **Processes**

R1 and R3 state manual systems such as Excel to be less useful due to manual systems being time-consuming, which prevents SMEs from daily activities. R3 further mentions it is accommodating for SMEs in transformation from Excel reports to using more advanced analysis tools, which requires SMEs to include the time effort into it. R6 however claims automation in a data-driven culture at SMEs reduces the number of manual processes where employees instead of extracting reports from Excel, which also is time-consuming, retrieves continuous analyzes in a much more efficient manner.

R8 states manual systems previously have been time-consuming for SMEs where employees sit in different source systems, arrange data and have to repeat the process every month. R8 mentions a new approach for SMEs that facilitates the process for SMEs to initially adopt new processes in a data-driven culture as a start-up business having personnel keen on labored data. *“It's a little easier to set up new processes, it's easier to control from the beginning how the personnel should work with data, it's easier to bring in such a culture.” (R8).*

R4 emphasizes SMEs can be successful when using business goals to develop processes. *“We develop the processes we need according to the goals we set and it has been successful back in time.”* (R4).

R7 believes SMEs must have the data-driven mindset from the start and to commit to an extra effort to be competitive against other SMEs. R7 mentions SMEs with data-driven processes are considered successful. R1 claims that the need for different processes depends on how advanced SMEs are and that occasionally processes are optimized due to an access to available data for the process. R7 further states that start-up SMEs usually initiate directly with data-driven processes that are highly automated, which is a major success factor.

R5 states automated processes increase the profitability of SMEs. R5 quotes with an example where automated processes are a proof of optimization and profitability. *“It was a manufacturing company like this and they buy a lot of aluminum and then they have products that they make based on this aluminum. What they do not know is how much aluminum is in each product and the aluminum prices change a lot when they buy it. One month it costs 100 SEK, the other month it costs 100 SEK. If they have the same prices in the products, then he does not know what margin he has when the month is over depending on the purchase price. If we can connect so that he can see all the time in real time how aluminum prices go up and affect the margin of all products, then he can become data-driven. Then he can set a new price every day on different products.”* (R5).

R1 states by automating processes, the required data can automatically be generated into the system, which eliminates the manual processes. R1 furthermore mentions the automated processes help SMEs to achieve and gain in business goals, which SMEs strive for. *“Automate it so that it becomes part of that when you perform a job, it automatically enters the data you need without the extra effort. Digitize different processes or create business systems or everything possible for them to achieve any business goal they have.”* (R1). R2 states that it is more advantageous for SMEs to own automated IT systems than manual processes. *“Then it is better to let an IT system do it for them instead.”* (R2).

### **Management support**

R4 mentions SMEs providing enormous management support is a success factor and a necessity where SMEs can benefit from acknowledging the employees with responsiveness. R8 concurs and claims the management support to be an important success factor. R8 further states that the management must create openness and provide the employees with freedom when forwarding suggestions for improvements. It is important for SMEs to comprehend how the management labor with data and conduct follow-ups, which also is the management's duty to distribute the data-driven culture to remaining employees. The management needs to make initiatives to strive for data-driven cultural changes and not singling out a middle manager. As R4 emphasized, R8 furthermore believes that the management must be responsive enough to the SMEs employees to be able to operate towards a data-driven culture. *“I would say an important factor is also very much about the management or the higher positions. How they themselves work with data, because it is very important if you notice that your managers work with data and you follow up, it helps to spread this data-driven culture. The management must take the initiative and push through such a change, it can not be up to a middle manager. The management needs to be very open about when employees come with suggestions for improvements. You need to have responsive management.”* (R8).

R6 highlights the importance of having the management's support. A major advantage for SMEs is knowledgeable employees with experience that possess great knowledge of working with data-driven systems. R6 further explains that there is a great deal of importance in the leaders using the information generated to make fact-based decisions. R1 claims that operations where steering groups and managements that receive reports constantly are automatically data-driven at a certain level.

### **Data collection**

R2 claims data collection is an important part of SMEs to enable a data-driven culture successfully. R8 describes a part of the SMEs data-driven culture that has been to gather data from all of the various systems and store it in a data warehouse owned by SMEs. R5 affirms R2 and R8 and mentions SMEs should consider creating a solution, i.e., all available data that exists across several reports ought to be integrated.

R7 emphasized the first step in becoming data-driven is to extract data that is collected from a business system and then process it so that the data is easy to understand and easy to use. *“We read data from business systems, we retrieve data there and then we redo it so that it is easy to understand and easy to use.”* (R7).

R6 and R3 mentions data collection as a success factor where SMEs possessing data collection processes open up for business possibilities and present SMEs data in a clear manner. The type of method SMEs are working after introduces new insights providing business opportunities. *“CRM-system as mentioned, we set up all business opportunities and see very clearly; what is it that will come in here in the future and how many of our meetings are converted to actual business in the end.”* (R6).

R3 notes SMEs have data collection support systems where data is collected successfully. All projects can be followed up based on how well the SMEs have succeeded internally towards the business goals. R3 further mentions the data collection support system presents SMEs productivity and profitability. The data collection support systems are easy-to-use and understandable systems. R3 further mentions the support systems at SMEs are not too complicated and motivates employees.

### **Accessible data**

R8 states a data-driven culture allows employees to have data accessible to all decision-makers. R8 clarifies accessible data is a success factor where SMEs make the data available in such a way that all decision-makers have access to the data required to make fact-based decisions and the data must also be reliable. However, R8 further mentions that employees must possess a certain competence to manage the available data in a correct manner. *“Then again, it's all about actually providing and accessing data, that's where you have to start. That everyone who needs to have access to data to be able to do their job and make decisions has access to it. Then it is about being able to trust data in some way.”* (R8).

R5 argues a data-driven culture makes data accessible and understandable for the employees. Available data allows the employees to take actions on the data and affects the results of the SME. *“Employees have access to the data at the time they need data and that it is made visible in a way that is easy to understand and based on the understandable data, get insights and take actions to achieve a result.”* (R5). R5 further claims SMEs receiving data and providing data is a key resource. A large part of SMEs data-driven culture is to make data accessible and understandable to be able to make decisions and take action. A

proper way of presenting accessible data can be through conducting analyzes and generating dashboards with graphs. SMEs have the ability to present the graphs exactly as desired. *“It is the will to, firstly, get data and provide data. Make data available, it exists in our culture. To make it understandable also exists, to make decisions and act, I would say that it also exists.”* (R5).

R7 illuminates accessible data as a success factor where all data is available for employees to conduct analysis. Transferring the accessible data requires the data to be adapted for analysis, which is a proper and effective approach of enabling a data-driven culture at SMEs. R6 states gathering all available data in one place is important. R3 further states that all involved should be able to possess the same accessibility to data as others. R7 mentions available data can be used in the best possible way when conducting analyzes where decision-makers receive insights on deviations and where SMEs can see where errors occur. It is not until when SMEs actually see where the errors emerge that SMEs understand to view data from a different perspective that can generate futuristic possibilities. R7 quotes furthermore *“seeing is believing”* as a highlight. R7 mentions a common problem for SMEs is where the SMEs experience the data is usually not on what the SMEs possess. One reason is that the data may be trapped in blackbox solutions, which are there to protect, i.e, the brand. R7 therefore mentions open data is required and enables the data-driven transformation.

R6 illuminates visualizing data is very important for SMEs who want to become data-driven. R6 describes that the number of visible key figures that SMEs follow and measure should be scaled down so it becomes clear what to focus on and that different groups do not focus on different things. The entire SME, from managers to employees have access to the right and available data by a few keystrokes away. It may be a necessity to adapt the degree of access to managers and employees, where managers should hold more accessibility of more details than employees. R6 concludes with mentioning that an only exception is where all the employees throughout the whole SME should be able to partake in each and every individual result.

### **Clear set goals**

R4 highlights clear set goals are the driving force for achieving development. For SMEs, impact goals and business goals have been significant for the change in working more data-driven and led to higher profitability. *“Without clear business goals, it is very difficult to move forward. Both impact goals and business goals have been in focus for us in recent years when we have made very big changes and become very profitable as a result.”* (R4).

R6 emphasizes the importance of defining and setting clear goals as a success factor. SMEs who engage on the basis of objective and clear set goals tend to be able to make decisions on measurability within SMEs, which leads to the establishment of a data-driven culture. R6 mentions clear goals as measurable and are divided between employees and throughout the SMEs creating an opportunity to follow up on the set goals where decision-makers discover what is most important for SMEs as a business and its development areas in the future. R6 claims further there is a transparency at SMEs with the set goals where the whole organization possesses the knowledge of what goals are to be strived for. R6 claims that there is a great importance in that the goals are clear and measurable and that important areas are identified to create a data-driven culture. There is no point in measuring for the sake of measuring or generating a lot of reports just because it is possible. *“How to make the goals more measurable and be able to follow them month by month and very transparent*

*within the enterprise so that I, who work in sales, know what the developers' goals are and how they work towards them. I think that has definitely been a success factor.” (R6).*

R7 notes SMEs with visions are important and SMEs must seek after what is important and what questions need to be answered. The visions are based on SMEs creating an agenda point. R3 states SMEs have clearly set goals for the activities from the board that are strived to be achieved before the end of each year. As R7 and R3, R1 states SMEs possess set goals, however, there are also certain aspects that must be kept in mind.

### **Technical knowledge**

R8 argues SMEs have a lot to gain if SMEs possess the right competence within the organization. High costs may arise, however, in order to avoid and reduce the high cost when external experts are brought in, SMEs must internally require to possess the knowledge. The solution can then be to employ young people with technical skills or ensure SMEs have IT skills and use current platforms and tools. The ideal for SMEs is to possess internal technical knowledge rather than to hire external expertise to run SMEs towards a data-driven culture. *“So there you gain a lot from having your own skills. If you do not want to hire someone to help you with that, SME needs to review the in-house competence all of a sudden and try to hire young people, or make sure that you have IT competence that knows the newer tools and platforms.” (R8).*

R1, R3, R6, R7 and R8 notes the importance of SMEs possessing technical knowledge. Furthermore, R1 states SMEs can gain in creating a data-driven culture by recruiting competent people. R1 further claims competence development begins internally and is an important aspect in achieving technical knowledge. R8 however states SMEs who have an IT-department must ensure the whole unit has the right knowledge when transforming into a data-driven culture.

R4 illuminates SMEs with the right knowledge from the right direction at the right time is a success factor. Technical competence is a well-needed aspect in order for SMEs to become data-driven. R7 concurs and additionally claims that technical knowledge is highly important to SMEs creating awareness when SMEs possess knowledge of organization data.

### **Business strategy**

R6 claims SMEs should work with objective key results (OKR), which means that all teams have measurable goals that are measured each month over a period of four months. SMEs then jointly review the results for the entire SME. R6 further mentions that SMEs have achieved good results from the mega sprints and sees great advantages in the business goals being measurable.

R7 states there is a need for a target image that presents how the business goal can strategically be achieved. To achieve and develop a business strategy, a roadmap can be set with slightly different intermediate business goals, which can be both soft and computer-technical parts.

R1 emphasizes to increase the data-driven at SMEs, the business goal for SMEs could be achieved by using data for decision-making, eliminating gut-feelings and towards more fact-based. The business strategy for achieving the business goals can thus be to become more data-driven for SMEs. *“If we know our goal in the company and we could somehow*

*use data as our lane to achieve those goals, that's where we could find our way to become more data driven to make decisions that are not so emotional, but based on facts.” (R1).*

R4 mentions SMEs can succeed in transforming towards a data-driven culture when creating a solid business strategy. R4 further mentions that external as well as internal perspectives need to be incorporated in the business strategy for a successful transformation. The perspectives in business strategy consists of discovering what the employees 'and customers' behaviors and desires are, which in order become wise decisions that support a good business strategy for SMEs.

### **Big Data**

R7 describes Big Data as a core asset for SMEs bringing value and opening up for new possibilities when discovered. SMEs require to be able to follow the data from stem to stern, which is a major strength for SMEs. R7 and R5 states Big Data to be a key resource where the data is an important valuable asset that SMEs nourish on. *“We create value with the things that we open our eyes to the data you have. And that makes you think that this is very valuable.” (R7).*

R4 recommends SMEs to enable a data-driven culture with Big Data rather than to refrain from it and thus expand functionalities gradually. R4 further mentions that all credible data that SMEs possess is worth taking advantage of. R6 notes that decisions that can be based on data, statistics and reports are relevant. R4 asserts also that fact-based decisions are made on the data that can be extracted from all the various channels SMEs have access to. R1 states however that Big Data must be sensible and easy to maintain and automated for it to be relevant. R1 and R2 states a data-driven culture refers to SMEs that can make decisions based on facts instead of relying on gut feeling. *“Data changes a culture of a company in the form of more accurate, more information simply, as based on facts rather than emotions.” (R2).* R8 highlights that although many SMEs draw conclusions based on gut feeling and it may occasionally be good, opinions still need to be confirmed with data and decision-making for more accuracy as SMEs constantly change. *“... But then it's also about getting away from those assumptions and understanding that we also need this as a complement. Of course it is good to have a feeling for something, but you also need to look at what it actually looks like because things can change.” (R8).*

R3 and R5 highlights the importance of owning Big Data. R8 claims in a data-driven culture, SMEs have a good understanding of data and continuously work with data. R8 further mentions that SMEs are provided with statistics over advantages and disadvantages based on data. R3 mentions in addition that it is important to have a system in order to generate reports that can provide results based on data.

R2 claims Big Data is highly relevant and useful as SMEs can use it to analyze the market and competitors. Big Data is also useful for analyzing the internal operations driving through optimization. R2 mentions that Big Data has the opportunity to improve the entire operations where SMEs gain competitive advantages. *“You can use data to see where the market is going and my competitors, what is happening in the market. The second is then to optimize their own business based on data. We have the right staff, the right number of employees, how efficient each employee is, they do what you are supposed to do. And then it's then the whole sales process, you can also use a data-driven culture or process, ie, how do we make sure we find leads, how do we make sure we find opportunities, how do we*

*handle them the fastest and best and then how we ensure that we have a winning price so that we are simply competitive” (R2).*

### **Business Intelligence**

R2 argues BI to be of a necessity in a data-driven culture at SMEs. R2, R5 and R7 mentions the advantages of a data-driven culture is that when structured data is analyzed, decision makers can decide what is critical by looking at the provided decision support. “... *structure data and decide what is important and not important, analyze data and then make intelligence data so that you can get a decision support .*” (R2). R2 further mentions SMEs using Cognos analytics as BI-tool is considered to be a success factor and SMEs who lack a proper BI-implementation are also lacking a data-driven culture.

R6 claims BI is a part of the data-driven culture where SMEs have a simple and clear basis for decision-making. All information can be gathered in one place and be clearly visualized. R6 claims visualization and statistics is a way of enabling a data-driven culture. R6 further mentions analysis assists decision-makers to discover the root-causes on different results. “...*we believe in the power of visualizing the statistics and working very data-driven. Then we have an analysis part in our tool where we combine different key figures to once again be able to work more data-driven and find root-causes for different outcomes.*” (R6).

R1 notes that by making SMEs data-driven, data reports can be woven into daily work, i.e, SMEs do not need the help of external expertise for decision-making. R2 points out that shareholders and stakeholders are also provided with visualization of data. R2 states it is a presumption for SMEs to possess analytical tools for becoming data-driven. R4 concurs with R2 and mentions Google Analytics has been a key factor for measuring statistics. Using analytics at SMEs is an easy way of clearly visualizing where traffic appears. Generally, there are often one or a couple employees at each department in a relatively small enterprise and it is extremely important to be bold and use the available free tools.

R7 asserts BI-tools to provide simple and relevant follow-up reports of SMEs revenue. R5 also highlights the importance of the follow-up tools and R4 mentions that it is a great advantage for SMEs to be able to follow up gut feelings with actual facts. R8 in turn mentions that BI is most easily done by visualizing the follow-up reports, which can be carried out with Microsoft Power BI where everything from the highest level to down level can be visualized.

R1 claims BI facilitates SMEs to monitor the situation on the market and make it possible to create a roadmap to SMEs daily operations. R6 states that a data-driven way of working is that relevant statistics are produced and that the measurements are not measured just for the sake of the measuring. Furthermore, BI can visualize how actions lead to opportunities. R5 highlights data-driven reporting means that clear facts are presented on an ongoing basis where historical, current and future forecasts can be generated. R6 explains SMEs set up a fairly predetermined dashboard of data that is to be measured. The predetermined dashboards consist of descriptive and current situation analyzes with only a quarter of a delay from reality. However, R4 states that the KPIs must have a well-defined purpose as a KPIs has no self-fulfilling purpose. R7 mentions BI provides SMEs with insight on how profitable SMEs can become with visualizing the data. SMEs with BI can see what has been possible with the assistance of data sensors to find errors at an early stage. It has simply been possible to act faster.

R8 argues for SMEs to include powerful visualization tools discovering trends over high-speed. Humans usually tend to perceive evident visualizations easier, e.g, graphs rather than tables. Analytical tools also facilitate decision making in the sense of trends. *“I think it helps one with much more powerful reporting and visualization tools. When using it, it is so much easier to be able to see trends quickly. You can visualize data in a good way. All of us people are better at seeing things in, for example, pie charts or graphs than just seeing a table. It helps one to make better decisions, but when you compile and can see a trend for example in the last 12 months, with the help of good graphic reports. It becomes much easier.”* (R8).

R8 illuminates SMEs to gain advantages when implementing Microsoft's data platform and Snowflake as a provider of cloud based services. Microsoft BI is an important aspect where SMEs stand out with competitive advantages where cutting-edge expertise is provided on the platforms with SMEs who focuses specific outcomes. *“We have selected to focus on Microsoft's computer platform and then also another supplier called Snowflake. We have always thought that; in order for us to be competitive, we are the absolute best consultants or for those customers who have, e.g, a Microsoft strategy because we have chosen that we want to be the best on this platform. We feel that we can stand out from the competitors who might say; we can deliver solutions on all platforms - but then they may not get top expertise.”* (R8).

R8 furthermore urges SMEs to labor with Microsoft's cloud platform Azure where SMEs can build integrations and data warehouses. R1 and R8 notes that Microsoft Power BI is a key resource as SMEs can use the powerful tool to visualize data. R8 also mentions Microsoft Power BI to be a part of the Power platform, where SMEs can build, e.g, apps to systematize processes or almost conduct anything possible and conceivable within the analytical tool.

R5 claims SMEs using Microsoft Power BI tools creating dashboards can be suited and adapted to SMEs needs. R5 and R8 mentions Microsoft Power BI provides support as SMEs gain insights on historical data and SMEs profitability with crucial day-to-day dashboards. *“We use the Power BI tools that make us, for example, modify and add different types of dashboards that make them get what they want to see. To see and compare volume and price over time to see if you lower the price, you get more volume than the price reduction is, given that you multiply the price and number of products or is it the case that you get more if you raise the price and get a little less, which gives the most revenue overall historically and in that way decides which pricing one should have ahead.”* (R5).

R6 describes a dynamic BI tool that provides SMEs the possibility to visualize results and forecasts from an organizational, country, team to individual level over time, which enables easy analysis of, e.g, the previous week or a specific month. R8 emphasizes embracing a good decision support and data platform have previously not been conceivable for SMEs due to high costs. Prior to now, SMEs had to purchase a server and capacity, which SMEs may not need today or could possibly need instead in five years. R8 notes that the development of the Microsoft BI tools has currently opened up new possibilities for SMEs to invest in the powerful tools gradually. SMEs have the opportunity to actualize the implementation of Microsoft BI with smaller investments and scale up the database over time, which has not been possible before as BI solutions were exclusive to LE due to LE possessing sufficient resources in terms of investment. *“It was quite difficult for small companies to invest in the architecture itself that is needed, but now small companies can*

*scale up their databases so that you start very cheaply and make sure that you build a great BI solution and data platform and only pay for it one needs, which means that those we examine all of a sudden can afford to also acquire the basic prerequisites for becoming data-driven.” (R8).*

R8 mentions the reason why SMEs have avoided becoming data-driven is due to investments in databases that have previously been very costly. R8 reveals Microsoft Power BI to be cost-efficient and affordable for SMEs where the platform merely costs 100SEK per user. The expense is similar for all sizes of enterprises with less than 500 employees, which concludes to an SME with, e.g, 30 employees barely needing to purchase Microsoft Power BI license for a monthly cost of 3000SEK allowing all users at SMEs to generate self made reports. *”You can have Power BI. It costs 100SEK per user per month, which is nothing. Then you can have more expensive licenses in Power BI. You can have something called premium, but then it's about large companies like Volvo where there is a breaking point. If you have more than 500 employees, it may be appropriate to change to another type of licensing. But for SMEs where there are maybe 30 users, it is 3000SEK a month, so everyone has a Power BI license.” (R8).*

R8 claims SMEs can have a relatively good backend architecture for approximately 10000SEK per month plus licenses, so for approximately 15000SEK per month, SMEs as a small enterprise can possess a very good platform, which is not quite that expensive.

### **Data-driven business model**

R7 pleads DDBM depends on the size of the enterprise. R5 mentions DDBM to be a success factor at SMEs where different processes guide the SMEs towards data-driven cultures. Acquiring DDBMs over e.g. the financial statement process, budget process, analytics process, reporting process etc. provides SMEs with valuable insights. R5 further refers that there is no other approach than DDBMs to become data-driven. R6 also utters in addition that SMEs embracing DDBM receives supportive structure, a phenomenon which ordinarily is not arranged initially at SMEs. R8 also mentions DDBM at SMEs create a solid IT-architecture and foundation. R3 notes DDBM are adapted to SMEs where SMEs with certified ISO standards or considerably relate to any standards possess a form of data-driven approach.

R6 states SMEs implementing DDBM and collaboration models increase generally in productivity by 5-20%. R6 further states that SMEs can gain the greatest effect by allowing employees to be involved and influence the time. *“There is usually an increase of 5-20% productivity. We see a certain increase in productivity, but the biggest increase we see is when we release it for employees and they themselves see how they can affect their productive time. We measure it as productivity.” (R6).*

R8 claims applying FR2000 for quality and management systems positions the SMEs towards data-driven cultures where all the business processes are documented around different areas within the SMEs. R8 assets also that FR2000 introduces a business strategy of how SMEs set goals can be followed-up and SMEs are quite structured around the domain. R8 further states the DDBM is a form of a growth strategy over the year. The business strategy is usually conducted by a mentor and a defined role. The strategy is documented and Power BI reports are created as supplementary. SMEs implementing DDBMs appear to be time efficient compared to SMEs that lack the complement.

R8 mentions that through FR2000, SMEs also need to conduct a SWOT-analysis annually for the management team to present SMEs strengths, weaknesses, opportunities and threats. The purpose is to investigate slightest changes that may have occurred. R8 adduces DDBM within SMEs should be organized to a certain extent that business goals and resembling such can be followed up. R8 claims in addition to follow-up reports and having weekly meetings is a compliment where resources can be distributed in an appealing way. *“Strategic changing methods around FR2000 is, due to our company, which is certified according to the quality and management system, you can also do a SWOT analysis every year. SWOT is about going through one's strengths and weaknesses and threats and opportunities. Every year we go through for those who are in the management group. And then we do a review about it every year where we see, for example, what we need to change. It can be things that change.”*(R8).

### **Self-Service Business Intelligence**

R5 mentions SMEs are self-leading in SSBI and is considered a success factor. Employees possess the degree of freedom to twist and turn data, thus making data accessible and tailored in exactly the way employees need it to generate BI reports. However, in order for employees to conduct analyzes independently, the data needs to be delivered in a simple and understandable manner and for employees to take actions. R6 affirms R5 where R6 claims SSBI creates a type of self-leadership where employees influence personal results. Visualization and commitment motivate employees to work more data-driven and perform independent analyses. *“...SSBI creates a kind of self-leadership in that employees can influence their own results over time. We strongly believe in the visual and to engage and motivate employees in working more data-driven and analyzing independently.”* (R6).

R6 and R7 states that employees of SMEs can easily review personal performance in the form of independent analyzes to achieve set goals on an operational, tactical and strategic level. *“...that one can more actually get data on it then and see; I'm really awesome at this and this part, but I need to work on this a little more and how do I achieve those goals in the future. (R6). We are a consulting company, so really, everyone works with selling hours which we therefore have a data-driven planning. You register your hours and you can also follow up your personal hours both operationally, but also tactically and strategically.”* (R7).

R7 emphasizes SMEs adopting SSBI is considered to be a strength and a support within SMEs, which contributes to independent employees. R8 implies SSBI is distributed throughout the whole organization where all the employees possess the competence to build follow-up reports, indicating that SMEs eliminate the external expertise. Educating the employees and providing accessibility to the analytical tool yields independent employees who can easily make self made analyzes and gain greater knowledge around the data, instead of relying on external expertise to generate BI reports. R7 mentions a metaphor where SSBI acts according to similar functionalities where individuals use self scanning in a boutique as the customer scans and completes the purchase independently. *“A strength with us is that we want people to do a lot themselves, we support self-service! They have the authority to be able to change and add. We educate everyone so that they can do it themselves as well.”* (R7).

R8 declares SSBI to be a success factor in enabling a data-driven culture for SMEs. SMEs can become independently analyzed where SMEs either assemble and provide data to the employees or allow employees to collect data, perform analyzes and make fact-based

decisions independently. R8 mentions there is always obvious data that is very related to what the SMEs employees are going to analyze, which opens up possibilities for improvements and leads to receiving new insights on more related data. *“It can be an important success factor, absolutely! Being data-driven is very much about making data available to their employees and providing them with tools so that they can, as well as themselves, collect the data they need and do the analyzes they need to be able to make decisions.”* (R8).

R4 claims certain SMEs are considered to have SSBI when using Google Analytics where employees are assessed as SSBI users that can make decisions around what might not be attractive and what needs to be improved, contributed or subtracted. R3 affirms and further illuminates that the employees possess a degree of freedom whereat how to conduct analyzes.

### **Education**

R7 and R8 declares educating personnel is a success factor in enabling a data-driven culture at SMEs. R7 illuminates education in terms of clear communication is a highly important aspect to drive the digital transformation throughout SMEs where the entire SME is well-informed regarding new approaches of working, goals and strategies. R6 mentions further that an important role at SMEs should be defined where e.g a manager in the authority should be responsible for steering the education. R7 also amplifies with coaching and training should lead to a cohesive “we-feeling” within SMEs amongst the employees.

R8 states SMEs may experience a challenge with non-technical employees lacking the right support and education regarding new analytical-tools. R8 further mentions education is a success factor where SMEs transferring knowledge from steam to stern within the organization provides the employees with a sense of a certain ownership. R5 claims occasionally a fragment of employees do not possess the right competencies to create follow-ups, however, SMEs educating employees within the different areas cause employees to understand the purpose of the results. R8 states knowledgeable employees can thus create integrations, build data warehouses and Power BI reports independently.

R7 argues for SMEs to engage employees in workshops in the form of education where employees receive insights on assured matters. R8 mentions further education in skill development is therefore the sole purpose, where the entire SME gains in all major aspects.

R8 emphasizes there are several opportunities for SMEs who desire to become data-driven and e.g. use SSBI without investing a large capital. R8 highlights there is a massive selection of online courses available that are usually free of charge, where Microsoft, among others, has a large selection of courses. On the other hand, SMEs are required to invest time into training and allow employees to take the time required to be fully educated in the area. SMEs with a data department obtains time to develop skills and also get the opportunity to listen to webinars and take part in the latest trends. *“There is a lot on the web in educating oneself, where most of the courses are free, where Microsoft has a lot of training courses and such. So that companies can raise their skills without the courses having to be so expensive. Then you have to set aside time for this employee to, as it were, study these courses during working hours, but there is a lot of support to take part in online for free.”* (R8).

### **External experts**

R2, R6 and R7 states SMEs using external expertise to enable a data-driven culture could considerably be a success factor. R2 claims SMEs occasionally do not possess enough knowledge and have therefore been offered a choice to involve external expertise. Through experts, SMEs can gain quick access to analytical tools, which are adapted to SMEs needs and business goals. R2 mentions an advantage at SMEs is that SMEs do not have to possess the extra competence required for incorporating the systems. *“They may not have that competence themselves, but then they get it, you can buy that competence. You can buy it as a project or consulting help, so it must be adapted to your business. Not only can but must be adapted to your business, to your size and to your end goals and then you may not do it yourself. Probably, very many small companies do not have that competence, so they have to buy that competence.”* (R2).

R8 states SMEs can fail to succeed if internal constraints are not identified. In cases where there is a lack of competence, SMEs can fail if the right knowledge is not obtained for specific tasks such as for data modeling and data integration. R8 emphasizes if SMEs utilize the help of external expertise, there is also the possibility of introducing support and management agreements that ensure that expert help is available when needed. The agreements can be adapted to the SMEs competence needs, which makes it possible for SMEs to choose the degree of freedom SMEs desire when operating the system.

### **Experimental environment**

R7 claims SMEs using data also provide employees with opportunities such as experimental environments where the employees can experiment with data and create data analyzes. R7 proposes that in order for SMEs to be able to produce new forecasts without affecting the performance of the central data warehouse, SMEs need to create an experimental environment for the inexperienced employees. *“...you also need to have time to be able to experiment with your data.”* (R7).

R8 emphasizes the importance of SMEs gaining in advantages of possessing all quality-assured data and claims it to be a positive sight as control mechanisms ensure data quality. As R7, R8 also notes certain aspects are central around key figures when creating an experimental environment, how to define truths without creating multiple truths within the same organization. *“I think there are only positive things if you have ensured that it is quality-assured data and that you sort of make sure that you still have it in some way. That certain things are central around key figures, how to define them so that it does not become several truths within an enterprise.”* (R8).

### **Digital maturity models**

R1 emphasizes digital maturity models in a data-driven culture at SMEs as a success factor where automated systems are a timesaving and efficient roadmap toward becoming data-driven in comparison with traditional manual approaches. R7 affirms with R1 and further mentions that in order for SMES to avoid manual processes, SMEs should implement DDBM. *“Imagine yourself that you have 150 people and it goes plus. Everything goes well and you might be able to optimize something. How do you know that data-driven is the way to go? It is the degree of maturity of the person and the degree of maturity is how digital you are, because somewhere, you can draw it on a whiteboard, but it is more efficient to have it in data automated systems.”* (R1).

R1 urges SMEs to integrate an entrepreneurial operating system (EOS) where SMEs create a vision of why SMEs exist. The vision is based on a strategy to introduce a ten-year vision, a three-year vision and a one-year vision, where activities are thereafter foresighted per quarter. The vision ultimately creates visions for SMEs to acquire future possibilities, a year in advance in quite a short time, but also quarterly business goals to reach SMEs one year business goal. The one-year vision then points to the three-year vision and the three-year vision points to the ten-year vision. R3 mentions in addition that SMEs including digital maturity models allows SMEs to form a strategic vision where SMEs decide what to accomplish based on current business goals and what to accomplish subsequently.

R8 states when SMEs have decided to enable a data-driven culture, it could be a large risk due to high ambitions and too many ideas at once, which leads to SMEs not executing anything. R6 claims that digital maturity models are a winning concept, even if SMEs are at different maturity levels and that the digital maturity models appear quite different from SME to SME. Depending on what maturity stage the SME is at, SMEs digital maturity models are a work of change or a successful factor that should be implemented at the beginning of development. The purpose of the digital maturity model is where it shifts the focus to, e.g., what is important to measure and not just for the sake of measuring. *“I would say that even though it may look very different from enterprise to enterprise, I would definitely say that you should have the concept. I would say that it depends on where the enterprise stands in it, whether it is a change of work or something you have with you from the start. I think it has more been a maturity process that has emerged in that we still have a fairly young enterprise and where it has become a little more, yes but; what is it that we should actually focus on so that you do not measure just for the sake of measurement, but what is important for us to move forward.”* (R6).

R7 also mentions that digital maturity models depend on how big of an enterprise it is and how newly established the enterprise is. A digital maturity model provides insights on how to work with the business development towards data-driven. *“It is a bit different depending on how big an enterprise is. In younger workplaces, you are more prepared and educated and you want this more. In perhaps a little more old-fashioned enterprise, the data maturity is not so high and it can also be in operations where you have very very low-skilled personnel. Then, perhaps you need to take more steps to get there. I think our computer maturity is so much higher. I also think that you have to work a lot with your business development. How should we develop this business towards data-driven direction? You need to look at where we are today and where we want to go, then you have to say that; let's try this.”* (R7).

R6 highlights SMEs are in a constant growth journey and SMEs can avoid growing pains. SMEs can focus initially on introducing one module and gradually incorporating additional modules as the need increases. R8 concurs and further believes SMEs transformation should follow a step-by-step where SMEs, e.g, begin with retrieving data from a system and invests in educating the personnel. *“In that case, we see that it is better that you sort of start by retrieving data from an business system and build up a good follow-up from it, and then you can build on it so that you sort of warm up and take one step at a time and help to educate the staff and alike, that's important too”.* (R8).

R3 states digital maturity models at SMEs refers to SMEs being in transition of adopting systems, where it is a natural part of the adoption not to take too large steps all at once as well as it is important to ensure that the systems are used by the employees. R8 suggests a

way to initiate the transformation is to store data that SMEs do not currently use, however, it can be relevant for future analyzes.

### **Define important roles**

R2 states defining an important role is a success factor, where the individual has the main responsibility for the development. *"I believe that you need to have a role in the company, even if you are a small company. You need to have a defined role that is responsible for that issue and that person should sit in the management team. So that it is perceived as an important person in one's business and not have 1000 other tasks on its desk but only to push that issue. Otherwise, I do not think it will be treated properly."* (R2).

R4 urges SMEs to define an important role, considering defined important roles can be a contribution to SMEs. The ultimate goal for SMEs is where they define important roles within the SMEs and share knowledge around data and decision-making. R3 confirms with R4 and mentions defining an important role can be a success factor. SMEs should have defined important roles sanctioned as an assignment from the employer. SMEs must procure a person who understands and can drive the issue in the SMEs towards success.

R5 reflects in a similar way and confirms that an important role can drive development, however, that the entire SME should be involved. An important role could also help the SME to be more independent. *"They are well in and of themselves. It must also be important for everyone. Ideally, you would like an organization where everyone is responsible and runs it, paid for it. But in the beginning, you may have someone who spreads knowledge."* (R5).

R6 highlights the importance of introducing a defined important role at SMEs. SMEs transformation depends however on the maturity stage of the SME. R6 further states defining important roles in a senior non data-driven SME is usually in greater need of defining important roles than in a youth SME where processes are not carved in stone where the data-driven mindset has already begun. R6 also mentions it can definitely be valuable where a person actively takes initiative responsibility at SMEs. R7 affirms and mentions the same visions as R6 with defining important roles at SMEs as a success factor. R7 and R3 states that at SMEs, it is often the case that knowledgeable employees drive the data-driven culture forward.

R1 emphasizes the importance of SME to identify a responsible role that ensures data to be collected correctly and sets goals that enable the correct data to be reported. R8 agrees along with R1 and also highlights SMEs need an internal ambassador as a defined important role who ensures that the data-driven transformation takes place in a good way at SMEs. R8 remarks in order for the integration of data to be sorted in an orderly manner, it is important that the employees are informed what roles and areas of responsibility the employee possesses. Defining important roles increases the personal responsibility of employees and incorporates a sense of ownership. It further provides employees access to create follow-up reports and facilitates the work as well as clarifies the framework for how employees are allowed to work within the roles.

### **Shared vision**

R2 emphasizes that a data-driven culture within SMEs cannot only be integrated in a single part of the organization or only involve managers in the transformation. A transformation must involve the entire SME to succeed where all employees have a common vision on

business goals and strategies to enable the data-driven culture. R2 mentions sponsorship and resources are key definitions in the shared vision to be a crucial aspect of the successful factor that should be involved to strengthen the shared vision. *“You make the business aware of why you do it. That’s why I mention that the person must sit in the management team to get everyone involved in the business. It is not enough, for example, if you were to put it in HR, then sales and marketing and the CEO, CFO, etc. All must be aware of this and run their respective businesses, because you can not run it as a silo business, but you have to run it across the entire company. You must have a sponsorship in all activities in the company. You must have a budget for it and you must have a common picture of where it will lead to.”* (R2).

R6 notes shared vision is achieved by SMEs having a transparency where all employees should be involved in different matters when striving towards achieving the business goals. R6 further mentions that it should not only be the leaders who have access to achieve a data-driven culture, instead the entire SME should be involved. *“I think a lot about transparency somewhere in it, in that everyone can see their results and follow them up over time for that matter, I think that is very important than that only leaders are on information for that matter. Even though there is transparency within the company for the various parts, I think it is important culturally.”* (R6).

R7 claims the purpose of being data-driven is to have a holistic perspective. R6 and R7 mention that it is extremely important to include the entire SME and to possess a shared vision and understanding, which is created jointly, from stem to stern, employee level to management level. R6 states the management needs to inform the employees of why a data-driven culture is needed and make sure all involved possess their own responsibilities. R6 further highlights that the shared vision must be constantly forwarded to new employees over time.

R6 illuminates by creating a shared vision where all employees labor towards the SMEs vision have an understanding of which clear set goals are within the SME. Thus, all involved can labor towards the same direction and influence personal results, which in turn affects the SMEs results eventually. R6 claims that even if the teams have different set business goals, the employees should all be targeted so that the employees jointly contribute to SMEs development.

R4 characterizes SMEs with an open and agile approach as a good resource to invest. R8 claims that it is extra important to include all employees in senior SMEs where the work ethic has not been data-driven from start. In junior SMEs, IT is often more controlled, which requires less effort in creating a shared vision.

R2 notes SMEs with a shared vision must include key resources such as a clear end goal, tools and data to be able to enable a data-driven culture at SMEs. SMEs do not afford employees to make fact-related decisions on useless information. R2 emphasizes the importance of SMEs without a shared vision can simply not succeed as well as SMEs with shared visions. *“It does not matter if you have those tools and then you collect all the data that is great, what should you do with the data if you do not have the business with you and do not know what your ultimate goal is? Then you just gather a lot of information and in the end you do not see the forest for all the trees, in the end you have so damn much information so you do not know what to do with it.”* (R2).

### **Prioritizing**

R1, R2, R4, R6, R7 and R8 emphasizes SMEs adopting priorities as a resource strategy in order to enable the data-driven culture as a success factor. R4 indicates SMEs often prioritize economic and time resources as well as strength where the profitability is greatest. R5 states SMEs require SMEs to spend time on focusing on data and attempting to understand the connection and merge it within SMEs, which is a major purpose of prioritization. R7 claims non-priority issues increase the risk of competitors gaining more power contributing to SMEs falling behind and losing market share.

R8 is enforced in order for SMEs to prioritize important aspects, it is necessary for SMEs to investigate what opportunities exist. It is enough that a small priority of the most important positions the stage of the transformation towards data-driven. *“And also then ensure that what you do when you prioritize what is most important, that you look at; we have so much time to spend internally on this. And what are we to prioritize? We only have 10h/week, what is the most important? And that you do the little analysis”* (R8).

R8 illuminates the greatest responsibility lies with SMEs management to prioritize towards a data-driven culture. The management possesses the greatest power at SMEs and is thus ultimately suited to drive through the inclusion of new strategies. R8 mentions the investment must follow a top-down approach where SMEs labor from the top and then gradually work downwards in order for the entire SME to be involved. *“It is the management that decides, it is they who have the opportunity to prioritize financial investments and it is they who have the opportunity to demand from their IT department that now we must become data-driven, now we must invest in new modern ways of doing this. So I would say that it has to start at the top and bottom and it has to start with making these decisions that now we are making these investments”*. (R8).

R7 mentions SMEs eliminates old habits by prioritizing a data-driven culture, which generates new opportunities that lead to optimization of SMEs business processes. R1 claims for certain SMEs, prioritization may be a necessity for future development.

### **Map data sources**

R8 asserts SMEs must initially carry out a mapping of data where entire SMEs are involved in order to become data-driven. An area should afterwards be selected as the starting point of the transformation and then gradually engage the entire data-driven culture.

R7 emphasizes SMEs that strive toward becoming data-driven must require an understanding of the data assets. By constructing a data catalog, the data can be identified and easily accessible. *“You do not know your data, so you need a clear; if you want to be data-driven, data catalog so you know where the data is, you must also be able to use this data.”* (R7).

R8 claims mapping data sources is a success factor for SMEs. R8 disclose SMEs to discover what data SMEs can be labor with, data must be mapped. R8 mentions Shadow IT, which arises when a SMEs IT department does not have a compendium of all data, yet only sees data partially. *“...map out what data sources you have, it is important to know what type of data we work with. It is also important to look at, sometimes it can be so, there is something called Shadow IT. It is a concept that may exist that the IT department may think that there is only this type of data that the company has.”* (R8).

R8 states mapping and categorizing data facilitates the analysis for employees. By SME clearly mapping and describing the data, employees can easily discover and determine whether the data is relevant for usage or not.

## 4.6. Comparison between theoretical & empirical findings

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*The sub-chapters begin with an introduction of a comparison between the theoretical framework and the empirical findings as the confirmed success factors. The sub-chapters further present a comparison between the theoretical framework and the empirical findings as the enriching success factors, which highlights the new additions of success factors enabling SMEs towards a data-driven culture. The sub-chapters for the comparative analysis ends with illustrating a comparison model between theoretical and empirical findings (see figure 1).*

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### 4.6.1 Confirmed success factors

#### Processes

R1, R2, R4, R5, R6, R7 and R8 state processes as success factors for SMEs as well all the literature which mentions processes (see table 2). R5 states that processes increase the profitability by optimization of SMEs. According to R4 should business goals be used to create processes. Watson & Wixom (2007) further states that business processes should have a holistic view. By transforming data to processes can SMEs generate value (Monino, 2016). Manual systems are time consuming (R1, R3 & R8). R1, R2, R6, R8 & Szopa & Cyplik (2020) states that SMEs should for that reason invest in automated processes to increase optimisation. Hamidinava et al. (2021) claims that an automated system saves resources and Tuukkanen and Wolgsjö & Rusu (2020) states that SMEs will receive business value from it. Automated processes save in turn reasoursers (Hamidinava et al., 2021) and integrate analysis into daily operations (R1).

#### Management support

R1, R4, R8, R6 and the literature mentioning management (see table 2) consider that managers must be proactive in implementing a data-driven culture. Chaudhuri & Vrontis, (2021) states higher performance will only occur if the managers succeed in sharing knowledge among the organization. A management without clear goals will not have the knowledge to convey strategies to employees (R2 & R8). Management support is considered one of the most important factors enabling a shared vision and shall set clear goals for how the organization shall act (Storm & Borgman, 2020). Chatterjee et al., (2020) claims that managers have the power to improve the technical capacity at SMEs. The manager must therefore prioritize the data-driven development (R1). In order to truly become data-driven the management needs to engage the employees (Lawton,). It is important that it is the top manager that possesses the responsibility and not just a middle manager (R8). Managers must give employees freedom and be responsive (R4 & R8) and use the information generated by knowledgeable employees (R6). The approach will ensure that SMEs become data-driven (R1).

### **Data collection**

R2, R3, R5, R6, R7 and R8 in agreement with the literature (see table 2) states the importance of qualitative data collection for enabling a successful data-driven culture. Wixom & Watson (2010) Busse (2012) & Anderson (2015) highlight that well-defined data collection processes enable advanced analysis to be generated. R7 and R8 states that collecting data from all various system SMEs possess and making the data accessible, understandable and useful is the first step of becoming data-driven. SMEs possessing a qualitative data collection open up for business possibilities (R3, R6. Data collection allows projects and goals to be followed up, however it is needed that the system is easy-to-use and understandable (R3). As Anderson states, enterprises without data can only make decisions based on opinions and gut-feeling. Grover et al., 2018 therefore stated that enterprises need to invest in software that enables qualitative data collection, data interpretation and data access. By integrating internal and external data claims Grover et al.(2018) that value is created.

### **External experts**

R2, R6, R7 & R8 the use of external experts can be a success factor for SMEs that do not possess sufficient internal knowledge. It is further noted by the literature (see table 2) that experts can be a success factor in achieving a data-driven culture. Experts give SMEs a quick access to knowledge and analysis tools adapted to SMEs needs (R2). R8 states that SMEs may have difficulty perceiving their limitations and the complexity of data integration and modeling. It therefore could be a downfall to not ask for help (R2). By starting with the help of an expert, the risks for inexperienced SMEs can be reduced (Busse, 2012). Hiring an expert to start the data-driven transformation will require a one-time cost, but SME can benefit from it in the long run to get a quality-assured foundation (R8). When support and management agreements are needed, it can be adapted to SMEs' needs and resources and allow SMEs to choose how much support is needed. Bringing in external expertise can, thus being part of being data-driven for those SMEs who have sufficient resources and do not possess the knowledge themselves (Parviainen et al., 2017).

### **Accessible data**

The literature (see table 2) claims accessible data to be a key factor in performance analysis in agreement with R3, R5, R6, R7 & R8. Available data means easily accessible and quality data and enables SMEs to use Big Data which in turn can solve business problems and create opportunities (Benyahia, 2021). The data must be available in one place and not spread across different systems for easy analysis (R6). Available data also prevents closed blackbox solutions from occurring (R8). Magoma Khumalo & Du Plessis (2021) believe that an intuitive interface of BI tools is a crucial factor in making data and creation value available. Intuitive interface allows employees to easily create reliable reports. R6 further states that through visualization, the data becomes more accessible and easier to perceive by the employees at SMEs. R5 states that a good way to visualize data is to present the data via graphs, which is an easy way to get an overview quickly. Even if the data is easily accessible, employees must possess some knowledge in order to generate reliable reports (R8). When the data is available and easy to analyze, for example, errors and futuristic possibilities can be easily seen that have not been available before (R7).

**Clear set goals** R1, R3, R4, R6 & R7 highlights the importance of establishing clear set goals in order for SME to become data-driven. R4 states that goals are the driving force for future development and profitable results. The literature further states clear set goals as a success factor (see table 2). Ulas (2019) states that SMEs should create a roadmap for digital

transformation and business goals. R5 mentions that the value of data-driven culture could be hard to define for SME. Direction (2021) further states that it could be challenging to assess what data should be used for analysis. R6 emphasizes that it therefore is important to define and set clear goals. By clarifying what the enterprises goals are right investments and decisions could be prioritized for value creation (Pozzo, 2018). R7 agrees and states SMEs must have a vision about what is important and what questions need to be answered. Goals must be set so that they can be pursued for a certain period of time (R3). Measurable goals further ensure that SMEs have a reason for each measurement and generate needed reports (R6).

### **Technical knowledge**

R1, R3, R4, R6, R7 & R8 believe its importance for SMEs to possess technical knowledge, as does the literature (see table 2). Storm & Borgman (2020) states that technical knowledge and skills must support everyday tasks. R8 claims that there may be a technical fear and ignorance of cloud storage at SMEs which could be cured if there is an understanding of technical aspects. According to Vitale, Cupertino & Riccaboni (2020), Big Data has been shown to help SMEs by providing managers with technical skills that previously could not be accessed. With the help of the right technical knowledge within SME, resources can be saved as the need for external expert help decreases (R8). When hiring new staff, SMEs aim to strengthen the enterprises technical knowledge and hire competent employees (R1). R7 finally states that technical knowledge is crucial for SMEs who want to create awareness and knowledge of organizational data to create a data-driven culture.

### **Business strategy**

A concept that has emerged from the literature is where business strategies are considered to be a success factor for SMEs to succeed in enabling a data-driven culture. Previously SMEs experienced difficulties understanding how to form good business strategies, however, R1, R4, R6 and R7 mentions SMEs have discovered an efficient way of transforming SMEs towards data-driven culture with different approaches. Storm & Borgman (2020) states business strategies creates awareness where organizations focus on internal processes rather than external processes, which R4 also claims. R4 suggests SMEs to form a solid business strategy where the SME incorporates internal and external processes for a successful data-driven transformation. R7 affirms with the literature and R3 and describes set goals that can be achieved by business strategies where a roadmap is introduced.

Data and analytics are a major part of enabling business strategies at SMEs creating new opportunities and empowers SMEs towards data-driven culture. Allowing SMEs to follow business strategies with data and analytics creates better decision-making, productivity and value to the SMEs (Anderson, 2015; Lawton, 2021; Chatterjee, Chaudhuri & Vrontis, 2021). R1 emphasizes as the literature that SMEs need business strategies to achieve business goals with using data and analytics for decision-making, which enable SMEs towards the data-driven culture. R6 concurs with R1 and mentions in addition that SMEs can labor with a business strategy as OKR to achieve the set goals and generate good results.

### **Big Data**

It is clear that SMEs need Big Data to enable a data-driven culture to win competitive advantages, flexibility and productivity. Processing to integrate more data results in better data and provide better detailed reports for strategic decisions. There is a possibility for SMEs to use Big Data and the availability of data within the organization. The literature and

all the respondents mention Big Data has shown to be a crucial asset to SMEs when discovering SMEs weaknesses and core competencies leading SMEs to gain value and opportunities. Benyahia (2021) highlights that Big Data has an important role for SMEs. Through Big Data, improvements can be made in business models, government science and human resources, which generates competitive advantages. SMEs that succeed in using BDA will also be able to generate increased customer insights (Chaudhuri, Shah & Maheshwari, 2022). Big Data can be generated from all various channels a SMEs have access to and it is beneficial to take advantage of all data that can optimize the SMEs (R4). R3 and R5 states the importance of an ownership of Big Data for SMEs and constantly working with the data. R3 further states that SMEs must possess relevant systems for data analytics in order to generate competitive advantages.

### **Business Intelligence**

BI is one of the most significant success factors within a data-driven culture at SMEs according to the literature as well as R1, R2, R5, R6, R7 and R8. The literature mentions BI adoption to be a driving force for SMEs (Marcinkowski & Gawin, 2020) and a crucial role in the economy (Ranasinghe & Madushanka, 2021). BI facilitated at SMEs allows the SME to gain in competitive advantages based on fact-based decisions leading to new opportunities and profitability, which goes in line with the literature and the respondents, also emphasizing SMEs with BI discovers trends that can increase value to the organization. SMEs become flexible and valuable when adopting BI-systems and identifying the available resources (Ranasinghe & Madushanka, 2021) where R2 and R8 affirms the literature mentioning SMEs are in constant change and affords to be flexible when enabling the data-driven culture.

According to the literature and the respondents, BI-implemtations are usually associated with expensive investments in financial and human resources and not quite adoptable for SMEs. SMEs have previously often relied on gut feelings hindering to enable the data-driven culture, however, R1, R2, R7 and Magoma, Khumalo & Du Plessis (2021) mentions IBM Cognos analytics to be an important complement to SMEs for decision-making. IBM Cognos analytics is considered to be a key resource to SMEs as an affordable and cost-effective option as well as suitable to SMEs preferences. SMEs adopting small portions of BI such as Cloud BI solution leads to competitive advantages (English, 2018) as Cloud BI solutions are adapted, expanded and scalable for SMEs (Hamidinava et al., 2021). R8 claims SMEs can gain competitive advantages with implementing Microsoft, Azure and Snowflake cloud based services to enable a data-driven culture successfully, which goes in line with the literature. The literature and R5, R6, R7 and R8 mentions Microsoft Power BI has become a cost-effective alternative for all types of SMEs, especially SMEs with constricted resources (Llave, Hustad & Olsen, 2018; Hamidinava et al., 2021). Llave, Hustad & Olsen (2018) and Ranasinghe & Madushanka (2021) mentions the complexity of BI pressures SMEs towards adopting Microsoft Power BI leading to SMEs becoming data-driven, which goes in line with R8. R8 notes SMEs can implement Microsoft Power BI licenses as an efficient and affordable solution with merely a minimum amount of resources allowing the employees to generate BI-reports independently.

### **Data-driven business model**

DDBM has been introduced as a new success factor that has emerged during recent years, where the DDBMs have previously been created only suitable for other sizes of enterprises. Within the literature, DDBMs build on procedure models guiding SMEs towards data-driven cultures. It is important for SMEs to position SMEs towards achieving the

business goals as it is a key strategy for valuable growth (Barann et al., 2019; Lawton, 2021). R8 mentions similar to the literature where applying business strategies for quality and management systems enables SMEs to become data-driven. Barann et al. (2019), states that creating a supportive environment allows the employees to become aware of the possibilities when enabling the data-driven culture, which goes in line with R6 and R8 mentioning SMEs need a supportive structure. R8 further claims that the support should come from the top management. Szopa & Cyplik (2020) mentions SMEs can gain in implementing efficient IT-architectures, where R8 affirmed with the literature and mentions SMEs need to incorporate DDBMs with a solid IT-architecture to become data-driven.

The literature emphasizes the importance of analytics as a core asset in the DDBMs where SMEs benefit from data and decision-making and by gaining competitive advantages, market shares and revenue (Brownlow et al., 2015; Pape, 2016; Watson, 2016; Szopa & Cyplik, 2020). R5, R7 and R8 mentions data and tools are fundamental aspects of DDBM and is a crucial success factor for SMEs to remain competitive on the market. SMEs become successful once the SME understands how to prioritize data and analytics for valuable insights. The adoption of DDBM in combination with competent personnel reduces risks that SMEs may experience in connection with the data-driven transformation. The implementation of DDBM at SMEs will assist SMEs to maintain and increase market shares and increase productivity with at least 5% according to Brownlow et al. (2015) and R6.

For SMEs to enable a data-driven culture, the literature has identified barriers such as culture, language, laws, knowledge and resources to be constrained at SMEs. The literature stated that SMEs with constricted resources can overcome the barriers with a process model created by Li et al. (2018) towards enabling a data-driven culture. R8 mentions a similar strategy with FR2000 can be introduced for SMEs with limited resources. The strategy consists of generating analyzes presenting the SMEs strengths, weaknesses, opportunities and threats. All literature mentioning DDBM claims that SMEs gain in facilitating planning and distribution of resources, which is necessary for SMEs where resources need to be treated with caution, which goes in line with R7 and R8.

#### **4.6.2 Enriching success factors**

*Following subb-chapter presents success factors that are either new in the context of data-driven culture in SME or enriches the previous literature with new views.*

##### **Self-Service Business Intelligence**

R4, R5, R6, R7 and R8 emphasizes SSBI as an unmentioned major success factor at SMEs that cause a significant and positive impact when implemented and empowered. R8 illuminates the importance of SMEs being grounded in SSBI, which provides SMEs with independence and new business opportunities. R7 claims SSBI to be a major strength of SMEs when allowing all the employees to build reports single handedly instead of relying on the external expertise to conduct the reports. R5 mentions enabling a degree of freedom where employees can use the available data and create reports independently is a type of self-leadership motivating the employees to become data-driven. R4, R6 and R7 also mentions SMEs can benefit from analyzing trends and needs to achieve the business goals. R7 notes in addition that the business goals can be achieved on operational, tactical and strategic levels.

## **Education**

R7 and R8 illuminates the importance of integrating education within the data-driven culture at SMEs. R7 and R8 mentions the focus should lie on the competence development of the employees in terms of the ability to analyze and understand data. The employees should also be educated in the analytical tools, but also on the analytical skills where the employees benefit from learning the analytical and technical abilities. R7 and R8 believe that education is an important success factor in the aspect that it can change the employees attitude and way of working towards goals and strategies. R6 notes that it is important that the top management drives employees towards skills development. Demands are set on employees as a lot of resources can be consumed to develop the employees competence. SMEs that strive to be data-driven, a lot of demands are placed on IT. With more pressure on the employees, the employees must shift focus on the development of other aspects, which is a huge bottleneck that creates a great deal of frustration beyond the entire organization. R7 emphasizes the importance of educating the employees with workshops, thus creating knowledgeable employees. R8 affirms with R7 and mentions in addition that education without spending any economic resources, SMEs can educate the employees with webinars and online courses in Microsoft as it is complimentary.

Education is an aspect that is not highly mentioned to large extents in the literature, however, more as an aspect that is good to take into account and perhaps not a necessity as the other success factors. Scholz et al. (2010) implies education in terms of training the employees as an implied success factor, although, Scholz et al. (2010) does not mention as R7 and R8 how education can be adopted at SMEs and about competence development as well as how it affects decisions.

## **Experimental environment**

R7 claims an experimental environment at SMEs is a success factor and considered an advantage, since the employees can be new to SSBI. R7 further mentions that SMEs should consider that the inexperienced employees should have an opportunity to test the knowledge in an environment free of, e.g, one data warehouse. It may be due to quality affecting when many inexperienced and new users of the tools get access to the tools. R7 also points out that it is important with this aspect in order not to affect the central data storage's performance. The development of the employees also becomes more controlled and the employees get the opportunity to test the competence-levels in a separate environment that does not affect primary data, decisions and performance. R7 notes that the employees possess the possibility of easily accessing data and being provided with more degree of freedom to manipulate and analyze the data as desired and needed to perform the work successfully.

## **Digital maturity model**

R1, R3, R6, R7 and R8 emphasize the importance of gradually integrating the data-driven culture at SMEs. R8 states that SMEs who want to become data-driven often possess too many ideas and high ambition alla at one which can inhibit the transformation. R6 highlights that by analyzing the maturity level of an SME a clearer vision will arise in what's most important to start measuring. As R3 and R7 claim, could a data-driven transformation seem like a too large project that takes a lot of resources both in terms of time and money for SMEs. R1 therefore urges SMEs to use a EOS where SMEs state a vision on why they exist and set both long and short term visions. The visions will help SME to manage the few resources SMEs have and make the best use of them. R7 declares that a maturity model is extra important to introduce in old-fashioned SMEs or where

employees have low technical competence. R3 & R8 highlights that it is a natural part of the transformation to take it step by step and helps SMEs to make sure according to R6 avoiding growth pain.

### **Define important roles**

All respondents confirm defining important roles as a success factor for SMEs. R2 and R3 highlights a data-driven culture at SMEs can be treated and unprioritized, however, defined important roles with power should be selected that drives the matter forward. Defining important roles can further help SMEs in becoming more independent. As R6 mentions, the demand for an important role is largest in non data-driven SMEs, but is relevant for all SMEs. Define important roles also concerns that the employees are informed and know their responsibilities in the data driven culture (R8). In conclusion, SMEs need a defined role that drives the transformation and assign the employee roles that describe their responsibilities to enable a data-driven culture.

### **Shared vision**

R2, R6, R7 & R8 states that a shared vision among the employees of SMEs is a major factor in succeeding enabling a data-driven culture. Since data-driven culture includes the entire organization, an SME cannot be classified as data-driven if only parts of the organization are included (R2). A data-driven culture must be created jointly which means that all involved, from the top management to every single employee needs a shared vision (R2, R6 & R7). The shared vision ensures that all employees are informed and strive towards the same clear set goals (R2, R6). R4 & R6 states that a shared vision demands an open and transparent approach. Further, according to R6, the management has the responsibility to transfer the knowledge and information to the entire SME and ensure that new employees will be informed as well over time. The importance of shared vision is large in all kinds of SMEs, however when transforming an older SME that lacks data-driviness the shared vision is particularly important (R8). An SME that succeeds in enabling a shared vision will see great results for the entire enterprise (R6).

### **Prioritizing**

R1, R2, R4, R5, R6, R7 & R8 acknowledge prioritizing as a successful strategy for SMEs to enable a data-driven culture. R3 mentions that for SMEs that mostly focus on day-to-day operations it could be hard to justify the investment. But the risk is according to R7 that SMEs will lose market shares if no prioritizing for a data-driven culture is made. R1 states that managers for SMEs often do not not prioritize while R8 states that the leaders have the power to drive the transformation. R7 claims that by prioritizing a data-driven culture at SMEs will old habits be broken and new opportunities arise. R4 further states that by prioritizing a data driven culture will lead to higher profitability for SMEs. Prioritizing helps SMEs to manage limited resources like time that R1 and R6 point out is a challenge.

### **Map data sources**

R7 & R8 highlights the importance of understanding what data the SME has access to. R8 states in order for SMEs to enable a data-driven culture, mapping data sources is a must to prevent shadow IT and facilitate the use for the employees. R7 suggests SMEs to develop a data catalog where as the data becomes identified as well as easily available. By mapping data sources will the SME generate a clear overall view over the entire data asset owned by the SME and be able to select a starting point for the digital transformation. Mapping data sources prevents blackbox solutions that R7 mentions as a challenge. It further can help SME structure unstructured data (R8).

### 4.6.3 Comparison model between theoretical & empirical findings

In order to be able to make a compilation based on what has emerged from both the literature and the interviews, a comparative model has been created to present success factors. The comparative model is a result of what the literature and interviews emphasize presenting the highlights of the most important success factors on how SMEs enable a data-driven culture. The core point of the comparative model is based on a data-driven culture where the branches are drawn from the core point to illustrate the key concepts that have emerged from the analysis of the literature and the interviews. The success factors are divided into confirmed success factors and enriching success factors to clarify previously emerged success factors from the literature and new additions of success factors from the interviews.

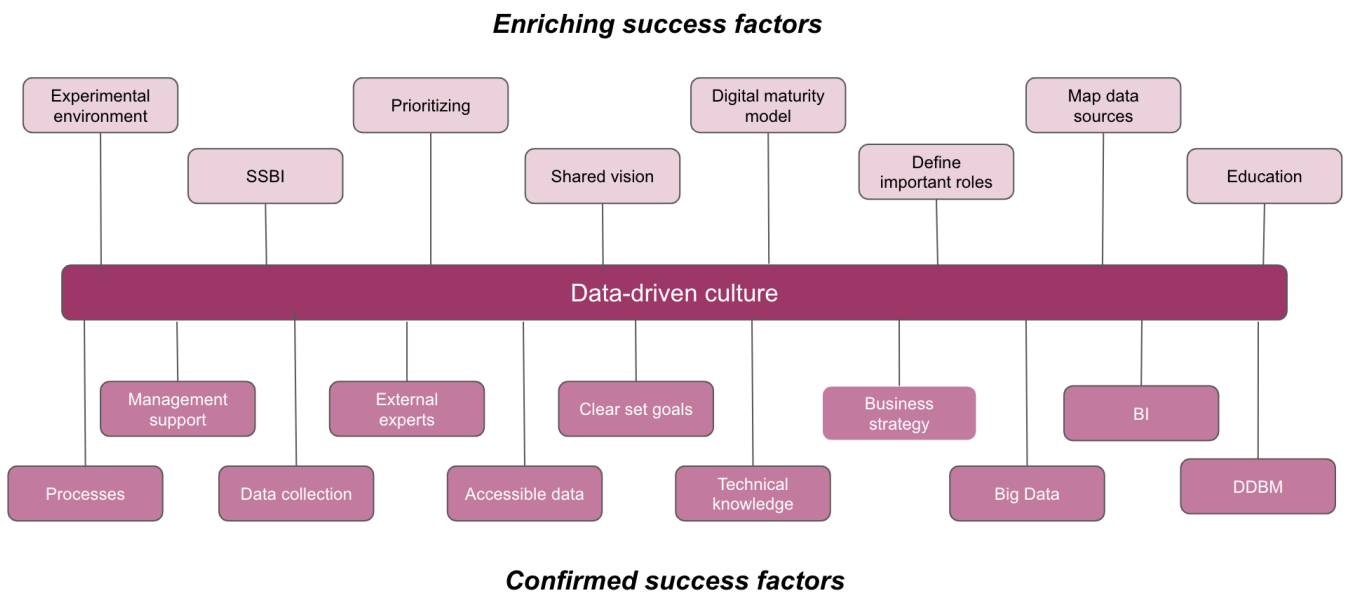


Figure 1. Comparison model of success factors at SMEs between theoretical & empirical findings.

## 5. Enabling a data-driven culture at SMEs

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*The chapter answers the research question by presenting the generated result of the analyzed in comparison between the theoretical framework and the empirical findings (see chapter 4. Analysis).*

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The research has been based upon conducting semi-structured interviews to discover success factors in a data-driven culture at SMEs. A secondary data collection in the form of a systematic literature review was also carried out to gain more in-depth and understanding on how SMEs labor in reality towards enabling a data-driven culture. The validation to the research question can thus also be viewed on how SMEs should labor to successfully enable a data-driven culture. To the best of the research knowledge, the research is one of the first researchers to focus on compiling success factors that enables a data-driven culture at SMEs. The research has therefore attempted to validate the following research question:

- ❖ *What are the success factors enabling a data-driven culture in small-medium enterprises?*

The research have discovered there are no specific answers to the research question though there are several different approaches, processes, and differences in how SMEs enable a data-driven culture. The analysis of the systematic literature review and the empirical findings have highlighted a difference in the strategies of how SMEs enable a data-driven culture. For SMEs to become successful, a number of success factors have emerged as a result of requirements to enable a data-driven culture. In order for SMEs to be able to initiate the change towards the data-driven culture, important decisions must be made.

Creating a proper data foundation in order to achieve a good structure is a crucial important asset due to SMEs handling both small and large volumes of data. Big Data within SMEs is formed after various areas such as infrastructure, decision-making and business aspects. Big Data provides SMEs a flexibility of cultural changes towards competitive advantages. An unspoken aspect is mapping data sources where SMEs receive a clear overview on business data. SMEs possessing good quality-assured, accessible and mapped data sources is essential when data is analyzed. In order for SMEs to be able to achieve a good analysis, great demands are set on prioritizing cost-efficient and suitable BI-tools when SMEs labor quantities of data. The data must also be reliable when emerging from the analysis reports due to the reports being the foundation of decision-making.

SMEs can implement DDBMs to conduct a competitive analysis to understand where the SMEs are positioned in the market. Prioritizing to integrate DDBMs can open up for new and increased knowledge where SMEs educate the employees as well as set up clear processes over different business strategies. Business strategies can simultaneously be used to structure the data and how to be used for creating analysis reports with the BI-tools.

Establishing business strategies and business goals, SMEs need a clear roadmap towards how the data-driven culture can be enabled. The establishment ought to be comprehensive where the top management as a defined important role decides how to drive the SME towards enabling the data-driven culture. The selected role should be a part of the

management team in order for the question to be treated properly. Defining important roles could further be to give the employees different assignments and responsibilities that drives the development. The management needs to support and motivate the employees towards successfully establishing the vision. It is important for SMEs to understand that the entire SME must have a shared vision to be able to succeed towards data-driven culture. The shared vision includes the entire SME, from top management to casual user need to strive towards the same strategies and goals in order to reach the vision. Incorporating a shared vision can also include areas of responsibilities, analytical tools, how data should be used in the best possible way and how the employees should be a part of the transformation. SMEs should also motivate the employees to work with agile methods once the shared vision and business strategy are integrated into the SME.

To be able to enable a data-driven culture at SMEs, it is important to support the employees and increase the technical knowledge, which tends to motivate the employees to strive towards value creation. SMEs need to prioritize a business strategy where a defined important role can be responsible for educating the employees and sharing technical knowledge within SMEs as the employees are an important factor when building the SME. The defined important role is the driving force towards change and can use BI to produce reports on Big Data.

In order for SMEs to enable a data-driven culture, SMEs can determine the enterprises digital maturity level. By ascertaining the digital maturity in internal and external perspectives, business goals, business strategies and processes can be determined as suitable for the SMEs digitalisation level. SMEs can use Big Data by creating analysis reports for decision-making. Digital maturity model govern Big Data and is a roadmap towards BI enabling a data-driven culture at SMEs. The management adopts the digital maturity model in order for SMEs to bring value and stay competitive on the market.

The employees can take important fact-based decisions on data analysis independently where the employees are motivated in creativity and innovation towards the data-driven culture. SMEs gain in saving economic and technical resources, eliminating the middle hand such as external expertise. Usually SMEs rely on external expertise, which can be costly, however it is a one-time expense. Introducing SSBI to the entire SME allows the employees to focus on projects towards achieving the business goals strategically without affecting the business performance. SMEs should also create an experimental environment for the employees to test data and be flexible in an external environment. The business vision that the management has created for the organization will be essential, once the SMEs recognize the cause of investing the time to educate the employees to use the analytical tools. It thus leads to new business opportunities and successes, even if the employees have to invest in educational resources, consulting and licenses. Regardless of the financial and human resources, SMEs should invest in adopting SSBI as applying SSBI, SMEs gain in competitive advantages on the market.

## 6. Conclusion

In conclusion, the purpose of the research was to investigate the success factors enabling a data-driven culture at SMEs. The theoretical framework had thus far only shed light on a few success factors to enable a data-driven culture at SMEs successfully. A missing gap in the literature was identified where there is a lack a clear compilation and thorough review of success factors. Instead, LEs have priority as LEs have more resources and opportunities, suggesting the shift to focus towards SMEs since SMEs accounts for the largest share of businesses in Europe.

A data-driven culture is a relatively new and unexplored area within SMEs where the results presents that the literature and the respondents' answers are in line with each other and the motivation behind it may be due to SMEs trying to enable a data-driven culture among SMEs in the pursuit of the success factors that arise in research. In both analysis and result chapters, the benefits are presented on which success factors enable a data-driven culture in SMEs. The theoretical framework and empirical findings emphasizes a compilation of 20 success factors of which four are main categories and sixteen sub-categories. By adopting a data-driven culture, SMEs can both maintain and increase market shares in today's ever-changing environment. By applying the success factors in enabling data-driven culture in SMEs, SMEs can have good conditions and great opportunities to become data-driven as technological development is now more affordable and SMEs can analyze independently. By enabling a data-driven culture, SMEs can have a maintainable and sustainable data-driven culture and increasing in market shares in today's ever-changing environment.

The research credibility based on the results of the research are considered to be average due to the number of respondents who were interviewed. However, it means credibility presents results in a still relatively unexplored area and more SMEs should enable a data-driven culture. A data-driven culture may be a new concept for SMEs, but it is a growing trend, which can also contribute to more success factors emerging as new technology, new analytical tools and application methods can enrich research, similar to the conducted research.

### 6.1 Future research

- ❖ Future research is recommended to further explore new success factors at SMEs to enrich the literature with how SMEs enable a data-driven culture.
- ❖ A suggestion is to conduct an in-depth analysis of the new success factors introduced in the research, though a larger sample of respondents.
- ❖ The success factors could be tested by a pilot project in SMEs to be strengthened.

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## Appendix 1

All interviews were conducted in Swedish, however the questions were translated for english speaking readers.

Interview questions (svenska/english)
<b>Berätta lite kortfattat om Er verksamhet</b> Tell us a little briefly about your enterprise
<b>Vad är Er arbetsroll och hur länge har Ni arbetat här?</b> What is your job role and how long have you worked here?
<b>Vilken data samlar SMF in?</b> What data does SMEs collect?
<b>Hur sparas den insamlade data?</b> How is the collected data saved?
<b>Vem/vilka ansvarar för verksamhetens data?</b> Who is responsible for the company's data?
<b>Kan du ge något exempel på hur SMF/Ni använder data för att ta strategiska beslut?</b> Can you give an example of how SMEs/You use data to make strategic decisions?
<b>Hur skulle du beskriva en datadriven kultur?</b> How would you describe a data-driven culture?
<b>Vilka erfarenheter har Ni kring datadriven kultur?</b> What experiences do you have about computer-driven culture?
<b>Besitter verksamheten en processmodell som visar/beskriver aktiviteter?</b> Does the business have a process model that visualizes/describes activities?
<b>Hur skapar Ni nya affärsmöjligheter för att blir konkurrenskraftiga?</b> How do you create new business opportunities to become competitive?
<b>Vad skulle du säga är de främsta faktorerna till att SME undviker/misslyckas med att bli datadrivna?</b> What would you say are the main factors why SMEs avoid/fail to become data driven?
<b>Hur tror Ni SMF behöver agera för att bli mer datadrivna?</b> How do you think SMEs need to act to become more data-driven?
<b>Vad ser du för nackdelar med en datadriven kultur?</b> What do you see as disadvantages of a data-driven culture?
<b>Hur resonerar Ni kring dessa som framgångsfaktorer?</b> - Besitta Big Data - Business intelligence (analysverktyg)

- **Datadrivna modeller (tydlig struktur och arkitektur)**
- **Tydligt uppsatta mål/strategi**
- **Ledningen stöd**

How do you reason about these as success factors?

- Possess Big Data
- Business intelligence (analysis tool)
- Data-driven models (clear structure and architecture)
- Clearly set goals / strategy
- Management support

**Är det något vi missat som Ni vill ta upp?**

Is there something we missed that you want to address?

**University of Borås** is a modern university in the city center. We give courses in business administration and informatics, library and information science, fashion and textiles, behavioral sciences and teacher education, engineering and health sciences.

In the **School of Business and IT (HIT)**, we have focused on the students' future needs. Therefore we have created programs in which employability is a key word. Subject integration and contextualization are other important concepts. The department has a closeness, both between students and teachers as well as between industry and education.

Our **courses in business administration** give students the opportunity to learn more about different businesses and governments and how governance and organization of these activities take place. They may also learn about society development and organizations' adaptation to the outside world. They have the opportunity to improve their ability to analyze, develop and control activities, whether they want to engage in auditing, management or marketing.

Among our **IT courses**, there's always something for those who want to design the future of IT-based communications, analyze the needs and demands on organizations' information to design their content structures, integrating IT and business development, developing their ability to analyze and design business processes or focus on programming and development of good use of IT in enterprises and organizations.

The **research** in the school is well recognized and oriented towards professionalism as well as design and development. The overall research profile is Business-IT-Services which combine knowledge and skills in informatics as well as in business administration. The research is profession-oriented, which is reflected in the research, in many cases conducted on action research-based grounds, with businesses and government organizations at local, national and international arenas. The research design and professional orientation is manifested also in InnovationLab, which is the department's and university's unit for research-supporting system development.



**HÖGSKOLAN I BORÅS**  
VETENSKAP FÖR PROFESSION

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