MASTER'S THESIS

Factors that contribute to the successful implementation of business intelligence and business analytics (BI&A) within the financial sector

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Abstract

Several studies show working with business intelligence and analytic (BI&A) technologies in daily business operations lead to better performance. Research also shows about 70% to 80% of organizations fail to implement the BI&A-technology successfully. In a response to this, researchers mapped out CriticalSuccessFactors (CSFs) aiming to increase successful implementations. Yet, the uptake has been minimal because of different causes, such as technical factors, data-quality and user-satisfaction. While investigate this phenomenon, it is noticeable researchers assume a one size fits all solution, but differences between sectors might also be the case. The aim of this study is to compile a framework based on empirically validated CSFs, relevant for successful implementations of BI&A-technologies within the financial sector. To this end, first a systematic literature review is conducted to set up a list of CSFs relevant for an implementation success. After finalizing this list, the CSFs are validated empirically by conducting a single embedded case study in which several semi-structured interviews are held with employees working at a bank within the Netherlands. Ultimately this research provides an empirical validation of eleven CSFs and left two open for further investigation.

Key terms

Business intelligence, business analytics, Critical Success Factors, CSFs, financial sector.

Summary

Several studies show including business intelligence and analytic (BI&A) technologies in daily business operations lead to better performance. Unfortunately, research also shows about 70% to 80% of organizations fail to implement BI&A-technology successfully. To improve BI&A-technology implementations, researchers mapped out CriticalSuccessFactors (CSFs) determine successful implementations of BI&A-technologies. Despite this, success rates has not improved. While investigate this, it was noticeable studies assume relevance of CSFs within different sectors are alike. This research especially focusses towards the financial sector. Therefore, the main question of this research is: 'What Critical Success Factors contribute to successful implementation of business intelligence and business analytics technologies within the financial sector?'

To answer the main question, following sub-questions are addressed:

- Which CriticalSuccessFactors related to the implementation of business intelligence and business analytics technologies are described in literature?
- How can these CriticalSuccessFactors identified in literature be integrated into one comprehensive overview?
- How can the identified CriticalSuccessFactors be validated in practice?
- How can the framework of CriticalSuccessFactors relevant during implementations of business intelligence and business analytics technology be refined with empirical information?

To answer these questions, a systematic literature review was conducted resulting into thirteen sustained CSFs. The CSFs and substantiations find their origin in theory focused towards BI&A-technology implementations making them broadly applicable but specific within BI&A-field. The CSFs are:

- Management support: The management is engaged and supportive. They recognize and understand the benefits or strategic values associated with BI&A and provides resources for the implementation.
- Business champion: An individual, who actively supports the BI&A-project, creates awareness, has a positive impression and recognizes the usefulness of the BI&A-project. This person also provides information, materials and political support to those involved.
- Vision: Vision defines itself by: 'What do we want to achieve with this BI&A-implementation?' The vision needs to be clear, aligned and well established. The vision can be an integral part of the broader company's vision or it can be defined on project/ business-case level.
- Strategy: A well-thought-out strategy answers the question 'How do we achieve our vision?' This can be an integral part of the broader company's strategy or it can be defined on a BI&A-project/ business-case level. The strategy must be properly described, scoped, prioritized and aligned with the company's/ BI&A-projects' vision.
- Benefits and costs: BI&A related benefits must be noticeable, for instance in; visualizations, work practice, or while managing. This CSFs also includes 'costs', because costs are seen as an investment aiming to be beneficial.
- Organizational readiness: The preparedness of the organization, as evidenced by the availability of organizational resources (like assets, knowledge and qualified and experienced personnel) and sufficient data quality and availability for the BI&A-technology to work with.
- Organization characteristics: Refers to characteristics of the firm e.g., culture, size or sector.
- Data quality: The quality of the BI&A source data must be high, integer, reliable and adequate.
- Technological readiness: The technological preparedness of the firm; defines skills, knowledge of the BI&A associated application and reliability of the (source) systems.
- User group(s)/-Involvement: This CSF is closely intertwined with the human side of organizational readiness. Not only the people must be able to work and adapt the technology, the selected BI&A-technology must be aligned with the users in terms of product specifications, needs and values.
- Competitive pressure: The degree of stress/pressure the company experience from competitors.
- External support: BI&A-support outside the company like; outsourcing, third-party support, maintenance and updates. This also include support like training and assistance during implementation.

- Regulatory support: A form of external support but given by a government in example by rules, policies and regulations related to data of BI&A etc.

To improve the readability and usability the CSFs were modelled into one comprehensive framework based on the Technological, Organizational and Environmental perspectives of the TOE-framework. The TOE-principles focusses on organizational context and the implementing process of technological innovations. Based on a deductive research approach the theoretical framework is empirically validate and refined in a qualitative manner preforming a single embedded case study. During this, twelve employees of a Dutch bank were interviewed using semi-structured interviews. This provides a collection of data which is transcripted, coded and analysed, resulting in a relevancy assessment of all thirteen CSFs. After the assessment, the framework needed a slight alliteration regarding CSF 'competitive pressure' and 'regulatory support', both not empirically validated nor removed because interviewees stated these could be relevant during other implementations or departments. This research contributes scientifically determining a framework specified to the financial sector. The practical contribution lies within the framework and the knowledge whether a CSFs is relevant during a BI&A-implementation. Practically the contribution lies in increasing successful implementations within the financial sector. Providing as main takeaway of this study the final framework below.

Figure 1: Final framework

Contents

1 Introduction

This chapter provides the introduction, problem definition and research objective.

1.1 Background

In recent years, data and information technology (IT) have grown in importance. Almost every company is collecting data and wants to generate value out of it. To generate this value, data need to be processed, analysed and transformed into actionable insights. To achieve this, organizations increasingly invest in business intelligence and analytics (BI&A) technologies (Paul Hawking, 2010). A recent study shows that investing in BI&A-technologies is a top priority of IT investments within organizations (Kappelman, et al., 2020).

A sector in which BI&A plays a major role is the financial sector. Since the financial crisis in 2008, companies within the financial sector are looking at ways to improve their businesses. Various developments are occurring, including IT/data-related developments. An example of this is KYC (fraud detection), where based on data, client profiles are analysed for suspicious deposits or transfers (R. Jesse McWaters, 2015). Due to these developments (and competitive advantages), data is also rapidly gaining importance within the financial sector. To ensure that these developments will run successfully, a well-implemented BI&A-technology providing reliable insights into business and client data is crucial (M. P. Bach, 2019).

Although several studies show that BI&A lead to better performance (Williams, 2003) (Aleš Popovič, 2010) (Mohamed Elbashir, 2013), not many organizations make full use of the benefits of these BI&A-technologies. Research shows that about 70% to 80% of organizations fail to implement BI&A successfully (NoorUl Ain, 2019). As a response, researchers started mapping out CriticalSuccessFactors (CSFs) (Paul Hawking, 2010) to help guide implementation of BI&A. Yet, the uptake of these guidelines into practice has been minimal because of different causes, such as technical factors, data quality and user satisfaction (Paul Hawking, 2010), (C. S. Fleisher, 2013), (N. Tsitoura, 2012). Additionally, while investigating successful and failed implementations, it is noticeable that researchers assume some sort of one size fits all solution, while it might be that relevant CSFs differ between sectors.

1.2 Exploration of the topic

As stated above, BI&A-technology is a top-priority of IT-investments within organizations. Business intelligence (BI) can be defined as a technology or software combining data gathering, data storage and knowledge management with analytical tools to translate data into information (Paul Hawking, 2010), (Negash, 2004). On the other hand, Business analytics (BA) can be described as a technology or software that enables machine learning and promotes efficiency and performance by supporting the decision-making process. Therefore, BA could be considered as an advanced form of BI (J. Yin, 2020). BI&A, a combination of the two, refers to technologies or software's analysing data and helps organizations understand their businesses and markets, and support their decision-making (D. Nam, 2019).Another frequently heard term in relation to BI&A is Enterprise Information Systems (EIS) this refers to a broader concept including BI&A, as well as legacy, security, data storage, CRM etcetera (Snoeck, 2020) (D.L. Olson, 2009).

In this research CSFs refer to key areas where 'things must go right' in order to achieve successful implementation of BI&A. If the results within these areas are not adequate, the expected results of the set goals will (most likely) be less than desired (Rockart, 1979). Unfortunately, even with CSFs outlined (i.e. technical factors, data quality and user satisfaction (Paul Hawking, 2010), (C. S. Fleisher, 2013), (N. Tsitoura, 2012), the implementation of BI&A-technologies in general is less successful than expected.

1.3 Problem statement

Despite the fact CSFs have been developed to increase the successfulness of BI&A-implementations, implementations of BI&A remain cumbersome and, in many cases, unsuccessful. A possible explanation for this is that the existing CSFs and frameworks are not specific enough to be implementable in specific sectors, such as the financial sector. This study will assess the CSFs needed for successful implementations in a specific sector, in this case the financial sector, and compare these CSFs to CSFs derived from the literature.

The financial sector has been chosen, as this sector is currently dealing with many challenges related to this topic and the growing urge of getting this right (R. Jesse McWaters, 2015).

1.4 Research objective and questions

The aim of this study is to compile an empirically validated list of CSFs relevant for successful implementations of BI&A-technologies within the financial sector. To achieve this, the following research question is addressed:
What CriticalSuccessFactors contribute to successful implementation of business intelligence and business analytics technologies within the financial sector?

This research question will be addressed by answering the following four sub-questions:

- Which CriticalSuccessFactors related to the implementation of business intelligence and business analytics technologies are described in literature?
  A list of relevant CriticalSuccessFactors will be compiled by performing an in-depth analysis of the available literature.
- How can these CriticalSuccessFactors identified in literature be integrated into one comprehensive overview?
  A theoretical framework will be set up, ready for empirically validation and refinement.
- How can the identified CriticalSuccessFactors be validated in practice?
  The theoretical CSFs will be validated preforming a single embedded case study using semi-structured interviews.
- How can the framework of CriticalSuccessFactors relevant during implementations of business intelligence and business analytics technology be refined with empirical information?
  After preforming the case study, the framework will be supplemented (if necessary) with empirical data.

1.5 Motivation/relevance

This study combines theoretical research with empirical research within the financial sector. The theoretical framework will be validated and refined using information gathered within a large bank in the Netherlands. The scientific contribution of this study lies in determine a framework specified to the financial sector.

The practical contribution of this research lies within the framework. By means of this study, it is possible to assess which CSFs are relevant and cannot be missed while implementing a BI&A-technology. This information contributes on increasing successful implementation of BI&A within the financial sector. This is important due to the consequences implementations can have on the customers, company and society. Also, money losses could decrease due to costs involved with the implementation. Lastly, there lies a contribution in creating competitive advantages within the sector. Given the fact more tech-companies (Google, Alipay and Apple(Pay)) entering the market who have a great technological advantage.

1.6 Main lines of approach

A systematic literature review is conducted to address the first two research sub-questions. Existing theoretical frameworks and CSFs are analysed, compared and mold into one theory-based framework. This process is described in chapter 2. After drafting the theoretical framework, the framework is empirically validated and refined within the financial sector. This process is described in chapter 3 (method) and 4 (results). The discussion, conclusion and recommendations are described in chapter 5.

2 Theoretical framework

This chapter addresses sub-questions: 'Which CriticalSuccessFactors related to the implementation of business intelligence and business analytics technologies are described in literature?' and 'How can these CriticalSuccessFactors identified in literature be integrated into one comprehensive overview?'

2.1 Research approach

To answer these questions, a systematic literature review is performed. By performing a systematic literature review, a large amount of literature can be processed systematically. Also, preliminary answers to the research questions can be found, which gives more guidance and substance to the empirical part of the research and clarifies the expectations on the subject. While performing this systematic literature review, Okoli's 8-step approach (C. Okoli & K. Schabram, 2010) is used because it provides a proven method for systematically approaching a literature search (appendix 1). The first step, 'Purpose of the literature review', is described in section 1.4 and 1.5. The second step: 'Protocol & Training', identifies keywords and search strings, followed with determination of the research source and inclusion and exclusion criteria.

Keywords and search string

Keywords directly derived from the main/sub-questions are 'CriticalSuccessFactors', 'business intelligence', and 'business analytics'. To broaden the search, synonyms were included, including: 'data analytics', 'BIA', 'BI&A', 'CSFs', 'success factors', 'key success factors', 'determinants' and 'drivers'. These synonyms are added because 'business analytics' and 'data analytics' are used interchangeably and 'BIA', 'BI&A', 'CSFs' are commonly used abbreviations. Additionally, 'CriticalSuccessFactors' are also known as 'key success factors', 'determinants' or 'drivers'. Despite the overlap between BI&A and EIS, EIS is not included into the search keeping the search narrow and focussed.

The keywords and their synonyms are used in a building block manner to make up a search string using Boolean-Operators. In order to search broadly, the literature search will be conducted on title and abstract of the articles. To not miss any relevant articles there is chosen to perform the search strings into two separate searches so more results are included. The following search strings were used:

- *((TitleCombined:(CriticalSuccessFactors)) OR (TitleCombined:(CSFs)) OR (TitleCombined:(success factors)) OR (TitleCombined:(key success factors)) OR (TitleCombined:(determinants)) OR (TitleCombined:(drivers))) AND ((TitleCombined:(business Intelligence)) OR (TitleCombined:(business analytics)) OR (TitleCombined:(data analytics)) OR (TitleCombined:(BI&A)) OR (TitleCombined:(BIA)))*
- *((Abstract:(CriticalSuccessFactors)) OR (Abstract:(CSFs)) OR (Abstract:(success factors)) OR (Abstract:(key success factors)) OR (Abstract:(determinants)) OR (Abstract:(drivers))) AND ((Abstract:(business Intelligence)) OR (Abstract:(business analytics)) OR (Abstract:(data analytics)) OR (Abstract:(BIA)) OR (Abstract:(BI&A)))*

Source

The source for the literature review is the Open University library. It provides open access to many journals and provides the opportunity to search multiple databases simultaneously.

Inclusion and exclusion criteria

For the understanding of the articles, English is chosen as main language. In order to search broadly, inclusively, but also focused and topical, it was decided to select articles published after 2010 with a focus on CSFs during a BI&A-implementation. The following inclusion and exclusion criteria were used to determine relevant articles:

Language	English
Publication	Peer reviewed publications
Publication date	01.01.2011/present
Focus	CSFs during BI&A implementations should be the focus of the study. Paper where CSFs are only a focus amongst other topics are excluded.

Data selection

The literature search yielded 3.116 results. The results were assessed on relevance and quality by following three consecutive steps. First, the title and focus of the articles were assessed. Duplicates and irrelevant articles based on title/focus were removed. Secondly, the headers, sub-headers and abstracts of the remaining articles were assessed. Eligible articles needed to report at least one CSFs as focus. Thirdly, the full text of the eligible articles was reviewed and an assessment of quality was done based on criteria suggested by Dybå (T. Dybå, 2007). The overall selection process is shown in appendix 2. The data extraction form in appendix 3 is used for data extraction. Only factual content was included.

Data extraction and synthesis

After quality assessment, a final list of selected articles is made. After this, the data extraction process takes place according to the deductive approach. This deductive approach is systematic in nature and consists of three phases: preparation, organizing and reporting (S. Elo, 2007). The preparation phase starts with selecting the unit of analysis, which is in this case the 'relevant CSFs related to the implementation of BI&A-technologies', because this is the core of the research question. After selecting the unit of analysis, it is important to become acquainted with the data. Therefore, the data is analysed in-depth by asking questions like: 'What is happening and why?' and 'Where and when did it happen?'

The organizing phase starts with developing a structured categorization matrix. By using this, it is possible to include aspects from the data that do and do not fit the categorization frame. In this manner, the matrix is used to test and expand concepts based on content analysis. After developing the matrix, the data is reviewed and coded for further use, using open coding first and subsequently axial coding to identify the CSFs (Saldaña, 2012). The categories for axial coding are based on codes identified during the open coding cycle. The definitions of the CSFs used to derive these axial codes are reported in table 2. An example of the process is illustrated in appendix 5.

In the final phase (reporting), a link between the results and the data is made by preforming a structured qualitative data synthesis (S. Elo, 2007) based on the TOE-framework (Tornatzky & Fleischer, 1990). This is done by firstly arranging findings captured in the data extraction form into separate tables of CSFs. Secondly, the CSFs are compared and grouped, and identical CSFs are removed. Next, the data is merged into one conceptual framework of CSFs. After the framework is set up, the extracted data will be checked again and the framework is supplemented where necessary. This last step will be repeated until all data is included.

Reflection on reliability and validity

It is important to address possible reliability and validity issues in advance, so possible mistakes and biases can be prevented or mitigated:

- Interpretation bias: To avoid misinterpretations, provided definitions or explanations are studied carefully.
- Existing biases: biased studies lead to a biased systematic review. To take this into account, a critical and objective quality assessment will be performed of all included studies.
- Understanding the topic: to conduct this research a basic knowledge about the topic is crucial. This is obtained by conducting a theoretical study.
- Small studies, big impact: small studies with very significant results can heavily impact the results of the review, as no selection is made on study sample size. During the quality assessment, this will be taken into account.
- Reporting: it is important data extraction is done in a critical a reliable way, to prevent incomplete data extraction and data loss. A review protocol and a data extraction form is used to improve transparency and reliability.

2.2 Implementation

The next steps from Okoli's 8-step plan are: Searching literature, Practical screen and Quality Appraisal. Table 1 depicts the date of the search, the search string, the results of the search (hits) and the number of selected papers. During the search also the inclusion and exclusion criteria; language, publication and publication

date were included into the search. A flow diagram of the selection steps can be found in appendix 2, and the steps are documented in detail in the data extraction form (appendix 4).

Table 1: Search date, string, hits and selected papers

#.	Search date	Search string	Hits	Selected papers
1.	07.05. 2021	((TitleCombined:(Critical success factors)) OR (TitleCombined:(CSFs)) OR (TitleCombined:(success factors)) OR (TitleCombined:(key success factors)) OR (TitleCombined:(determinants)) OR (TitleCombined:(drivers))) AND ((TitleCombined:(business Intelligence)) OR (TitleCombined:(business analytics)) OR (TitleCombined:(data analytics)) OR (TitleCombined:(BI&A)) OR (TitleCombined:(BIA)))	42 (App. 3)	10
2.	07.05. 2021	((Abstract:(Critical success factors)) OR (Abstract:(CSFs)) OR (Abstract:(success factors)) OR (Abstract:(key success factors)) OR (Abstract:(determinants)) OR (Abstract:(drivers))) AND ((Abstract:(business Intelligence)) OR (Abstract:(business analytics)) OR (Abstract:(data analytics)) OR (Abstract:(BIA)) OR (Abstract:(BI&A)))	3074 (App. 3)	11

2.3 Results and conclusions

In total, 86 CSFs are extracted from literature (duplicates included). After coding and grouping (see appendix 5 in example of this process) a list of thirteen sustained CSFs focused on BI&A-technology implementations is compiled (sub-question 1). These CSFs are used to define the framework (sub-question 2). After data extraction, the data was reviewed and coded. Subsequently, the extracted data was checked in multiple rounds to make sure that nothing was missed. This step was performed repeatedly until a complete and properly defined list of CSFs was compiled. Lastly, a definition for each CSF was created based on the extracted data. The CSFs, their definition description (including contributing literature) is shown in is presented in table 2.

Table 2: Theoretical CSFs, their definitions and literature references

Defined CSFs	Definition	Original CSF from literature	# Ref.
Management support	The management is engaged and supportive. They recognize and understand the benefits or strategic values associated with BI&A and provides resources for the implementation.	Committed management support and sponsorship	*2,6*
		Strong Management Commitment	*3*
		Top Management Support	*8,11*
		Management support	*12,15*
		Leadership commitment and support	*14*
Business champion	An individual, who actively supports the BI&A-project, creates awareness, has a positive impression and recognizes the usefulness of the BI&A-project. This person also provides information, materials and political support to those involved.	Business-centric championship	*2*
		Having a business champion	*4*
		Existence and active involvement of a strong sponsor to BI project	*11*
		Project champion	*12*
		Presence of the project champion	*15*
Vision	Vision defines itself by: 'What do we want to achieve with this BI&A-implementation?' The vision needs to be clear, aligned and well established. The vision can be an integral part of the broader company's vision or it can be defined on project/ business-case level.	A clear vision	*2*
		Business vision	*4*
		Closely tied to a strategic vision	*10*
		Vision of objectives for BI.	*11*
Strategy	A well-thought-out strategy answers the question 'How do we achieve our vision?' This can be an integral part of the broader company's strategy or it can be defined on a BI&A-project/ business-case level. The strategy must be properly described, scoped, prioritized and aligned with the company's/ BI&A-projects' vision.	A well-established business case	*2*
		Business-driven and iterative development approach	*2*
		Business-driven, scalable and flexible technical framework	*2*
		Project management process	*3*
		Non-life-critical project nature	*3*
		Agile-style delivery strategy	*3*

		Variable Scope Project Type	*3*
		Dynamic, Accelerated Project Schedule	*3*
		IT influence on the strategy	*4*
		Business case	*4*
		Project needs to be properly scoped and prioritized	*10*
		Strategy and clear definition of objectives for BI.	*11*
		BI integration strategy with the overall business strategy.	*11*
		BI project range- enterprise-wide solution scope	*11*
Benefits and costs	BI&A related benefits must be noticeable, for instance in; visualizations, work practice, or while managing. This CSFs also includes 'costs', because costs are seen as an investment aiming to be beneficial.	Methodical Project Definition Process	*3*
		Observability	*6*
		Trialability	*6*
		Cost	*12*
		Relative advantage	*12*
		Sustainability	*14*
		Expected benefits of BIS	*15*
		Perception of BIS strategic value	*15*
		BIS-related costs	*15*
Organizational readiness	The preparedness of the organization, as evidenced by the availability of organizational resources (like assets, knowledge and qualified and experienced personnel) and sufficient data quality and availability for the BI&A-technology to work with.	A balanced team composition	*2*
		High-caliber Team Capability	*3*
		Organizational resources	*6*
		Right team of qualified and experienced Business Intelligence workers	*11*
		Organizational readiness	*12,15*
Organization characteristics	Refers to characteristics of the firm e.g. culture, size or sector.	Agile-friendly organizational environment	*3*
		Team Environment	*3*
		Size	*8,15*
		Open corporate culture	*11*
		Rational decision-making culture	*12*
		Organizational culture	*15*
Data quality	The quality of the BI&A source data must be high, integer, reliable and adequate.	Sustainable data quality and integrity	*2*
		Agile Analytics Techniques	*3*
		Data quality	*6*
		Big Data Quality	*8*
		Quality of source data.	*11*
		Organizational data environment	*12,15*
Technological readiness	The technological preparedness of the firm; defines skills, knowledge of the BI&A associated application and reliability of the (source) systems.	Business-driven, scalable and flexible technical framework	*2*
		Technology readiness	*8,13*
		Technology maturity	*14*
User group(s)/-involvement	This CSF is closely intertwined with the human side of organizational readiness. Not only the people must be able to work and adapt the technology, the selected BI&A-technology must be aligned with the users in terms of product specifications, needs and values.	Strong customer Involvement	*3*
		User involvement	*4*
		Complexity	*8*
		Compatibility	*8,13,14*
		Technology readiness	*13*
		Users' traits	*14*

Competitive Pressure	The degree of stress/pressure the company experience from competitors.	Competitive pressure	*8,13,14*
External support	BI&A-support outside the company like; outsourcing, third-party support, maintenance and updates. This also include support like training and assistance during implementation.	User-oriented change management	*2*
		External support	*6,12,15*
		Continued support of active use of BI tools BI for the duration of the project.	*11*
		Vendor support	*13*
Regulatory Support	A form of external support but given by a government in example by rules, policies and regulations related to data of BI&A etc..	Regulatory Support	*8*

How can these CriticalSuccessFactors identified in literature be integrated into one comprehensive overview?

To make the list above easier to read and use, there is looked for ways to reshape the list into a practically useful framework. Multiple frameworks were assessed, e.g.: 'Theory of Reasoned Action, TOE-framework, Technology Acceptance Model and Theory of Planned Behaviour. After studying the pros, cons and perks of the frameworks, the TOE-framework is selected for this purpose. The TOE-framework refers to a framework explaining technology adoption within organizations and describes the influence of the Technological, Organizational and Environmental perspectives while adopting and implementing technological innovations (Tornatzky & Fleischer, 1990). Also the TOE-framework pays significantly more attention to the organizational context and focuses explicitly on the implementation process of technological innovations (Martins, Oliveira, & Popovič, 2014).

The TOE-perspectives can be described as followed; technology perspective represents the internal and external technological-related CSFs in an organization. Technologies include equipment as well as processes. The organizational perspective outlines the characteristics and resources required for the BI&A-implementation. This perspective also includes the way an organization is set up, organized and managed internally. The environmental perspective describes the influence of the organization's competitors, the macro-economic context and the regulatory environment of the industry in which the organization operates (Tornatzky & Fleischer, 1990). Taking this, and the outlined list of CSFs in table 2 into account, leads to the following theoretical framework (Figure 2).

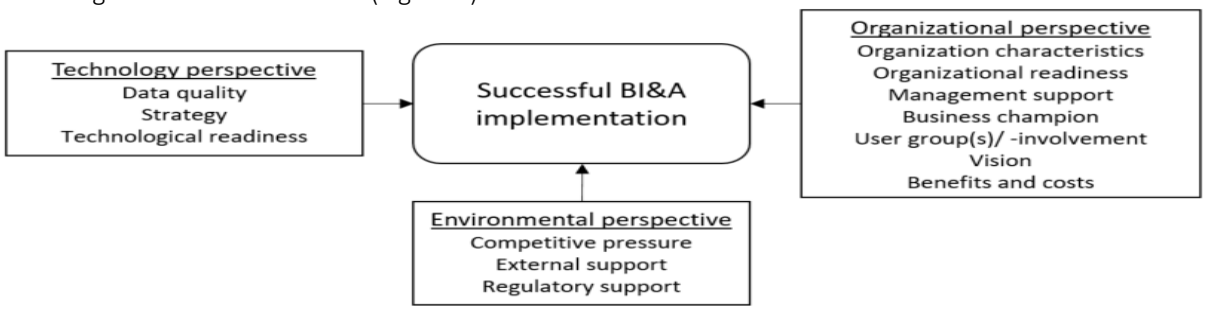

Figure 2: Conceptual theoretical

Objective of the follow-up research

In the follow-up study, the theoretical framework (figure 2) will be validated empirically and refined if needed. This is important because this framework is based on data from different theoretical studies, and as most included studies had different focus and were different in nature, this could have had consequences for the validity and reliability of the framework. Additionally, empirical validation is needed to test whether this framework is usable in the financial sector.

3 Methodology

The substantiation of the empirical research is provided within this chapter.

3.1 Conceptual design

In this study, a two-phase approach is followed. In the design-phase (chapter 2), a framework of relevant CSFs is developed. In the second phase (evaluation-phase), the sub-questions: 'How can the identified CriticalSuccessFactors be validated in practice?' and: 'How can the framework of CriticalSuccessFactors relevant during implementations of business intelligence and business analytics technologies be refined with empirical information?' are answered. By answering these sub-questions based on a deductive research approach, an empirically validated and refined framework will be drafted within a qualitative manner, which provides an answer to the main question. By performing the empirical refinement within the financial sector, the nuance towards the financial sector is established. The second phase is relevant because until now the drafted framework (figure 2) is only based on data from general scientific theoretical studies which still needs to be validated empirically.

Based on Saunders' theory (Saunders, 2019), empirical methods are survey, case study, experiment or expert interviews. Due to the limitation of not being able to ask clarifying questions and the likelihood of discordant interpretations, a survey is not the best approach for this study. An experiment was discarded because it was not feasible to conduct within the allotted timeframe and scope of this research. Lastly, expert interviews was discarded, because it is difficult to find experts especially on BI&A-implementations within the financial sector providing sufficient empirical validation. Also it turns out to be difficult to define whether someone reaches an expert-level. Therefore, a case study approach was chosen to create the best possibility reaching the desired depth level and empirical validation. Within the case study, interviews will be planned with people who own a high-level of empirically expertise in BI&A-implementations having the benefits that expert interviews would provide but combined with the benefits of the case study.

According to Yin (Yin, 2018) there are four types of case studies: holistic versus embedded and single versus multiple. For this research, the holistic approach is unsuitable due to the limited practical validation and the inability to reach the desired depth level. Embedded case studies on the other hand, seem suitable because of the possibility including multiple units-of-analysis, making an in-depth understanding of the relevant CSFs during BI&A-implementation possible.

Between a single- and multiple case study, a single case study creates the best possibility to gain an in-depth understanding of the topic by planning interviews with people who own a high level of expertise in BI&A-implementation. The deeper understanding might not be achieved within a multiple embedded case study, due to the fewer interviews that can be scheduled at individual case organizations within the set timeframe. The downside (one-sidedness) of the single case study is taken into account by paying close attention selecting the right amount of people to interview, ensuring enough diversity between involved departments (units-of-analysis) and triangulation between departments.

3.2 Technical design

A single embedded case study approach is selected. Therefore the first step is to select the case and secondly the interviewees from the different departments (units-of-analysis). The case will be selected according to predefined selection criteria. The selection criteria are:

- The case-organization must operate within the financial sector.
- The case-organization is large enough to perform an embedded case study and has multiple analysis units (interviewees from different departments).
- The case-organization is willing to contribute.
- The case-organization recently underwent a large-scale BI&A-implementation.

The Rabobank headquarters fulfil these selection criteria and is willingly to participate. Appendix 8 provides a short organization description of the Rabobank. To answer the main- and sub-questions detailed data is needed. To collect this kind of data, three methods were assessed: observation, interviews and source analysis (Saunders, 2019). During contact with the Rabobank it became apparent that insufficient reporting

was available to perform an adequate analysis. Also observation was not possible, as the BI&A-implementation was already completed. Therefore, data collection will be conducted by performing interviews within multiple departments. The data will be collected using semi-structured interviews, as this allows for an in-depth analysis and creates the opportunity to ask clarifying questions on verbal and non-verbal behaviour. This depth level would not be reached sufficiently in other types of interviews (structured- or unstructured interview). Semi-structured interviews use a protocol with predetermined, generally formulated questions (appendix 7) and an interview process (see below). This gives the flexibility to make adjustments during the interview if desired.

The second selection step is selecting interviewees from the different departments (units-of-analysis). To select the correct interviewees, requirements are set up. According to Yin, interviewees must be familiar with the field and directly related to the objective. In addition, the participants must be able to provide in-depth information about the CSFs encountered during the implementation of BI&A-technology and be able to verify the theoretical CSFs. Secondly, interviewees should be accessible and available (Yin, 2018). Lastly, interviewees have a minimum of 2 years work experience in managing/ BI&A-projects and, due to the abstractness of the subject, have a higher education-level. Based on these requirements interviewees from the 'Higher/Top management', 'Management', 'Staff' and 'Supporting departments' are included. A list of interviewees and their role description is provided in table 3.

In total, twelve interviews will be conducted across three IT departments (also known as: 'domains') and two supporting departments. In this way sufficient saturation is reached, different perspectives are included and the outcomes remain manageable. Within the category 'Higher/Top management', one interview will be a combination interview, as the role 'Head of ITSystems' and 'Head of the domain Distribution' is fulfilled by the same person. The remaining domains are chosen based on the successfulness of the implementation. According to the case organization, these are 'Business Lending & Insurance' and 'Payments Solutions'. To ensure triangulation is possible and to create a deeper understanding of domain-related issues, different roles are interviewed within the same domains. The number and distribution of the interviews is included in table 3. Appendix 8 provides information about the case organization.

Table 3: Sample sizes and descriptions

Role	Function title	Description	#
Higher/Top management	Head of ITSystems or Head of the domain	'Head of ITSystems' is in charge of the IT department responsible for all IT systems serving consumer use and divided into multiple sub departments (domains). Included within this role are the 'Heads of the Domain' which are responsible for all IT systems related to one domain.	3
Management	Sr. IT lead or IT/Area lead	'Sr. IT leads' are responsible for the operational part of a domain which contain a certain cluster of IT applications. 'IT/Area leads' are operational managers of this departments. This person reports to a Sr. IT leads.	3
Staff	Domain Officer	Domain Officers provide insights and advise about budget-, personnel- and financial issues towards higher management, management or controllers. Generally this group makes the most use of BI&A technology.	3
Supporting department	Business Controller	Business Control keeps domains financially in control; other activities are accounting and reporting. Hierarchically Business Controllers fall outside the scope of ITSystems but a strong connection with ITSystems is applicable, they are also working with the BI&A software.	2
Supporting department	Business Consultant FLR	FLR contributes in optimizing BI&A tooling and makes necessary adjustments in it. Hierarchically this group falls outside the scope of ITSystems but a strong connection with ITSystems is applicable.	1

Interview process

To increase the validity and reliability of the semi-structured interviews it is important to keep an open attitude, use interview techniques such as LSD (listening, summarizing and dig deeper) and ask open-ended questions (Miller & Rollnick, 2014). Due to the COVID pandemic, interviews are conducted via Teams and scheduled for 90 minutes. After planning the interview, a confirmation e-mail is sent containing information

the interviewee needs to know before the interview (appendix 6). The interview will be recorded via Teams and transcribed. These transcripts will be submitted to the interviewees for verification and can be requested by those who are interested. After verification, these transcripts will be used for further analysis. This process is described in section 3.3. Interviews are held in English, however given the Dutch origins of the organization, a Dutch or bilingual interview is also possible. When this is the case, the interview will be translated into English and submitted to the participant for verification.

The interview is divided into three parts: the introduction, main body and closing part. The introduction contains questions about the participants and their general view on the subject. During the main body, the CSFs from the framework will be shared, explained and discussed, and the participant is asked to reflect on his/her practical experience with the CSFs. During the closing part, final questions and clarifications can be addressed and attention will be paid to reflect on the interview. The interview protocol can be found in appendix 7. To minimize misinterpretation during the interviews and to check if all questions are clear, a pilot interview is scheduled prior to planning the official interviews. This pilot interview is held with a domain officer who belongs to the target group and who has a good understanding of the research objective. However, this pilot interview will not be included in the study.

3.3 Data analysis

To answer the last two sub-questions, it is necessary to extract relevant statements out of the interview data. This is done by following three procedures: 'summarize (condense)', 'categorize (grouping)' and 'structuring (ordering)' (Saunders, 2019). The first step after verifying the interview transcripts, is coding the transcripts. This is done using the theoretical CSFs as initial codes and if needed, additional codes will be added using open and axial coding. This provides insight into the CSFs relevant for the interviewees before- and based on, the theoretically CSFs. The process is performed by the researcher.

After completing the coding process, the prevailing coding principles will be structured based on occurrence, frequency and relevance (Likert-scale) starting at the introduction followed by the main body and closing part. After finalizing this step, all empirically identified CSFs are set out into several tables distinguishing between before and after discussing the theoretically found CSFs. If necessary CSFs will be added to the theoretical list. In order to answer the main question, the insights of the sub-questions are used to design a final framework presented in chapter 4 and 5.

3.4 Reflection

Despite the great care to develop a reliable and valid approach, validity and reliability threats are recognized in this paragraph. Also, an ethical justification is added.

Validity

Different types of validity threats exist (Saunders, 2019). For this research, the following are identified:

- Internal validity: internal validity is enhanced by conducting interviews at multiple departments and triangulating between these department. This validates the research findings by checking if different departments produce the same results.
- It is proactive examined what to find out during the interviews. Correct and open questions will be asked to minimize socially desirable answers. This will be checked during and at the end of the interview. Unclear questions will be explained.
- External validity: the downside (one-sidedness) of a single case approach is taken into account by paying close attention to selecting the right amount of people to interview and ensuring enough diversity between involved departments (units-of-analysis) and triangulate between departments.
- Scope: follow-up study is needed determine whether the results of this study are applicable to other companies within the financial sector and other sectors.
- Construct validity: by discussing the definitions of the CSFs during the interview and asking the interviewee if the definitions are clear, effort is made to ensure the CSFs discussed are clear. Also, jargon use, and the clarity of the questions is regularly checked.
- The interviews will be conducted in a familiar environment, so no other factors will affect the answers given.

- Geographical validity: the research takes place within The Netherlands. Further research is needed to establish global generalizability.
- Ecological validity: interviews are conducted via Teams, creating the possibility of conducting the interviews in the familiar environment of the interviewee given the COVID-19 pandemic.

Reliability

To increase consistency and reliability (Saunders, 2019), the following is taken into account:

- Sample size: it is recommended to perform between 4 and 15 interviews to attain "theoretical generalizability" (Yin, 2018) (Miles & Huberman, 1994). For that reason, twelve interviews are included to achieve sufficient saturation.
- Participant errors: deviation from normal behaviour is prevented by conducting interviews within the interviewees' natural environment. To gain trust and create an open atmosphere during the interview, easy introduction questions are included.
- Participant bias: by emphasizing that interview data is treated confidentially and is used for study purposes only, it is tried to prevent socially desirable answers or inaccurate responses. If desired; the results can be processed anonymously in the report.
- During the interviews it is important to check whether the interviewer and interviewees speak the same language i.e., whether they have the same understanding/ interpretation of important terms and concepts. Giving a clear definition of terms or concepts is therefore important.
- Miscommunications: miscommunications are mitigated by proper interview techniques (for example; open attitude, open-ended questions or LSD (Miller & Rollnick, 2014)) and by discussing the theoretical CSFs and their definitions during the interview.
- Interview error: The interview will be conducted by the researcher; the researcher is not a professional interviewer and might lack certain interview skills. This is mitigated by using interview techniques such as LSD and asking open-ended questions.
- Observation error: observational errors are mitigated by asking clarifying questions based on factual findings or behaviour. Observation error can also occur during the data analysis phase. This is mitigated by the objectification of the data by using a coding technique.
- Coding error: despite the fact the coding process is carried out as objectively as possible, the process is subjective and performed by one researcher. Therefore, time and diligence are invested to perform the coding as correct as possible to increase the objectiveness of the process.

Ethical aspects

If desired; the results can be processed anonymously. However, the possibility sensitive or confidential information addressed is minimal. If required by the case organization, a nondisclosure agreement can be set up. No further requirements were defined based on research ethics.

4 Results

In this section, the execution of the case study is described. Herein the theoretical framework of CSFs is empirically tested.

4.1 Refection on the interview and data collection process

To validate the theoretical CSFs in practice, semi-structured interviews are conducted within several domains within a Dutch bank (Rabobank). A bank is chosen to assess the framework of CSFs in the financial sector. Furthermore, conducting the study at only one bank, made it possible to do an in-depth empirical analysis. In general, the interview process went as planned. Twelve interviews were planned and held with interviewees in roles, functions and domains as described within chapter 3.2 table 3. Also, the interview requirements were fulfilled. In table 4 the information of the participants. During the pilot interview, it turned out 48 minutes, instead of 90 minutes, were sufficient to complete the interview. For this reason, 60 minutes interviews were scheduled. This was the case for all but one interviewee in the 'Higher/Top management' role; with one interviewee (#7) only a 30-minute interview could be scheduled due to conflicting responsibilities. This was agreed because this person was important and irreplaceable within the research.

The interviews took place between the 5th of October 2021 and 11th of November via teams. The interviews were recorded (with permission) and transcribed. The transcripts were verified by the interviewees. One of the interviews (interview #6) was bilingual, which means that the questions were asked in English, but the answers were given in Dutch. This because the interviewee indicated English language was understandable, however speaking would be a limitation in expression for this participant. As described in chapter 3.2; the interview was transcribed and translated to English using Google Translate and submitted to the participant for verification. After verification, the data extraction took place. This was done in two steps. First the interview transcripts were coded in a structured way using open and axial codes and the table presented in appendix 9. Within this table, the question asked, the short answer and the elaboration are included. Also, within this same table, in the column: 'Extra remark', the codes and the Likert-score given by the interviewee are noted. The completed tables are included in appendix 10. In the second step, the data was grouped a summarized using Excel.

Table 4: Information of the participants

Interview #	Role	Function title	Department	Ability to provide information /verification	Accessible and available	Work experience in function	Work experience in industry	Education level
Interviewee #1	Staff	Sr. Domain Support Officer	Domain Business lending & Insurance	Y	Y	Almost 4 years	Almost 4 years	Higher
Interviewee #2	Management	Business manager	Domain Wholesale and Rural	Y	Y	11 years	25 years	Higher
Interviewee #3	Supporting department	Business Controller	CFO Retail NL Leiding & Staff	Y	Y	2,5 years	15 years	Higher
Interviewee #4	Staff	Domain Support Officer	Domain Payment Solutions	Y	Y	4,5 years	4,5 years	Higher
Interviewee #5	Management	Area IT-Lead a.i.	Banking-as-a-Service	Y	Y	2 years	12,5 years	Higher
Interviewee #6	Staff	Domain Support Officer	Domain Distribution	Y	Y	2 years	>25years	Higher
Interviewee #7	Higher/Top management	Head of domain distribution, Head of ITSystems a.i.	Domain Distribution/ITSystems	Y	Y	5,5 years	>5,5 years	Higher
Interviewee #8	Higher/Top management	Head of IT Payment Solutions, Tribe lead APF	CIOO	Y	Y	4 years	>4 years	Higher
Interviewee #9	Supporting department	Business controller	CFO	Y	Y	2 years	>25 years	Higher
Interviewee #10	Higher/Top management	Head of reporting and Analytics (FLR)	CITO	Y	Y	1,5 years	>10 years	Higher
Interviewee #11	Supporting department	Product owner	FLR	Y	Y	1,5 years	23 years	Higher
Interviewee #12	Management	Sr. IT lead	ITSystems	Y	Y	2 years	23 years	Higher

4.2 Interview results

To provide in-dept understanding of the CSFs and their relevance for BI&A-implementation within the financial sector, interviewees were repeatedly asked to elaborate on answers given. The results are presented below. In addition, clarifying tables are added in the appendixes. Appendix 11: 'Relevant CSFs for successful implementations (introduction phase)' includes the CSFs discussed during the introduction phase. Appendix 12: 'CSFs scoring most relevant (main body)' describes CSF rated most relevant after discussing the list of all thirteen CSFs. Appendix 13: 'Relevant CSF to add (closing part)' are possible additions. Lastly, an additional table of Likert-scores is presented in appendix 14.

Interview results (introduction)

During the introduction phase the interviewees were asked to name the CSFs that, according to them, are relevant for successful implementations of BI&A-technology. To ensure interviewees give unbiased answers, this question was asked prior discussing the theoretical framework. Several interviewees reported features of the BI-technology: 'Flexibility', 'performance', 'standardization' and 'useability'. These were coded with a new code 'Feature of the BI-technology'. Other CSF were 'organizational readiness' (4), 'data quality' (4), 'technological readiness' (1), 'user group(s)/ -involvement' (2), 'vision' (1), 'strategy' (1), 'benefits and costs' (2) and 'management support' (1). Within appendix 11 the CSF named, combined with the theoretical CSF.

Interview results (main body)

During the main body, the CSFs were discussed and interviewees were asked if the CSFs were relevant whether these CSFs were relevant for a successful implementation of BI&A-technology.

Management support	Relevant: Yes (8)	Relevant: No (2)	Relevant: undecided/ neutral (2)	Average Likert-score 3,7

Elaboration: Eight out of twelve considered management support relevant. Interviewee #3, #4, #10 and #12 reported reasons such as: "*If management support is not there or management is not using the tooling, then it failed"* (#3), and: "*Management needs to support the direction and also explain where are we going and that eventually it will become better than what you had" (#12).* According to Interviewee #1 and #11; providing resources (time, FTE, money) is the main contribution of the management. According to interviewee #2 and #6, this factor could be 'not relevant', explaining: "*They don't care how they get the information as long as it's easy"* (#6) and: *"I don't think management cares what software you use or what a product or how you come to your report, as long as they get a report that shows what the budget is and what they're spending"* (#2). As a counter-thought it can be stated that if the management cares about the outcomes, and the outcome is good, the attitude of the user towards the BI-technology is affected positively and the users are going to use it more, which again contributes to the successfulness of the implementation.

Business champion	Relevant: Yes (8)	Relevant: No (3)	Relevant: undecided/ neutral (1)	Average Likert-score 3,4

Elaboration: Eight out of twelve considered the CSF business champion relevant. There were two main reasons for this; four interviewees reported having a business champion is relevant because of better steering, collecting feedback and translating value of the BI into the day-to-day practicalities. The other frequently stated reason is to motivate the teams/users. Two interviewees mentioned that it is helpful but not a critical factor. One said a champion could be relevant, but it also can be automated by using Google, YouTube or a good index/confluence page where necessary information can be found.

Vision	Relevant: Yes (11)	Relevant: No (1)	Relevant: undecided/ neutral (0)	Average Likert-score 4,1

Elaboration: For the CSF vision eleven out of twelve interviewees said that it is relevant. The reason was quite universal, seven said something similar to interviewee #1: "*You want to know beforehand what questions you want to answer"*. The other three said in some way the same thing but mentioned it in example related to benefits and results (efficiently, time, costs). Only one (#3) said: "*What you want is already known",* stating this CSF not relevant. Based on other interviewees answers, this seems a prejudice.

Strategy	Relevant: Yes (9)	Relevant: No (1)	Relevant: undecided/ neutral (1)	Average Likert-score 3,3

Elaboration: For the CSF Strategy nine interviewees said it is relevant. The difficulty of this lies in the agreement with the chosen strategy. Five of the interviewees mentioned that a vision can be quite concrete and unanimous agreed on, but for strategy, people tend to have an 'own' opinion (agreement or disagreement). This makes it harder to align BI&A-technologies with the strategy. Another aspect why the CSF strategy is relevant, is if the strategy is clear, it is more clear which BI-technology is suitable. And according to the interviewees a good suitable BI-technology results into more successful implementations. One interviewee (again #3) said: *"The strategy is already known",* stating this CSF not relevant. Based on other interviewees answers, this seems a prejudice.

Benefits and costs	Relevant: Yes (8)	Relevant: No (0)	Relevant: undecided/ neutral (4)	Average Likert-score 4.1

Elaboration: Benefits and cost seems to be a difficult one. Most interviewees gave this CSF a 'Yes' for relevancy. Interestingly all interviewees mentioning the CSF relevant, also mentioned a dependency between the benefit/costs ratio. So, if the costs (direct or indirect) are outweighed by the benefits, the implementation is successful and visa-versa. The other four interviewees (#3, #7, #9, #10) couldn't confirm or deny a causal relationship between the CSF and the successfulness of the implementation. The explanation lies within company size (#3: "*If you have a small company, the money you pay for a business intelligent tooling system is of course more relevant than if you have a multinational"*), the implementations manner (#7: "*I would rather emphasize on how we implement instead of focusing on the benefits and costs"*), the quality of the underlying data (#9: *"It depends on how many cost you would like to pay for data quality related to what you want to achieve as a bank"*) or the management context (#10: *"That highly depends on your management context"*). Seeing these elaborations, a sort of relevancy of benefits or costs lays beneath it. Two interviewees (#3 and #7) did not score the CSF on the Likert-scale because of this (this is settled in the average score of this CSF, see appendix 14).

Organizational readiness	Relevant: Yes (8)	Relevant: No (1)	Relevant: undecided/ neutral (3)	Average Likert-score 3.6

Elaboration: Eight interviewees said it's relevant to have some sort of preparedness. The argumentation lies in the skills or willingness to learn, willingness to adapt and up-to-date data and data literacy. Interviewee #3 stated not relevant and elaborated: "*I think we are all quite skilled and otherwise, you can easily learn it quickly"*. This describes organizational readiness partly. Therefore, this is considered as relevant. Three were doubting, one (#8) explained it happens that a project already starts while the preparation hasn't started yet or is starting. Another (#9) explained you need to continue going forward if you want too innovative.

Technological readiness	Relevant: Yes (11)	Relevant: No (1)	Relevant: undecided/ neutral (0)	Average Likert-score 3.8

Elaboration: Except interviewee #10, every interviewee said the technological readiness should be in place and is relevant. This is mainly due to two reasons. First, errors or malfunctions are a big dissatisfier. So, if they occur users seem to stop using/trust the technology. Second, systems should be aligned because if the implementation causes manual/time-consuming tasks, users wouldn't enjoy using the BI-technology.
Furthermore, two interviewees mentioned it is possible to do the preparation during the implementation, but it must be thoroughly investigated whether this is possible and does not involve unnecessary risks of malfunctions which are expensive to repair. Only one interviewee considered this CSF not relevant because technical issues are all manageable. Interestingly, this interviewee was the manager of the FLR-department which leaded this implementation.

Organization characteristics	Relevant: Yes (9)	Relevant: No (1)	Relevant: undecided/ neutral (2)	Average Likert-score 3.0

Elaboration: Organization characteristics consist of multiple factors, which made it difficult for the interviewees to answer and score the CSF. Nine said it was relevant, but the average Likert-score was 3.0 (neutral). One (#7) did not score the CSF on the Likert-scale (this is settled in the average score of this CSF, see appendix 14) or answered whether he/she considered the CSF relevant or not (this is added to the

undecided counts). The ones who answered, mostly elaborated on two characteristics: size and culture. Size because this appears to be relevant for the complexity and needs of the BI-technology implementation. Culture because if there is an open, free and learning culture, people tend to be less afraid of making mistakes and are more open for accepting change. What is also mentioned related to this CSFs, is the amount of Excel-lists being used. This 'Excel list-thinking' is embedded into a culture, influencing the implementation success. Interviewee #1 mentioned the financial sector in relation to the CSF and implementation success in the following quote: *"We are a bank, and we are used to work with data, dashboarding and doing a lot of stuff with data, maybe another company like a hospital or a city hall uses data very differently"*. This is interesting due to the mater of this research.

One interviewee (#4) said not relevant and elaborated that due to the size, the speed of implementation could be influenced but the success not. Within this same elaboration was mentioned: *"If you have a smaller company, with smaller departments, I think they can implement easier."* Suggesting 'size' and so on the CSF 'organization characteristics', is relevant.

Data quality	Relevant: Yes (12)	Relevant: No (0)	Relevant: undecided/ neutral (0)	Average Likert-score 4.5

Elaboration: All interviewees were unanimous, scoring data quality relevant during a BI&A-technology implementation. Elaborations were short and similar, saying that if the data is not reliable, adequate, correct or up to date, the implementation is useless due to garbage-in-equals-garbage-out-principle. Two interviewees made a nuance, mentioning if known the data is troubled, the implementation could still be successful depending on the desired outcome. One gave data quality a low Likert-score (1 not relevant at all) because the interviewee had the opinion that despite an implementation, data quality should be high. A remark given multiple times, is data quality must score 100% and not any lower to keep faith into the data.

User group(s)/-Involvement	Relevant: Yes (11)	Relevant: No (1)	Relevant: undecided/ neutral (0)	Average Likert-score 4.3

Elaboration: Eleven interviewees said user group(s)/-involvement is relevant. The users should use the BI&A-technology and provide feedback towards those who are implementing. One (#12) scored 'not relevant' based on the simplicity of the particular BI-technology implemented (PowerBI), although if it was a more complex technology, its relevance would arise.

Competitive pressure	Relevant: Yes (1)	Relevant: No (11)	Relevant: undecided/ neutral (0)	Average Likert-score 1.4

Elaboration: Interviewees think this isn't relevant related to the PowerBI implementation. The PowerBI implementation was merely internal. Also, not many users have contact with competitors which makes it harder to see competitor influence. A few (#8 and #11) mention competitive pressure might be relevant in case of other BI-technologies. Interviewee #9 mentioned competitor pressure not relevant for the implementation success but the BI-technology can be used for competitor's advantages. This is nice but more related to the CSF benefits and costs.

External support	Relevant: Yes (10)	Relevant: No (1)	Relevant: undecided/ neutral (1)	Average Likert-score 3.3

Elaboration: External support is relevant to motivate, educate and kick-start the implementation. When a select number of employees know how it works, they can spread the knowledge within their teams. Three interviewees (#7, #8 and #12) refer to the implementation of PowerBI as a quite standard tool, where external support was less relevant. Therefore, a lower relevancy score.

Regulatory support	Relevant: Yes (5)	Relevant: No (7)	Relevant: undecided/ neutral (0)	Average Likert-score 2.8

Elaboration: Regulatory support shows some sort of resemblances with competitor pressure. Seven interviewees scored the CSF not relevant, mostly because they only work internally and do not have contact with (external) parties. The ones stating regulatory support relevant (mainly in the roles: (Higher-/Top)

management) refer to regulations like KYC or GDPR which are assigned elsewhere in the organization (not within ITSystems).

After discussing all the theoretically CSFs in-depth, the interviewees were asked to name the most relevant CSFs for implementation success of BI&A-technologies. In the answer to this question 'data quality' was named six times as most relevant. Also, 'vision (5)', 'management support (4)', 'business champion (4)', 'user group(s)/-involvement (4)' and 'technological readiness (4)' were named often. 'Organizational characteristics', 'regulatory support', 'competitive pressure' and 'external support' were not reported. See the overview of answers given in appendix 12.

Interview results (closing part)

During the closing part was asked whether CSFs were missed. Most interviewees mentioned the theoretical list complete. Interviewee #7 and #8 named a factor/part of a CSF ('vision' and 'organizational readiness') they already mentioned in the 'most relevant question'. Interviewee #6 and #10 added a count on the CSFs ('regulatory support' and 'strategy') on the list most relevant, since they didn't mention it answering the 'most relevant question'. See appendix 13 for an overview of answers given. Another question asked is: 'Do you think this list of CriticalSuccessFactors is useful during implementation?' Multiple interviewees found recognition within the theorical CSFs. One of the interviewees answered: *'Yes, so when you set up an implementation, you can make sure that you are very conscious about what's important for the success. And that is very important to do. In this way you can shape your project in a way that it can succeed with the highest possible probability'.* Another answered the question as follows: *'I think they were very recognizable. There were no surprises or anything like that. I think I noticed all the subjects during the implementation'*. These elaborations form the basis of the answer to the third sub-question.

An last result appears when data 'most relevant (appendix 12)' and 'additions (appendix 13)' are combined with the average Likert-scores given (appendix 15). The frequency of 'most relevant CSFs' and 'average Likert-scores' somehow correlate. You can see data quality, named 6 times 'most relevant' having an average Likert-score of 4.6. User group/-involvement frequency 4 has Likert-score 4.3. Vision frequency 5, Likert-score 4.1. This also applies to CSFs mentioned less often, these do score lower; Likert-scores (<3,5). This seems to be the case for all CSFs, except for benefits and costs: frequency 2, Likert-score 4.1. This may find its origin in the dependency between the benefits-and-costs-ratio, and this is why it isn't referred as most relevant by the interviewees.

4.3 Research results

Reflecting on the literature- and interview results, the framework presented in chapter 2.3 seems quite accurate, though a little tweak should be made. Although 'competitive pressure' and 'regulatory support' were deemed relevant based on the theoretical framework, both were not empirically validated within the empirically part of this research. Despite this, it is too short-sighted to remove these CSFs from the framework because interviewees also state these CSFs could be relevant within other implementations or departments. Due to this, further investigation is needed (see chapter 5 for further elaboration). Based on this, the theoretical framework was adapted. The final framework is presented in figure 3.

Figure 2: Final framework

5 Discussion, conclusions and recommendations

Within this chapter the discussion and a substantiation of the outcomes of this research are given, including recommendations for practice and recommendations for further research.

5.1 Reflection on the empirical results

The first observation during the introduction phase of the interview is several interviewees mentioned 'features of the BI-technology' like 'flexibility', 'performance', 'standardization' and 'useability' as a CSFs. According to literature (appendix 4), these features are not part of the implementation phase, but are rather important components of the selection process of the BI&A-technology (which precedes the implementation phase). Therefore, these features should not be described as a CSF related to the implementation of BI&A-technology. However, these features were mentioned several times, so it may be interesting to conduct further research into which preconditions are essential (see chapter 5.4).

During the main body of the interviews, the theoretical list of CSFs was reflected on, in this manner the theoretical relevancy is assets directly with the interviewees followed by assessing the CSFs 'relevant' or 'not relevant'. Also the CSFs mentioned during the introduction phase (appendix 11), those considered most relevant (appendix 12) and as relevant additions during the closing part (appendix 13), are included in the following relevancy-assessment:

- **Management support:** Management support is considered relevant. The management has to provide resources and is considered as a role-model within the company in case of BI&A-technology implementations occur. Also, the lack of support proved relevant, for negatively influencing the implementation success. During the introduction phase, one interviewee mentioned this CSF relevant (appendix 11). And during the closing part; four interviewees named this CSFs 'most relevant' (appendix 12). Therefore, this CSF scored quite high on this last question. This, and the interviewees elaboration was in line with the theoretical findings.
- **Business champion:** Based on theories focusing on relevant CSFs, and the interviewees answers, this CSF is assets relevant during BI&A-implementations. Most interviewees considered this CSF relevant. The average Likert-score is above 3. Two interviewees believed having a business champion would help in achieving a better understanding and adoption of the BI&A-technology, though they did not considered it to be a CSF. Unfortunately, it was not sufficiently explained why. Four interviewees found this CSFs most relevant (appendix 12) making this CSF ranked quite high and more relevant.
- **Vision:** Based on the given answers, Likert-score, elaborations and theory; 'relevant'. Knowing were to works towards while a BI&A-technology is implemented gives direction. Also, having a concrete end goal makes the definition 'successful' more attainable.
- **Strategy:** Strategy is considered relevant. This CSF is named in five different theoretical articles (table 2) and several interviewees confirmed the relevancy empirically since the new BI&A-technology is a change in the current way of working.
- **Benefits and costs:** This seems from great relevance in theory and in practice. Eight interviewees scored it relevant for BI&A-projects. The other four could not confirm or deny a direct causal relationship between the CSF versus the successfulness of the BI&A-implementation, and elaborated on it by giving examples of how it is relevant. Besides this, the high Likert-score confirms relevancy.
- **Organizational readiness:** Assessed 'relevant' during BI&A-implementations by the interviews and confirmed by the Likert-score (3.6). Also, during the introduction-phase organizational readiness was named four times (appendix 11) and theoretically six articles found this CSFs relevant during BI&A-implementations.
- **Technological readiness:** Due to answers given, a Likert-score of 3.8 and four interviewees naming this CSF 'most-relevant during BI&A-implementations', technological readiness is assessed relevant. The technological requirements should be in order to gain user satisfaction and by this increase the successfulness of the BI&A-implementation.
- **Organization characteristics:** Despite the lower Likert-score, this CSF is considered relevant for BI&A-implementations. This, based on the interviewees elaborations and theories claiming

relevancy. The explanation of the lower Likert-score lies into multiple factors of this CSF, increasing the difficulty to score the CSF singular.

- **Data quality:** With the highest Likert-score and theoretical and empirical frequency this CSF is assessed relevant. Data quality seems a requirement for reliable outcomes of BI&A-technologies and therefore provides essential contribution to successfulness of BI&A-implementations.
- **User group(s)/-involvement:** The Likert-score and elaborations sustain the relevancy. This CSF increases the usability (and so on the successfulness of the implementation) of the BI&A-technology. Also its frequently named in response to the most relevant question (appendix 12).
- **Competitive pressure:** This CSF received the lowest Likert-score (1.4) and eleven interviewees considered this CSF 'not-relevant'. However, this was given with the implementation of a fairly simple BI&A-technology in mind. If another BI&A-technology would have been implemented, it could be this CSF scored higher. Therefore, it cannot be concluded that this CSF is irrelevant for all sorts of implementation of BI&A-technology in the financial sector.
- **External support:** Six theories consider external support relevant. Empirically, a 3.3 on the Likert-scale states relevancy. Some interviewees elaborations (especially the ones referring towards PowerBI as standard-tooling) negatively affected the Likert-score, explaining: *'if the complexity of the BI-technology implemented rises, the relevancy of this CSF increases'.*
- **Regulatory support:** One theoretical review pointed out the relevancy of regulatory support. Based on market-trends like KYC this CSF was included. Empirical elaborations did not confirm relevancy. The origin of this lies in the internal orientation of the included interviewees. Also monitoring these regulations are assigned elsewhere within the case-organisation. This influenced the scores of this CSF. Therefore further research is necessary related to this CSF.

5.2 Reflection on the research set-up

Generally, the predefined process was followed (see chapter 4.1). The selected case-organization and interviewees turned out to be suitable and the data collection method (semi-structed interviews) were sufficient. The company was big enough and covered a sufficient field of expertise. The interviewees were able to provide sufficient data and had in-depth understanding of the topic. As a remark, all interviewees worked at the same company and were mainly internally-oriented. Eventually this was a limitation working with the interview data when interviewees were referring towards the 'PowerBI' implementation while the research's focuses boarder.

Related to the methodology set-up, A deliberate choice for a single embedded case study is made due to the benefits. Beforehand limitations of this approach were acknowledged and mitigated (by selecting multiple interviewees, diverse departments, etc.). Despite these precautions the one-sidedness of a single case study eventually formed limitations in generalizability. This limitation was recognized in multiple fronts: geographically (the research took place in the Netherlands), sector-wise (only one bank and no other companies within the finical sector was included) and theoretically (the research contains only one firm which makes theoretical generalizability not possible). Other reliability and validity threats were:

Reliability

- Theoretical generalizability is not possible because one bank (single-case-study approach) is included. Multiple interviewees, diverse departments are included to triangulate between those.
- Geographically generalizability is not possible because one bank within the Netherlands is included, it is possible results may differ between countries.
- To increase the reproducibility all steps and outcomes are recorded as accurately and complete as possible. However, it remains possible that interviewees will give different answers if the research is repeated due to influences of time, momentum and interviewees' s state of mind.
- While working with the data it appeared a few questions were not answered. These questions were not included within the results. It was stated when this was the case.

Validity

- External validity is taken into account selecting the right amount of interviewees working in different departments. In general a right saturation is reached. Thus, if several interviewees from other

disciplines were included, validity could increase. This also appears to be the case if interviewees of other companies were included.
- To reach better validation different BI&A-technology implementations need to be assessed. This includes difference in complexity and scale.
- Construct validity: Prior the interviews, a pilot interview was conducted to check if the questions were clear. During the interviews it was repeatedly checked if the questions, concepts and CSFs were clear. When the interviewer had the feeling concepts were not understood correctly, the interviewer added clarification. This happened sporadically.
- Ecological validity: due to the pandemic interviews were held via teams, interviewees worked from home since March 2020, so this was considered 'normal' work surroundings. Interviewees answered the questions about comfort, openness and good safe environment positive.
- Since the interviews were done by the researcher, it was important for the researcher to not be biased or suggestive when asking questions. Close attention was paid to this and incidentally questions had to be rephrased.
- A context issue may occurred when interviewees gave answers with the PowerBI implementation in mind, instead of BI&A-technology implementation in general. Therefore, some clarifying questions were added during the interview to check if answers were related to PowerBI or BI&A-implementations in general.

Ethical aspects
- The results are processed anonymously in the report.
- Sensitive or confidential information is minimal.

5.3 Conclusions

This paragraph briefly answers the sub-questions ending up into answering the main question.

- **Which CriticalSuccessFactors related to the implementation of business intelligence and business analytics technologies are described in literature?**

A list of thirteen relevant CriticalSuccessFactors is compiled based on an in-depth analysis of the available literature (table 2). This list formed the basis of the interviews during the empirical part of this research.

- **How can these CriticalSuccessFactors identified in literature be integrated into one comprehensive overview?**

Based on the thirteen found CSFs a theoretical framework is formed based on the TOE-principles (figure 2).

- **How can the identified CriticalSuccessFactors be validated in practice?**

During semi-structured interviews the theoretical CSFs were empirically tested upon practical experience. This approach is proven to be the best approach for getting an in-depth understanding of the CSF. More about this you can find in chapter 3. Multiple interviewees mentioned practical recognition with the theorical CSFs. In this way the answer on this sub-question can be simple: 'the theoretical CSFs can be validated in practice by conducting several interviews'. This is also reinforced by the apparent correlation between frequency CSFs called most relevant and the height of the Likert-score (appendix 15). The conclusions 'how' and 'why' the CSFs are relevant is discussed within in chapter 5.1. In that section also reflection upon the theoretical findings compared with the empirical findings.

- **How can the framework of CriticalSuccessFactors relevant during implementations of business intelligence and business analytics technologies be refined with empirical information?**

After reflecting on the collected data, interviews yielded no additions of CSFs on top of the theoretical ones. However, the empirical research also did not confirm the relevancy of all CSFs. Two CSFs ('competitive pressure' and 'regulatory support') were not relevant for a successful implementation of BI&A-technology according to the empirical study. Despite of this, they were not removed from the framework because interviewees stated these CSFs could be relevant within other implementations or departments . therefore, further investigation is needed and a slight alliteration on the framework is made (figure 3).

Elaborating on these findings; the main question: **'What CriticalSuccessFactors contribute to successful implementation of business intelligence and business analytics technologies within the financial sector?'** can

be answered with the framework presented in figure 3. As a sidenote, besides further research is needed to assess the relevancy of the CSFs 'competitive pressure' and 'regulatory support' more in-depth, it could be interesting to investigate about intended implementations in order to make choices paying the right amount of attention to the right CSFs. Despite this, this research certainly shows the theoretical and empirical relevancy of the defined CSFs and framework.

5.4 Recommendations for practice

This research shows relevant CSFs for a successful implementation of a BI&A-technology in financial sector. In the context of recommendations in practice, the interviews show 'features of the BI-technology' are a critical factor prior the implementation. For this reason, it appears to be important to prepare a good business case beforehand. While this is done keep in mind what is practically necessary, what is expected of the technology and what are the requested outcomes. Also, within the implementation phase a costs- and benefits-analysis is relevant. Other factors to pay attention to are CSFs technological readiness, vision, benefits and costs, strategy and organisation characteristics.

Besides this data should be of sufficient quality. Also, it is necessary to consider whether the organizational readiness is in line with the established expectations, or whether the implementation needs external support and/or support by the management. Furthermore, it is important that the implementation is assisted by appropriate user groups/-involvement and a business champion to keep users aligned. Finally, depending on the implementation progress and external involvement, regulations and competitors will also need to be monitored or included into the considerations.

5.5 Recommendations for further research

A first recommendations already mentioned is: 'expanding the research scope'. Despite pre-determined advantages of a single embedded case study this approach also had some limitations, especially in terms of generalizability. Therefore, it is recommended to conduct a follow-up study using a multiple case study approach, including multiple organizations within the financial sector differing in organizational characteristics (i.e., sizes and georgical location) to increase generalizability around the financial sector.

Another recommendation is 'expanding BI&A-technology characteristics'. The CSFs framework is empirically validated at an IT-department within a Dutch bank that implemented PowerBI. To increase generalizability follow-up research into other BI&A-technology implementations is recommended (i.e., size or complexity of the BI&A-technology).

A third recommendation is 'expanding the research field'. This research provides a framework validated within the financial sector. Follow-up research is recommended including other types of organizations outside the financial sector to check if the framework is applicable on different sectors as well.

Finally, the degree of preparation prior the implementation could influence the success of the implementation. This is not something taken into account during the research but came across in earlier found theories (in example article ref. #2 and #4 (see appendix 4)).

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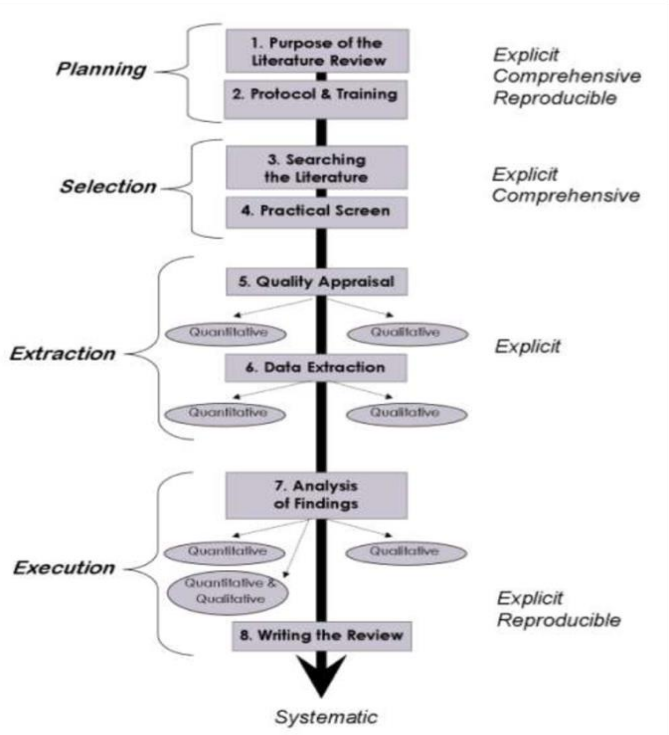
7 Appendices

Appendix 1 - Okoli's 8-step plan

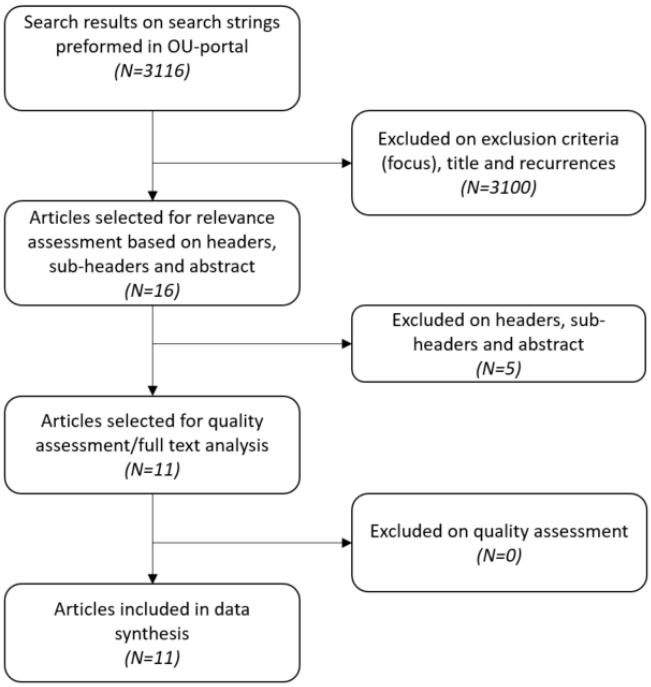
Okoli's 8-step plan to conduct a Systematic Literature Review (C. Okoli & K. Schabram, 2010).



Appendix 2 - Flow diagram of the systematic literature review

Flow diagram – The progression of the systematic literature review process*.

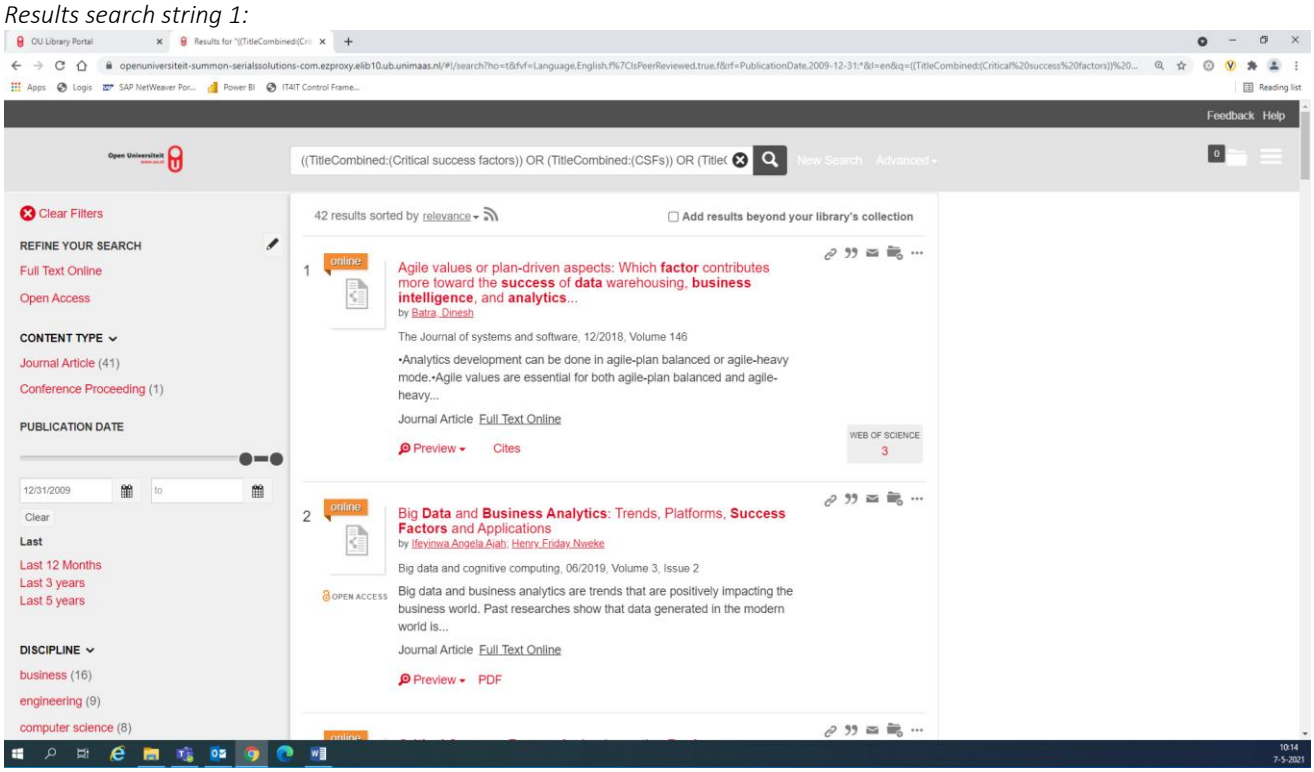
**The first selection (based on exclusion criteria (focus), title and recurrences is done online (via OU-portal)). With this source it is not possible to extract a list of titles without re-write them one-by-one. Therefore, the original list of search results (3.116 hits) is not available within the appendix. Print screens of the first pages of the library displaying the initial search result are provided in appendix 3.*



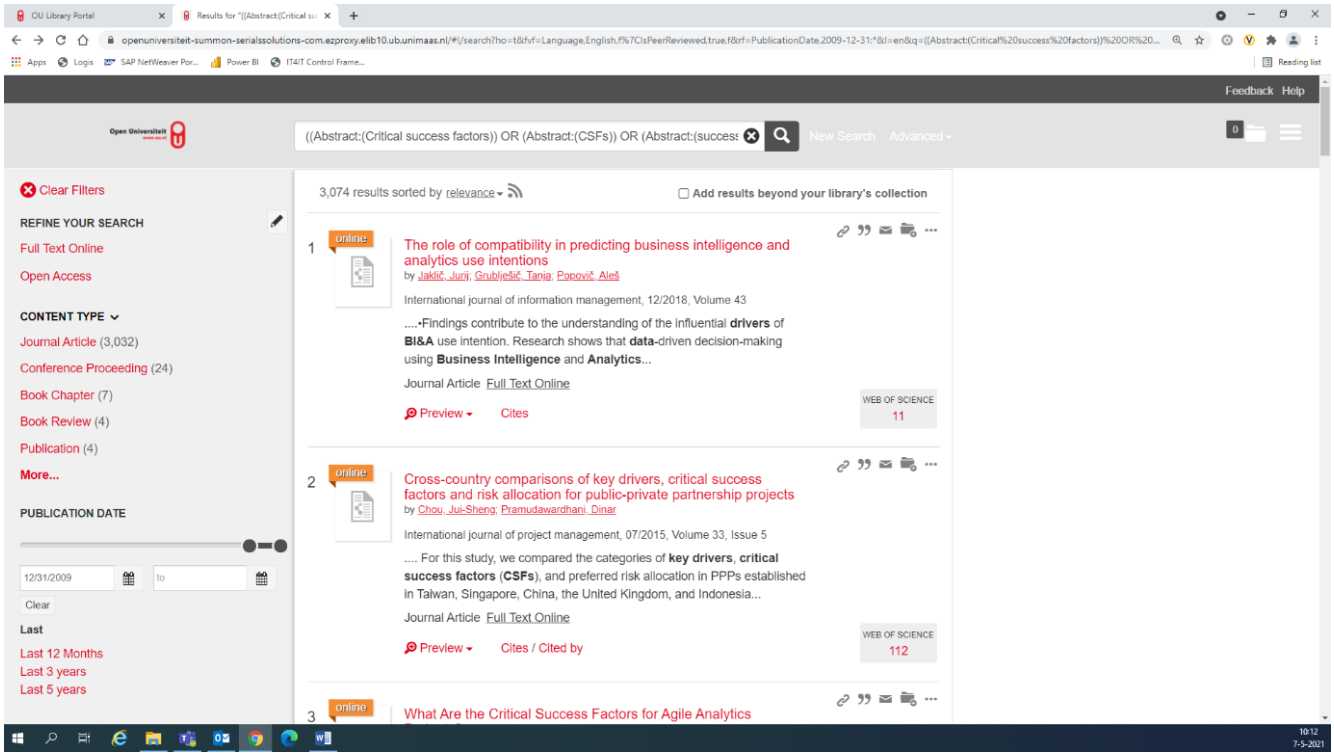
Appendix 3 - Print screen OU-Portal with amount of hits

Print screen OU-Portal; to provide insight of the amount of search results.

Results search string 1:



Results search string 2:



Appendix 4 - Data extraction form used during the systematic literature review.

Data extraction form used during the systematic literature review*.

**The first selection (based on exclusion criteria (focus), title and recurrences is done online (via OU-portal)). With this source it is not possible to extract a list of titles without re-write them one-by-one. Therefore, the original list of search results (3.116 hits) is not available within the appendix. Print screens of the first pages of the library displaying the initial search result are provided in appendix 3.*

Data extraction form

Date search preformed 28-04-2021

Date form completed 07-05-2021

Selected articles

#. Ref.	Reference	Included based on inclusion/exclusion criteria (focus) and title	Relevance assessment	Full-text analysis
1.	Agile values or plan-driven aspects: Which factor contributes more toward the success of data warehousing, business intelligence, and analytics project development? by Batra, Dinesh, 2018	Yes, focuses on understanding CSFs for BI&A-technology.	Not useable/ Excluded	No, based on abstract focus is not on CSFs.
2.	CriticalSuccessFactors for Implementing Business Intelligence System: Empirical Study in Vietnam by Pham, Quoc Trung; Mai, Tu Khanh; Et al, 2016	Yes, focuses on understanding CSFs for BI&A-technology.	Useable	Yes, meets the criteria, focus is good, abstract relevant.
3.	What Are the CriticalSuccessFactors for Agile Analytics Projects? By Mikhail Tsoy & D. Sandy Staples,2020	Yes, focuses on understanding CSFs for BI&A-technology	Useable	Yes, meets the criteria, focus is good, abstract relevant.
4.	CriticalSuccessFactors for business intelligence in the South African financial services sector by Dawson, Lionel; Van Belle, Jean-Paul, 2013	Yes, focuses on understanding CSFs for BI&A-technology.	Useable	Yes, meets the criteria, focus is good, abstract relevant.
5.	Understanding the determinants of big data analytics (BDA) adoption in logistics and supply chain management by Lai, Yuanyuan; Sun, Huifen; Ren, Jifan, 2013	Yes, focuses on understanding CSFs for BI&A-technology.	Not useable/ Excluded	No, focusses on determining firms' intention to adopt BDA.
6.	Big data-analytics adoption: Determinants and performances among small to medium-sized enterprises by Maroufkhani, Parisa; Tseng, Ming-Lang; Iranmanesh, Mohammad et al., 2020	Yes, focuses on understanding CSFs for BI&A-technology.	Useable	Yes, meets the criteria, focus is good, abstract relevant.
7.	Influencing models and determinants in big data analytics research: A bibliometric analysis by Aboelmaged, Mohamed; Mouakket, Samar, 2020	Yes, focuses on understanding CSFs for BI&A-technology.	Not useable/ Excluded	No, study isn't focused on the CSFs but targets models and theories that shape big data analytics adoption
8.	Strategic determinants of big data analytics in the AEC sector: a multi-perspective framework by Sushil S. Chaurasia; Surabhi Verma 2020	Yes, focuses on understanding CSFs for BI&A-technology.	Useable	Yes, meets the criteria, focus is good, abstract relevant.
9.	Complementarity as a Driver of Value in Business Intelligence and Analytics Adoption Processes by Valter Moreno; Felipe Elias Lobo Vieira da Silva; Rodrigo Ferreira et al., 2019	Yes, focuses on understanding CSFs for BI&A-technology.	Not useable/ Excluded	No, focuses on assessing the generation of business value for the organization and not the CSF.

10.	Key Success Factors in Business Intelligence by Szymon Adamala; Linus Cidrin, 2011	Yes, focuses on understanding CSFs for BI&A-technology.	Useable	Yes, meets the criteria, focus is good, abstract relevant.
11.	Model of key success factors for Business Intelligence implementation by Mesaros, Peter; Carnicky, Stefan; Mandicak, Tomas; et al., 2016	Yes, focuses on understanding CSFs for BI&A-technology.	Useable	Yes, meets the criteria, focus is good, abstract relevant.
12.	Understanding the determinants of business intelligence system adoption stages an empirical study of SMEs by Puklavec, Borut; Oliveira, Tiago; Popovic, Ales, 2017	Yes, focuses on understanding CSFs for BI&A-technology.	Useable	Yes, meets the criteria, focus is good, abstract relevant.
13.	Elucidating the determinants of business intelligence adoption and organizational performance by Bhatiasevi, Veera; Naglis, Michael, 2020	Yes, focuses on understanding CSFs for BI&A-technology.	Useable	Yes, meets the criteria, focus is good, abstract relevant.
14.	Exploration of Influential Determinants for the Adoption of Business Intelligence System in the Textile and Apparel Industry by Sumera Ahmad; Suraya Miskon; Rana Alabdan et al., 2020	Yes, focuses on understanding CSFs for BI&A-technology.	Useable	Yes, meets the criteria, focus is good, abstract relevant.
15.	Unpacking Business Intelligence Systems Adoption Determinants: An Exploratory Study of Small and Medium Enterprises by Borut Puklavec; Tiago Oliveira; Aleš Popovič, 2015	Yes, focuses on understanding CSFs for BI&A-technology.	Useable	Yes, meets the criteria, focus is good, abstract relevant.
16.	THE IMPORTANCE AND IMPACT OF DETERMINANTS INFLUENCING BUSINESS INTELLIGENCE SYSTEMS EMBEDDEDNESS by Tanja Grubljesic; Pedro Simoes Coelho; Jurij Jaklic 2014	Yes, focuses on understanding CSFs for BI&A-technology.	Not useable/ Excluded	No, focus is not on BI&A and its CSFs but on multiple objectives.

Quality assessment (T. Dybå, 2007)

Article number and title:	2. CriticalSuccessFactors for Implementing Business Intelligence System: Empirical Study in Vietnam
Is the paper based on research (or is it merely a “les-sons learned” report based on expert opinion)?	Based on research. Chapter 2 describes the theoretical findings and also case studies were carried out.
Is there a clear statement of the aims of the research?	The research aims to understand BI implementation in Vietnam, get an understanding of the CSFs affecting the implementation of BI in companies in Vietnam and to provide suggestions for successfully implementation of BI in Vietnam. (Pham, Mai, Mai, Crawford, & Soto, 2016)
Is there an adequate description of the context in which the research was carried out	Yes, chapter 3 describes the method (purpose, framework and process) and chapter 4 the data collection an analysis process.
Was the research design appropriate to address the aims of the research?	Yes, four case studies in enterprises implementing BI system in Vietnam.
Was the recruitment strategy appropriate to the aims of the research?	Yes, 4 participants of MIS Department, 5 participants of MIS department, 5 participants of Customer service department, 4 participants of technical support department.
Was there a control group with which to compare treatments?	N/a
Was the data collected in a way that addressed the research issue?	Yes, described in chapter 3 and 4.
Was the data analysis sufficiently rigorous?	Sufficient, data extraction process is sufficient descripted.

Has the relationship between researcher and participants been adequately considered?	Not described.
Is there a clear statement of findings?	Yes, chapter 5.
Is the study of value for research or practice?	Yes.

Article number and title:	3. What Are the CriticalSuccessFactors for Agile Analytics Projects
Is the paper based on research (or is it merely a “les-sons learned” report based on expert opinion)?	Based on research, a literature review combined with multiple case-based research
Is there a clear statement of the aims of the research?	The aim is not clear stated but possible to define based on the text and title, to define the CriticalSuccessFactors for agile analytics projects.
Is there an adequate description of the context in which the research was carried out	Yes.
Was the research design appropriate to address the aims of the research?	Yes, four case studies were analysed in which several interviews were conducted.
Was the recruitment strategy appropriate to the aims of the research?	Yes.
Was there a control group with which to compare treatments?	N/a
Was the data collected in a way that addressed the research issue?	Yes.
Was the data analysis sufficiently rigorous?	Yes. 4 cases and 29 interviews.
Has the relationship between researcher and participants been adequately considered?	Not described.
Is there a clear statement of findings?	Yes.
Is the study of value for research or practice?	Yes, despite there is focused on agile analytics projects the study is addressed valuable because outcomes might also be generalized to other types of projects.

Article number and title:	4. CriticalSuccessFactors for business intelligence in the South African financial services sector
Is the paper based on research (or is it merely a “les-sons learned” report based on expert opinion)?	Based on research. A literature review is described and presents theoretical findings. In addition, surveys and interviews were carried out.
Is there a clear statement of the aims of the research?	Yes. The research aims to determine the CSFs that organizations within the financial services sector of South Africa need to address by improve new BI projects. (Dawson & Belle, 2013)
Is there an adequate description of the context in which the research was carried out	Yes, research methodology is well descripted.
Was the research design appropriate to address the aims of the research?	Yes, the authors used a mixed method of a survey and interviews. The survey followed the Delphi method and semi structured interviews were conducted. However, the number of participants seems low (N = 26) the response rate is quite high, for this reason this has been found sufficient.

Was the recruitment strategy appropriate to the aims of the research?	Yes.
Was there a control group with which to compare treatments?	N/a
Was the data collected in a way that addressed the research issue?	Yes.
Was the data analysis sufficiently rigorous?	Yes.
Has the relationship between researcher and participants been adequately considered?	Not described.
Is there a clear statement of findings?	Yes.
Is the study of value for research or practice?	Yes, the study is extra valuable because it also shows a focus on the geographical differences (EU and South Africa and it has a focus on the financial sector.

Article number and title:	6. Big data-analytics adoption: Determinants and performances among small to medium-sized enterprises
Is the paper based on research (or is it merely a "les-sons learned" report based on expert opinion)?	Based on research (literature and surveys).
Is there a clear statement of the aims of the research?	This study aims to explore the effect of BDA on SMEs performance.
Is there an adequate description of the context in which the research was carried out	Yes, chapter 4.
Was the research design appropriate to address the aims of the research?	Yes.
Was the recruitment strategy appropriate to the aims of the research?	Yes, the sampling frame of this study represents the Iranian Small Industries and Industrial Parks Organizations. The owner/managers are targeted in this study. This study called the target firms to explain the purpose of this study and provide the meaning of BDA and collected the names and email addresses of the respondents who agreed to participate in our study. The link of the online survey was sent to the informants of the firms by email. (Maroufkhania, Tseng, Iranmanesh, Ismail, & Khalid, 2020)
Was there a control group with which to compare treatments?	N/a
Was the data collected in a way that addressed the research issue?	Yes.
Was the data analysis sufficiently rigorous?	Yes.
Has the relationship between researcher and participants been adequately considered?	Yes.
Is there a clear statement of findings?	Yes.
Is the study of value for research or practice?	Yes, however the study focuses only on SME's, the study is addressed valuable because outcomes might also be generalized to other types of businesses.

Article number and title:	8. Strategic determinants of big data analytics in the AEC sector: a multi-perspective framework
Is the paper based on research (or is it merely a “les-sons learned” report based on expert opinion)?	Based on research. A literature review is described and the article presents empirical findings.
Is there a clear statement of the aims of the research?	Yes, aims to develop and test a holistic model on adoption of IT innovation. (Chaurasia & Verma, 2020)
Is there an adequate description of the context in which the research was carried out	Yes.
Was the research design appropriate to address the aims of the research?	Yes, about 365 structured surveys but limited itself geographically in India.
Was the recruitment strategy appropriate to the aims of the research?	Yes, described on page 70.
Was there a control group with which to compare treatments?	N/a.
Was the data collected in a way that addressed the research issue?	Yes.
Was the data analysis sufficiently rigorous?	Yes.
Has the relationship between researcher and participants been adequately considered?	Yes.
Is there a clear statement of findings?	Yes.
Is the study of value for research or practice?	Yes, however the study focuses only on India, empirically found results may apply also within other geographical areas.

Article number and title:	10. Key Success Factors in Business Intelligence
Is the paper based on research (or is it merely a “les-sons learned” report based on expert opinion)?	Based on research. A literature review is described and the article presents empirical findings.
Is there a clear statement of the aims of the research?	Yes, the of this study is to identify the factors that are present in successful Business Intelligence projects and to organize them into a framework of CriticalSuccessFactors. (Adamala & Cidrin, 2011)
Is there an adequate description of the context in which the research was carried out	Yes, described in chapter 3.
Was the research design appropriate to address the aims of the research?	Yes.
Was the recruitment strategy appropriate to the aims of the research?	Yes.
Was there a control group with which to compare treatments?	N/a
Was the data collected in a way that addressed the research issue?	Yes, in a quantitative approach, surveys were used and 68 fully completed surveys obtained.
Was the data analysis sufficiently rigorous?	Yes, first quantitative methods correlation analysis of individual variables with the dependent variable of success and Partial Least Squares Regression used to build the target framework. Internet based e-surveys were used.

Has the relationship between researcher and participants been adequately considered?	Not described
Is there a clear statement of findings?	Yes.
Is the study of value for research or practice?	Yes.

Article number and title:	11. Model of key success factors for Business Intelligence implementation
Is the paper based on research (or is it merely a "les-sons learned" report based on expert opinion)?	Based on research. A literature review is described and the article presents empirical findings.
Is there a clear statement of the aims of the research?	The aim is unclear. The objective is to verify the effects and dependence of selected factors and proposes a model of key success factors for successful implementation of Business Intelligence. (Mesároš, et al., 2016)
Is there an adequate description of the context in which the research was carried out	Mediocre, the context in which the research was carried out is limited descripted.
Was the research design appropriate to address the aims of the research?	Yes, 54 enterprises of different sizes with a diver's field in Slovakia are included.
Was the recruitment strategy appropriate to the aims of the research?	Recruitment strategy is not descripted.
Was there a control group with which to compare treatments?	Not described.
Was the data collected in a way that addressed the research issue?	Unknown.
Was the data analysis sufficiently rigorous?	Hard to say due to limited description.
Has the relationship between researcher and participants been adequately considered?	Unknown.
Is there a clear statement of findings?	Yes.
Is the study of value for research or practice?	Yes, the research is valuable although it must be taken into account that reporting is mediocre. This makes it difficult to assess the quality in its entirety.

Article number and title:	12. Understanding the determinants of business intelligence system adoption stages; An empirical study of SMEs
Is the paper based on research (or is it merely a "les-sons learned" report based on expert opinion)?	Yes, research based.
Is there a clear statement of the aims of the research?	Yes, the aim is to provide a better understanding of the determinants of business intelligence system (BIS) adoption stages. (Puklavec, Oliveira, & Popovič, 2017)

Is there an adequate description of the context in which the research was carried out	Yes, the research model is based on the TOE-framework, a framework that occurs more often within the research results.
Was the research design appropriate to address the aims of the research?	Yes.
Was the recruitment strategy appropriate to the aims of the research?	Yes.
Was there a control group with which to compare treatments?	N/a
Was the data collected in a way that addressed the research issue?	Yes.
Was the data analysis sufficiently rigorous?	Yes.
Has the relationship between researcher and participants been adequately considered?	Yes.
Is there a clear statement of findings?	Yes.
Is the study of value for research or practice?	Yes.

Article number and title:	13. Elucidating the determinants of business intelligence adoption and organizational performance
Is the paper based on research (or is it merely a “les-sons learned” report based on expert opinion)?	Based on quantitative and qualitative research. In addition, a literature review is performed.
Is there a clear statement of the aims of the research?	Yes, the aim is to identify the factors and the influence towards the adoption of BI by SMEs in Thailand, to identify the factors and to what extent do they influence organizational performance after the adoption of BI by SMEs in Thailand and to conduct a multi-group analysis in order to understand the adoption of BI by SMEs in Thailand. (Bhatiasevi & Naglis, 2020)
Is there an adequate description of the context in which the research was carried out	Yes, the research model is based on the TOE-framework and the BSC.
Was the research design appropriate to address the aims of the research?	Yes, a list of 220 SMEs in Thailand was compiled from an online database.
Was the recruitment strategy appropriate to the aims of the research?	Yes.
Was there a control group with which to compare treatments?	N/a
Was the data collected in a way that addressed the research issue?	Yes.
Was the data analysis sufficiently rigorous?	Yes.
Has the relationship between researcher and participants been adequately considered?	Yes.
Is there a clear statement of findings?	Yes.
Is the study of value for research or practice?	Yes.

Article number and title:	14. Exploration of Influential Determinants for the Adoption of Business Intelligence System in the Textile and Apparel Industry
Is the paper based on research (or is it merely a “les-sons learned” report based on expert opinion)?	Yes, research based.
Is there a clear statement of the aims of the research?	Yes, the objective of this study is to fill the gaps by identifying the significant determinants pertaining to BIS adoption in the textile and apparel industry using the proposed TOE-framework.
Is there an adequate description of the context in which the research was carried out	Yes, literature review and semi-structured in-depth interviews were used.
Was the research design appropriate to address the aims of the research?	Yes.
Was the recruitment strategy appropriate to the aims of the research?	Yes, designation levels were used as an indicator of decision-making status in a company with an owner manager, IT manager, and other executive posts, which empower them to take decisions for implementation and adoption of any innovation in their organizations.
Was there a control group with which to compare treatments?	N/a
Was the data collected in a way that addressed the research issue?	Yes, 22 interviews were conducted.
Was the data analysis sufficiently rigorous?	Yes.
Has the relationship between researcher and participants been adequately considered?	Yes.
Is there a clear statement of findings?	Yes.
Is the study of value for research or practice?	Yes.

Article number and title:	15. Unpacking Business Intelligence Systems Adoption Determinants: An Exploratory Study of Small and Medium Enterprises
Is the paper based on research (or is it merely a “les-sons learned” report based on expert opinion)?	Based on research. A literature review is described and the article presents empirical findings.
Is there a clear statement of the aims of the research?	Yes, the aim is to identify SME-specific determinants of BIS adoption at firm level that will guide the development and testing of a BIS adoption framework in the milieu of SMEs. (Borut Puklavec, 2014)
Is there an adequate description of the context in which the research was carried out	Yes.
Was the research design appropriate to address the aims of the research?	Yes, theoretical finds were tested within 10 face-to-face semi-structured interviews by one of the researchers. The interviews were carried out through a 2-phase approach.

Was the recruitment strategy appropriate to the aims of the research?	Yes, informants were selected through criterion sampling among 4 SMEs identified as BIS adopters and 6 BI professionals from the field. All sufficiently familiar with BIS adoption phenomenon in SMEs.
Was there a control group with which to compare treatments?	N/a
Was the data collected in a way that addressed the research issue?	Yes.
Was the data analysis sufficiently rigorous?	Yes.
Has the relationship between researcher and participants been adequately considered?	Yes.
Is there a clear statement of findings?	Yes,
Is the study of value for research or practice?	Yes.

Data extraction of the selected articles

<table>
<tr><th># Ref.</th><th>Reference</th><th>Identified CSF and definition</th><th>Research context and main findings</th></tr>
<tr><td>2.</td><td>CriticalSuccessFactors for Implementing Business Intelligence System: Empirical Study in Vietnam by Pham, Quoc Trung; Mai, Tu Khanh; Et al, 2016 (Pham, Mai, Mai, Crawford, & Soto, 2016)</td><td>Serval CSFs are theoretically defined within three categories. Four were added later when emerged empirically during the interviews (these are displayed Italic). No specific definition description is given in the research but can be distilled from the text and description. See table below:
<table>
<tr><td>Committed management support and sponsorship</td><td>-Committed top management support
-Adequate resources are provided
-Involvement of top management</td></tr>
<tr><td>A clear vision and a well-established business case</td><td>-Aligning the BI project with org. business vision
-Well-established business case</td></tr>
<tr><td>Business-centric championship and a balanced team composition</td><td>-Existent of a business-centric champion
-Use of external consultant at early phase
-Committed expertise from business domain
-The team is cross-functional</td></tr>
<tr><td>Business-driven and iterative development approach</td><td>-Adoption of iterative development approach
-Project scope is clearly defined
-Project scheduled to deliver quick wins</td></tr>
<tr><td>User-oriented change management</td><td>-Formal user involvement throughout the lifecycle
-Foundation education, training and support are in place
-Change management</td></tr>
<tr><td>Business-driven, scalable and flexible technical framework</td><td>-Stable source systems are in place
-Establishment of strategic scalable and flexible technical framework
-Performance considerations</td></tr>
</table></td><td>Research focusses on defining CSFs theoretically, grouped them and then ranks them specified on geographical area Vietnam. Main finding are that In Vietnam, all theoretically found CSFs were confirmed and four extra CSFs emerged during the interviews. These were Involvement of top management, change management, performance considerations and business-led data governance. The ranking might differ per country. (Pham, Mai, Mai, Crawford, & Soto, 2016)</td></tr>
</table>

<table>
<tr><td></td><td></td><td><table><tr><td>Sustainable data quality and integrity</td><td>-High quality of data at source system
-Business-led establishment of common measures and classifications
-Sustainable dimensional and metadata model
-Business-led data governance</td></tr></table></td><td></td></tr>
<tr><td>3.</td><td>What Are the CriticalSuccessFactors for Agile Analytics Projects? By Mikhail Tsoy & D. Sandy Staples,2020 (Tsoy & Staples, 2020)</td><td>Twelve CSFs were mapped-out within this study:<table><tr><td>Strong Management Commitment</td><td>Strong executive support and committed sponsor or manager. (Tsoy & Staples, 2020)</td></tr><tr><td>Agile-friendly Organizational Environment</td><td>Cooperative organizational culture. (Tsoy & Staples, 2020)</td></tr><tr><td>Team Environment</td><td>Coherent, self-organizing teams. (Tsoy & Staples, 2020)</td></tr><tr><td>High-caliber Team Capability</td><td>A team that has time and a high competence and expertise. This team is divers, motivated, dedicated, engaged. (Tsoy & Staples, 2020)</td></tr><tr><td>Strong Customer Involvement</td><td>Good customer relationship and a strong customer commitment. (Tsoy & Staples, 2020)</td></tr><tr><td>Project Management Process</td><td>Good project planning and tracking. (Tsoy & Staples, 2020)</td></tr><tr><td>Methodical Project Definition Process</td><td>Establishing clear goals with an up-front costs and risk analysis. (Tsoy & Staples, 2020)</td></tr><tr><td>Agile Analytics Techniques</td><td>Ensure high data quality, appropriate documentation and pursuing simple design. (Tsoy & Staples, 2020)</td></tr><tr><td>Agile-style Delivery Strategy</td><td>Regular delivery of customer functionality and delivering most important features first. (Tsoy & Staples, 2020)</td></tr><tr><td>Non-life-critical Project Nature</td><td>Project nature being non-life-critical. (Tsoy & Staples, 2020)</td></tr><tr><td>Variable Scope Project Type</td><td>Variable scope with emergent requirements. (Tsoy & Staples, 2020)</td></tr><tr><td>Dynamic, Accelerated Project Schedule</td><td>Dynamic, accelerated schedule. (Tsoy & Staples, 2020)</td></tr></table></td><td>In this study, the main conclusion is that the reproduced version of Chow and Cao’s list of CSFs fits today’s agile projects, and most of the success factors and corresponding attributes do appear to be relevant to analytics projects, with one exception. Part of the agile style delivery strategy is the regular delivery of customer functionality, referred to as an incremental approach in the project management literature. (Tsoy & Staples, 2020)</td></tr>
<tr><td>4.</td><td>CriticalSuccessFactors for business intelligence in the South African financial services sector by Dawson, Lionel; Van Belle, Jean-Paul, 2013 (Dawson & Belle, 2013)</td><td>Multiple CSFs were addressed within this paper. The study identified the following CSFs divided within three categories:<table><tr><td>Committed (top) management support</td><td>Management support is widespread sponsorship for a project across the management team and consistently (Watson, 2001)</td></tr><tr><td>Having a business champion</td><td>A champion actively supports and promotes the project and provides information, material resources, and political support (Watson, 2001)</td></tr><tr><td>Business vision</td><td>Vision of the organization is clear (Watson, 2001)</td></tr></table></td><td>Within this research, a theoretical framework is set up and tested empirically within the financial sector in South Africa. The research concluded the contextual variables of the existing theoretical framework from Wixom and Watson fared well within the focus group of this research. Five factors</td></tr>
</table>

<table>
<tr><td></td><td></td><td><table>
<tr><td>User involvement</td><td>User involvement occurs when users are assigned project roles and tasks, which leads to a better communication of their needs and helps ensure that the system is implemented successfully (Watson, 2001)</td></tr>
<tr><td>Data quality</td><td>The quality of the data that are available (Watson, 2001)</td></tr>
<tr><td>Committed (top) management support</td><td>Management support is widespread sponsorship for a project across the management team and consistently (Watson, 2001)</td></tr>
<tr><td>Having a business champion</td><td>A champion actively supports and promotes the project and provides information, material resources, and political support (Watson, 2001)</td></tr>
<tr><td>Data quality</td><td>The quality of the data that are available</td></tr>
<tr><td>Business case</td><td>The defined goal/case</td></tr>
<tr><td>IT influence on the strategy</td><td>The way to go</td></tr>
</table></td><td>featured in the top seven CSFs the respondents suggested future research into two other CSFs: ‘business case’ and ‘IT-influence on business unit strategy’. (Dawson & Belle, 2013)</td></tr>
<tr><td>6.</td><td>Big data-analytics adoption: Determinants and performances among small to medium-sized enterprises by Maroufkhani, Parisa; Tseng, Ming-Lang; Iranmanesh, Mohammad et al., 2020 (Maroufkhania, Tseng, Iranmanesh, Ismail, & Khalid, 2020)</td><td>In the essay serval aspects were mapped out that affect BDA adoption in SMEs positively or negatively. Since the aim of the study is to address the critical ‘success’ factors, the aspects that effect the adoption positively are addressed in the table below:<table>
<tr><td colspan="2">Technological factors:</td></tr>
<tr><td>Trialability</td><td>Trialability is the degree to which an IT innovation is promising to be tried. (Maroufkhania, Tseng, Iranmanesh, Ismail, & Khalid, 2020)</td></tr>
<tr><td>Observability</td><td>The degree to which the results of an innovation are visible to others. (Maroufkhania, Tseng, Iranmanesh, Ismail, & Khalid, 2020)</td></tr>
<tr><td>Committed (top) management support and sponsorship</td><td>Refers to the degree to which managers comprehend and embrace the technological capabilities of a new technology system. (Maroufkhania, Tseng, Iranmanesh, Ismail, & Khalid, 2020)</td></tr>
<tr><td colspan="2">Organizational factors:</td></tr>
<tr><td>Committed (top) management support and sponsorship</td><td>Refers to the degree to which managers comprehend and embrace the technological capabilities of a new technology system. (Maroufkhania, Tseng, Iranmanesh, Ismail, & Khalid, 2020)</td></tr>
<tr><td>Organizational resources</td><td>Resources within the organization i.e., data-driven culture and organizational learning.</td></tr>
<tr><td>External support</td><td>External support/ external pressure like government regulations or competitive pressure.</td></tr>
</table></td><td>This study revealed that complexity, uncertainty and insecurity, trialability, observability, top management support, organizational readiness, and external support affect significantly on BDA adoption. The analysis of the literature reveals that the drivers of a technology adoption depend on the type of technology, size of firms, and country of study. (Maroufkhania, Tseng, Iranmanesh, Ismail, & Khalid, 2020)</td></tr>
<tr><td>8.</td><td>Strategic determinants of big data analytics in the AEC sector: a multi-perspective framework by Sushil S. Chaurasia; Surabhi</td><td>This study speaks also about operational and technical adoption concerns related to BDA therefore positive and negative influence may occur.<table>
<tr><td>Technology perspective:</td></tr>
</table></td><td>The results indicated that the inhibitors and facilitators of BDA adoption are different in the construction services firms (architecture and engineering)</td></tr>
</table>

<table>
<tr><td></td><td>Verma 2020 (Chaurasia & Verma, 2020)</td><td><table>
<tr><td>Big Data Quality</td><td>Big data quality includes adequate characterization of data, real-time view of data, right interpretation of results and determining the relevance of results, while addressing the trustworthiness of input data. (Chaurasia & Verma, 2020)</td></tr>
<tr><td>Complexity</td><td>It is the degree to which an innovation is perceived to be comparatively challenging to use and understand. (Chaurasia & Verma, 2020)</td></tr>
<tr><td>Compatibility</td><td>It is the extent to which an innovation suits with the prospective adopter’s current needs and existing values. (Chaurasia & Verma, 2020)</td></tr>
<tr><td>Technology Readiness</td><td>Technology readiness defines the technological preparedness and IT support resources. It defines the skills and knowledge required to leverage BDA associated IT applications. (Chaurasia & Verma, 2020)</td></tr>
<tr><td colspan="2">Organization Perspective:</td></tr>
<tr><td>Top Management Support</td><td>The management that recognizes, understands and supports the benefits or strategic values associated with BDA. (Chaurasia & Verma, 2020)</td></tr>
<tr><td>Firm Size</td><td>The size of the firm.</td></tr>
<tr><td colspan="2">Environment Perspective</td></tr>
<tr><td>Competitive Pressure</td><td>It can be defined as the extent of pressure experienced by a firm from its competitors. (Chaurasia & Verma, 2020)</td></tr>
<tr><td>Regulatory Support</td><td>It is the support given by a government authority for the adoption and assimilation of IT innovation i.e., by existing rules, policies, and regulations. (Chaurasia & Verma, 2020)</td></tr>
</table></td><td>and construction firms. Therefore, not all CSFs extracted will be applicable on all sorts of firms. This also is relevant to know for the study and makes it interesting to know what is applicable for the financial sector.</td></tr>
<tr><td>10.</td><td>Key Success Factors in Business Intelligence by Szymon Adamala; Linus Cidrin, 2011 (Adamala & Cidrin, 2011)</td><td colspan="2">Five out of seventeen independent variables that offer the highest explanatory power of the model are taken in to account for this study. This study concludes the next five statements:
-Business Intelligence solution must be built with end users in mind, as they need to use it.
-The Business Intelligence system needs to be closely tied to a company’s strategic vision.
-Project needs to be properly scoped and prioritized to concentrate on best opportunities first.
-Although technological issues are encountered, all of them need to be solved.
-Non-technological issues should be avoided as they can hinder the success of the BI initiative. (Adamala & Cidrin, 2011)</td><td>Five correlations are found by doing regression analysis on empirically data (survey’s). Eventually the researchers decided to separately propose a theoretical framework and a specific measurement method for each of the variables.</td></tr>
</table>

<table>
<tr>
<td>11.</td>
<td>Model of key success factors for Business Intelligence implementation by Mesaros, Peter; Carnicky, Stefan; Mandicak, Tomas; et al., 2016 (Mesároš, et al., 2016)</td>
<td>Within this study in total seven key success factors of BI are identified. No specific definition description is given in the research but can be distilled from the text and description:
-Vision, strategy, clear definition of objectives for BI.
-BI integration strategy with the overall business strategy.
-Quality of source data.
-BI project range- enterprise-wide solution scope.
-User segmentation solutions and identification of specific technology needs of individual user groups.
-Existence and active involvement of a strong sponsor to BI project.
-Top management support.
-Right team of qualified and experienced Business Intelligence workers.
-Continued support of active use of BI tools BI for the duration of the project.
-Open corporate culture.</td>
<td>In this study, the main finding is the testing of hypothesis and conclude a positive correlation between the theoretical found key success factors.</td>
</tr>
<tr>
<td>12.</td>
<td>Understanding the determinants of business intelligence system adoption stages an empirical study of SMEs by Puklavec, Borut; Oliveira, Tiago; Popovic, Ales, 2017 (Puklavec, Oliveira, & Popovič, 2017)</td>
<td>This paper provides empirical insights about how technological, organizational, and environmental factors affect the three individual BIS adoption stages (evaluation, adoption, and use) CSFs found are:
<table>
<tr><td colspan="2">Technological context:</td></tr>
<tr><td>Relative advantage</td><td>The degree to which a BIS is perceived as being superior to the system it replaces. (Puklavec, Oliveira, & Popovič, 2017)</td></tr>
<tr><td>Cost</td><td>In the study cost are defined as cost effectiveness, i.e., where the benefits of adoption new technology exceed the costs of such technology. (Puklavec, Oliveira, & Popovič, 2017)</td></tr>
<tr><td>BIS is part of ERP</td><td>The state where BIS does not subsist as an independent IS solution but is integrated into an ERP solution as an indivisible part of it. (Puklavec, Oliveira, & Popovič, 2017)</td></tr>
<tr><td colspan="2">Organizational context:</td></tr>
<tr><td>Management support</td><td>Top management’s explicit and active support for the introduction and development of an IT innovation. (Puklavec, Oliveira, & Popovič, 2017)</td></tr>
<tr><td>Rational decision-making culture</td><td>The presence of organization-wide respect for measuring, testing and evaluating quantitative evidence in decision processes. Such a culture encourages the use of data and information to support work processes and perform analyses with advanced techniques. (Puklavec, Oliveira, & Popovič, 2017)</td></tr>
<tr><td>Project champion</td><td>This management-level individual is the person who creates the awareness and a positive impression of an IT innovation. One who recognizes the usefulness of an idea for the organization. (Puklavec, Oliveira, & Popovič, 2017)</td></tr>
</table>
</td>
<td>This study is one of the few studies to conduct comprehensive research on three adoption phases, i.e., evaluation, adoption, and use. By examining both the direct and total effect of the independent variables, the study provides a broader understanding of the BIS adoption phenomenon given that evaluation, adoption, and use are not individual processes. (Puklavec, Oliveira, & Popovič, 2017)</td>
</tr>
</table>

<table>
<tr><td></td><td></td><td><table>
<tr><td>Organizational data environment</td><td>Data quality, availability, etc., related to the process of preparing input data for BIS. (Puklavec, Oliveira, & Popovič, 2017)</td></tr>
<tr><td>Organizational readiness</td><td>The availability of the organizational resources required for innovation adoption. (Puklavec, Oliveira, & Popovič, 2017)</td></tr>
<tr><td colspan="2">The environmental context:</td></tr>
<tr><td>External support</td><td>The readiness of support for implementing and using a technology-based solution i.e., outsourcing and third-party support. (Puklavec, Oliveira, & Popovič, 2017)</td></tr>
</table>Within the study is also stated that Size and industry have an impact on the adaption stages.</td><td></td></tr>
<tr><td>13.</td><td>Elucidating the determinants of business intelligence adoption and organizational performance by Bhatiasevi, Veera; Naglis, Michael, 2020 (Bhatiasevi & Naglis, 2020)</td><td>The result of this research confirms five CSFs have a significant influence on the business intelligence adoption among SMEs in Thailand.<table>
<tr><td colspan="2">Technological context:</td></tr>
<tr><td>Compatibility</td><td>The degree to which an innovation is perceived as being consistent with the existing values, needs and past experiences of potential adopters.</td></tr>
<tr><td colspan="2">Organizational context:</td></tr>
<tr><td>Technology readiness</td><td>Technology infrastructure as well as human resources equipped with IT skills.</td></tr>
<tr><td>Top management support</td><td>Top management support expresses itself in willingness to invest financial resources for the good of the firm and that the firm is willing to take risks and is interested in gaining competitive advantage. In addition, if SMEs have top management support, that means conflict and resistance to adopt BI can be minimized. (Bhatiasevi & Naglis, 2020)</td></tr>
<tr><td colspan="2">Environmental context:</td></tr>
<tr><td>Competitive pressure</td><td>Knowledge of competitors adopting BI.</td></tr>
<tr><td>Vendor support</td><td>This support includes training, assistance during implementation and maintenance, as well as updates this could be provided by vendors or by consultants.</td></tr>
</table></td><td>This study proposes a model that integrates the TOE-framework and the BSC to better understand the influence that each factor has on the adoption of BI as well as the organizational performance among SMEs in Thailand. The results show five CSFs that have a positive relationship towards BI adoption. The adoption of BI had a positive effect on internal process and learning and growth in terms of organizational performance. (Bhatiasevi & Naglis, 2020)</td></tr>
<tr><td>14.</td><td>Exploration of Influential Determinants for the Adoption of Business Intelligence System in the Textile and Apparel Industry by Sumera Ahmad; Suraya Miskon; Rana Alabdan et al., 2020</td><td>This study explores and prioritize the determinants that influence BIS adoption in the textile and apparel industry. The significant determinants are addressed here:<table>
<tr><td>Leadership commitment and support</td><td>Refers to active engagement of leadership for providing long-term strategic vision of industry and it also provides significant resources for BIS implementation. (Ahmad, Miskon, Alabdan, & Tlili, 2020)</td></tr>
<tr><td>Sustainability</td><td>Refers to the approach that includes economic, environmental, and social factors, informally known as profits, planet, and people. (Ahmad, Miskon, Alabdan, & Tlili, 2020)</td></tr>
<tr><td>Users’ traits</td><td>i.e., Personal readiness and innovativeness.</td></tr>
</table></td><td>This study explores and prioritize the determinants that influence BIS adoption in the textile and apparel industry. The most important factor is top leadership commitment and support followed by sustainability, users’ traits, and technology maturity.</td></tr>
</table>

<table>
<tr><td></td><td>(Ahmad, Miskon, Alabdan, & Tlili, 2020)</td><td><table>
<tr><td>Technology maturity</td><td>The degree of maturity at which a technology is considered as mature for broad adoption. (Ahmad, Miskon, Alabdan, & Tlili, 2020)</td></tr>
<tr><td>Compatibility</td><td>BIS should be compatible with existing systems, working skills, experience and should be relevant with all contexts of current working conditions of the modern-day executives. (Ahmad, Miskon, Alabdan, & Tlili, 2020)</td></tr>
<tr><td>Competitive pressure</td><td>The degree of stress that companies go through by peers within the industry. (Ahmad, Miskon, Alabdan, & Tlili, 2020)</td></tr>
</table></td><td>Satisfaction with existing systems and interpersonal communications are considered to be the least important. (Ahmad, Miskon, Alabdan, & Tlili, 2020)</td></tr>
<tr><td>15.</td><td>Unpacking Business Intelligence Systems Adoption Determinants: An Exploratory Study of Small and Medium Enterprises by Borut Puklavec; Tiago Oliveira; Aleš Popovič, 2015 (Borut Puklavec, 2014)</td><td>This qualitative study provides several determinants of BIS adoption in SMEs these are:<table>
<tr><td colspan="2">Technological context:</td></tr>
<tr><td>Expected benefits of BIS</td><td>Expected benefits of BIS. like “easier management”, “growth control”, “management needs”, “managements initiative”, “better management”, “management effort”, “managements sponsorship”, “risk control”, and “cutting expenses” (Borut Puklavec, 2014)</td></tr>
<tr><td>Perception of BIS strategic value</td><td>The ‘how’ BIS innovation can help with strategic activities of the firm.</td></tr>
<tr><td>BIS-related costs</td><td>Costs of BIS innovations.</td></tr>
<tr><td>BIS is a part of an ERP solution</td><td>BIS is sufficiently integrated with the system.</td></tr>
<tr><td colspan="2">Organizational context:</td></tr>
<tr><td>Management support</td><td>Engagement of top management with IS implementation.</td></tr>
<tr><td>Organizational culture</td><td>The culture of the organization.</td></tr>
<tr><td>Presence of the project champion</td><td>A champion is within the organization, the champion is a high-level individual to promote the innovation within the firm. (Borut Puklavec, 2014)</td></tr>
<tr><td>Organizational data environment</td><td>The organizations attitude against data -quality, -reliability, -security, -availability, -integrity and -standards.</td></tr>
<tr><td>Organizational readiness</td><td>I.e., the availability of the needed organizational resources (not only physical assets, but also human knowledge of IS) for adoption. (Borut Puklavec, 2014)</td></tr>
<tr><td>Size</td><td>Size of the firm</td></tr>
<tr><td colspan="2">Environmental context:</td></tr>
<tr><td>External support</td><td>Outsourcing and third-party support.</td></tr>
</table></td><td>This qualitative study provides several determinants of BIS adoption. These determinants were partly theoretically found and tested within semi-structured interviews others were addressed within the unstructured part of the interviews. Through the two-phase approach the research pinpointed determinants for BIS adoption in SMEs and provide a succinct list of determinants for empirical confirmatory testing. (Borut Puklavec, 2014)</td></tr>
</table>

Appendix 5 - Example of the coding process

Example of the coding process for the first two articles.

Open Coding				Axial coding
#Ref.	Researchers' category	Researchers' definition	Open Code	Category
2.	CriticalSuccessFactors for Implementing Business Intelligence System: Empirical Study in Vietnam by Pham, Quoc Trung; Mai, Tu Khanh; Et al, 2016 (Pham, Mai, Mai, Crawford, & Soto, 2016)			
	Committed management support and sponsorship.	Committed top management support.	Commitment. Top management support.	-Management support.
		Adequate resources are provided.	Resources.	-Organizational readiness.
		Involvement of top management.	Top management.	-Management support.
	A clear vision and a well-established business case.	Aligning the BI project with org. business vision.	Alignment with Business vision.	-Vision. -Business case.
		Well-established business case.	Well-established business case.	-Vision. -Business case.
	Business-centric championship and a balanced team composition.	Existent of a business-centric champion.	Champion.	-Business champion.
		Use of external consultant at early phase.	External consultant.	-External support.
		Committed expertise from business domain.	Expertise from domain.	-Organizational readiness.
		The team is cross-functional.	Cross-functional team.	-Organizational readiness.
	Business-driven and iterative development approach.	Adoption of iterative development approach.	Iterative development.	-Business case.
		Project scope is clearly defined.	Clearly defined project scope.	-Business case.
		Project scheduled to deliver quick wins.	Project planning. Benefits.	-Business case.
	User-oriented change management.	Formal user involvement throughout the lifecycle.	User involvement.	-User group(s)/-involvement.
		Foundation education, training and support are in place.	Education, training and support.	-Organizational readiness. -External support.
		Change management.	Change management.	-Management support.
	Business-driven, scalable and flexible technical framework.	Stable source systems are in place.	Stable source systems.	-Technological readiness.
		Establishment of strategic scalable and flexible technical framework.	Project planning.	-Business case. -Technological readiness.
		Performance considerations.	Performance considerations.	-Technological readiness.
	Sustainable data quality and integrity.	High quality of data at source system.	High data quality.	-Data quality -Technological readiness.

		Business-led establishment of common measures and classifications.	Business-led measures and classifications.	-Technological readiness.
		Sustainable dimensional and metadata model.	Sustainable dimensional and metadata model.	-Technological readiness.
		Business-led data governance.	Business-led data governance.	-Technological readiness.
3.	What Are the CriticalSuccessFactors for Agile Analytics Projects? By Mikhail Tsoy & D. Sandy Staples,2020 (Tsoy & Staples, 2020)			
	Strong Management Commitment.	Strong executive support and committed sponsor or manager.	Commitment. Top management support.	-Management support.
	Agile-friendly Organizational Environment.	Cooperative organizational culture.	Culture.	-Organization characteristics.
	Team Environment.	Coherent, self-organizing teams.	Coherent, self-organizing teams.	-Organizational readiness. -Organization characteristics.
	High-caliber Team Capability.	A team that has time and a high competence and expertise. This team is divers, motivated, dedicated, engaged.	High-caliber Team capability.	-Organizational readiness. -Organization characteristics.
	Strong Customer Involvement.	Good customer relationship and a strong customer commitment.	Customer involvement.	-User group(s)/-involvement.
	Project Management Process.	Good project planning and tracking.	Project planning.	-Vision. -Business case.
	Methodical Project Definition Process.	Establishing clear goals with an up-front costs and risk analysis.	Clear goals. Cost and risk analysis.	-Vision. -Benefits and costs.
	Agile Analytics Techniques.	Ensure high data quality, appropriate documentation and pursuing simple design.	High data quality. Simple design.	-Data quality. -Business case.
	Agile-style Delivery Strategy.	Regular delivery of customer functionality and delivering most important features first.	Customer value. Project planning.	-Vision.
	Non-life-critical Project Nature.	Project nature being non-life-critical.	Project characteristics.	-Business case.
	Variable Scope Project Type.	Variable scope with emergent requirements.	Project planning. Project characteristics.	-Business case.
	Dynamic, Accelerated Project Schedule.	Dynamic, accelerated schedule.	Project planning.	-Business case.
…	…			

Appendix 6 - Email send to the participants before the interviews

Email send to the participants before the interviews.

Dear Sir / Madam,
We ask you to participate in a scientific study: 'Factors that contribute to successful implementation of business intelligence and business analytics (BI&A) within the financial sector', by Marco Zwering. Participation is voluntary. In order to let you join, we do need your written permission to interview you via Teams (video call) and record this interview. Before you decide whether you want to participate in this research, you will be informed about what the research entails. Read this information carefully and ask the researcher to explain if you have questions. You can also ask the principal investigator, who is mentioned at the end of this email, for additional information.

Purpose of the research

The study aims to provide understanding of CriticalSuccessFactors (CSFs) that determine successful implementation of a BI&A-technologies within organizations in the financial sector. Within this study, CSFs refers to factors identified as a must-have and not just preconditions/nice-to-haves. And BI&A-technologies refers to technologies / systems who combine data gathering, data storage and knowledge management with analytical tools to translate data into information.

Background of the research

In recent years, data and information technology (IT) grew in importance. Almost every company is collecting data and wants to generate value out of it. To generate this value data needs to be processed, analysed and transformed into actionable insights. Therefore, organizations increasingly invest in business intelligence and analytics (BI&A) technologies, which aim to translate data into actionable insights (Paul Hawking, 2010). Recent study shows organizations invest so much in BI&A-technologies that it turned out to be one of the top priorities of IT investments within organizations (Kappelman, et al., 2020).

Although, studies show BI&A leads to better performance (Williams, 2003) (Aleš Popovič, 2010) (Mohamed Elbashir, 2013), not many organizations make full use of these benefits after implementing a BI&A-technology. Research shows about 70% to 80% fails to implement BI&A successfully (NoorUl Ain, 2019). In a response, researchers started mapping out CriticalSuccessFactors (CSFs) and frameworks as guidelines to successful implementations. The research of Paul Hawking in example even provides a list of CSFs reported by different authors (Paul Hawking, 2010). Unfortunately, even with these CSFs mapped out, successful implementations seem more to be an exception. The reason of this low success rates lies in different causes like technical factors, data quality, user satisfaction, etcetera (Paul Hawking, 2010), (C. S. Fleisher, 2013), (N. Tsitoura, 2012). However, while investigating successful and failed implementations, it is also noticeable researchers assumes some sort of one size fits all solution. However, it might be possible the relevancy CSFs differ between sectors.

To elaborate on this, this research focusses towards the financial sector. Since the financial crisis in 2008, companies within the financial sector looking for improvements within their businesses. Various developments are going on, which also include IT/data related developments. In example KYC (fraud detection), where based on data, client profiles are analysed for suspicious deposits or transfers (R. Jesse McWaters, 2015). Due to these developments (and competitive advantages), data is also rapidly gaining importance within the financial sector. To ensure these developments run successfully, good, implemented BI&A-technology providing reliable insights into business and client data is crucial (M. P. Bach, 2019).

What participation means and what is expected of you

Participation in this research means that we plan and conduct an interview focused on CriticalSuccessFactors (CSFs) that determined successful implementation of a Business Intelligence or Business Analytics technologies within your organization. This interview will take about 60-90 minutes and will be conducted via Teams.

Possible advantages and disadvantages

We are familiar with the time we ask you to participate in the investigation. We would like to thank you in advance for this.

If you do not want to participate or want to stop the research

You decide whether you will participate in the research. Participation is voluntary. If you do not want to

participate, this does not have any negative consequences for you. If you do participate, you can always change your mind and quit, even during the research. You do not have to explain why you quit. The data collected up to that moment may be used for the research, unless you opt to withdraw also the data that you have provided so far.

End of the research

Your participation in the research ends when the interview is over. The entire research is finished when all participants are ready. After processing all data, the researcher will inform you about the most important results of the research. This happens within 12 months after your participation.

Use and storage of your data

For this research, personal data will be collected, used and stored. It concerns name, function title, working location, years of experience and date the interview was conducted. The collection use and storage of your data is necessary to answer the questions posed in this study. The results of the research will be shared with colleagues. The data that is shared does not contain any information that can be traced back to you. In addition, data used in reports and publications related to the research, cannot be traced back to you.

Confidentiality of your data

To protect your privacy, your data will be given a code. Your name and other data that can immediately identify you will be omitted. Your data will be encrypted in this way. The key to the code is stored securely within the Open University. Persons who access the unencrypted information are only the researcher, Principal investigator and the co-reader.

Access to your data for control

In order to be able to assess whether the investigation has been carried out in a reliable manner, members of a visitation committee can inspect the unencrypted information.

Duration of data storage

Your data must be kept for 10 years by the Open University.

More information about your rights when processing data

For general information about your rights when processing personal data, you can consult the website of the Dutch Data Protection Authority (Autoriteit Persoonsgegevens). The privacy disclaimer of the Open University can be found at www.ou.nl/privacy.

Do you have questions?

If you have any questions, please contact the researcher; Marco Zwering.

Signing the consent form

If you have had sufficient time for reflection, you will be asked to decide on participation in this study. By giving your written consent, you indicate that you have understood the information and agree to participate in the research. Both you and the researcher will receive a signed version of this consent statement.

Kind regards,

Marco Zwering, MC (Marco)
Marcozwering@hotmail.com
0651399099

Principal investigator:
Samaneh Bagheri
Samaneh.Bageri@OU.nl

Appendix 7 - Interview protocol (Script)

Interview protocol – Script

Interview protocol

Generic information	
Date, time and duration of interview	
Name of interviewee (anonymized)	
Name of the organization	
Department and function	
Educational level	
Years of work experience in function	
Years of work experience in industry	

Introduction

Goal: Learn more about the background, field of knowledge and the perspective of the participant to better understand the answers. In addition, these questions aim gain trust and get to know each other.

-What is your function title/ What department are you in?

<<…>>

-How long do you work in this particular function/and for how long within this industry?

<<…>>

-What are the main responsibilities of your job?

<<…>>

-In what way were you involved with the BI&A (PowerBI) implementation?

<<…>>

- Based on your experience, do you consider the implementation the BI&A-technology within your department <<name department>> successful? And why?

<<…>>

-According to your experience what factors contribute to this success/ failure? And how?

<<…>>

-Do you consider the implementation the BI&A-technology within ITSystems successful? And why?

<<…>>

-According to your experience what factors contribute to this success/failure? And how?

<<…>>

Main Body

Within this part, the theoretically found CSFs will be discussed in depth one by one. After that, the participant reflects on their own experience of the relevance of CSFs. The goal here is to check what the main CSFs are according to the interviewee and to verify the completeness and accuracy of the list of theoretically found CSFs. Also, to go in depth about the given answers and gain deeper understanding of the objective.

*Keep checking answers are referring to CSFs (must-have) and not to preconditions (nice-to-have).

-The CSF 'Management support' is described as 'The management is engaged and supportive. They recognize and understand the benefits or strategic values associated with BI&A and provides resources for the implementation.'. Could you indicate on a scale of 1 to 5 (where 1 is not at all relevant and 5 is very relevant) how relevant the CSF 'Management support' is for implementation of BI&A? And why?

<<…>>

-The CSF 'Business champion' is described as 'an individual, who actively supports the BI&A-project, creates awareness, has a positive impression and recognizes the usefulness of the BI&A-project. This person also provides information, materials and political support to those involved.' Could you indicate on a scale of 1 to 5

(where 1 is not at all relevant and 5 is very relevant) how relevant the CSF 'Business champion' is for implementation of BI&A in your opinion? And why?
<<…>>

-The CSF 'Vision' defines itself by: 'Vision defines itself by: 'What do we want to achieve with this BI&A-implementation?' The vision needs to be clear, aligned and well established. The vision can be an integral part of the broader company's vision or it can be defined on project/ business-case level.' Could you indicate on a scale of 1 to 5 (where 1 is not at all relevant and 5 is very relevant) how relevant the CSF 'Vision' is for implementation of BI&A in your opinion? And why?
<<…>>

-The CSF 'Strategy' defines itself as the answer on the question 'A well-thought-out strategy answers the question 'How do we achieve our vision?' This can be an integral part of the broader company's strategy or it can be defined on a BI&A-project/ business-case level. The strategy must be properly described, scoped, prioritized and aligned with the company's/ BI&A-projects' vision.' Could you indicate on a scale of 1 to 5 (where 1 is not at all relevant and 5 is very relevant) how relevant the CSF 'Strategy' is for implementation of BI&A in your opinion? And why?
<<…>>

-The CSF 'Benefits and costs' describes 'BI&A related benefits must be noticeable, for instance in; visualizations, work practice, or while managing. This CSFs also includes 'costs', because costs are seen as an investment aiming to be beneficial.' Could you indicate on a scale of 1 to 5 (where 1 is not at all relevant and 5 is very relevant) how relevant the CSF 'Benefits and costs' is for implementation of BI&A in your opinion? And why?
<<…>>

-The CSF 'Organizational readiness' is defined as 'The preparedness of the organization, as evidenced by the availability of organizational resources (like assets, knowledge and qualified and experienced personnel) and sufficient data quality and availability for the BI&A-technology to work with.' Could you indicate on a scale of 1 to 5 (where 1 is not at all relevant and 5 is very relevant) how relevant the CSF 'Organizational readiness' is for implementation of BI&A in your opinion? And why?
<<…>>

-The CSF 'Organization characteristics' refers to 'Refers to characteristics of the firm e.g. culture, size or sector.' Could you indicate on a scale of 1 to 5 (where 1 is not at all relevant and 5 is very relevant) how relevant the CSF 'Organizational characteristics' is for implementation of BI&A in your opinion? And why?
<<…>>

-The CSF 'Data quality' is states 'The quality of the BI&A source data must be high, integer, reliable and adequate.' Could you indicate on a scale of 1 to 5 (where 1 is not at all relevant and 5 is very relevant) how relevant the CSF 'Data quality' is for implementation of BI&A in your opinion? And why?
<<…>>

-The CSF 'Technological readiness' is described as 'The technological preparedness of the firm; defines skills, knowledge of the BI&A associated application and reliability of the (source) systems.' Could you indicate on a scale of 1 to 5 (where 1 is not at all relevant and 5 is very relevant) how relevant the CSF 'Technological readiness'' is for implementation of BI&A in your opinion? And why?
<<…>>

-The CSF 'User group(s)/-involvement' is closely intertwined with the human side of organizational readiness. Not only the people must be able to work and adapt the technology, the selected BI&A-technology must be aligned with the users in terms of product specifications, needs and values. Could you indicate on a scale of 1 to 5 (where 1 is not at all relevant and 5 is very relevant) how relevant the CSF 'User group(s)/-involvement' is for implementation of BI&A in your opinion? And why?
<<…>>

-The CSF ‘Competitive Pressure’ is described as ‘The degree of stress/pressure the company experience from competitors.’ Could you indicate on a scale of 1 to 5 (where 1 is not at all relevant and 5 is very relevant) how relevant the CSF ‘Competitive Pressure’ is for implementation of BI&A in your opinion? And why?
<<…>>

-The CSF ‘External support’ is described as ‘support outside the company like; outsourcing, third-party support, maintenance and updates. This also include support like training and assistance during implementation.’ Could you indicate on a scale of 1 to 5 (where 1 is not at all relevant and 5 is very relevant) how relevant the CSF ‘External support’ is for implementation of BI&A in your opinion? And why?
<<…>>

-The CSF ‘Regulatory Support’ is described as ‘A form of external support but given by a government in example by rules, policies and regulations related to data of BI&A etc..’ Could you indicate on a scale of 1 to 5 (where 1 is not at all relevant and 5 is very relevant) how relevant the CSF ‘Regulatory Support’ is for implementation of BI&A in your opinion? And why?
<<…>>

-According to you, what are the most relevant CSFs for implementation success of a BI&A-technology on this list?
<<…>>

-Why are these CSFs most relevant?
<<…>>

Closing part

Within this last part of the interview, the interview is reflected and final questions and clarifications can be discussed by the interviewee and the interviewer. Also, the participant is thanked for their cooperation.
-Is the list discussed, clear and are the definitions used sufficiently explained?
<<…>>

-What is your opinion about this list comparing it with your practically experiences?
<<…>>

-Is the list complete, accurate? And why?
<<…>>

-Are there any topics or subjects missed during this interview?
<<…>>

-Do you have the feeling you had the opportunity to mention all that you wanted?
<<…>>

-Do you think a list of CSFs as we discussed is useful for implementation of BI&A in your organization? And why?
<<…>>

I want to thank you for your cooperation and a transcript of this interview will be send and eventually I will send you a copy of the report.

Appendix 8 - Profile of the case-organization

The selected case organization is the Rabobank. The Rabobank is a bank from the Netherlands, which has grown into an international financial services provider active in the field of banking for private and business customers. Rabobank serves over 9.5 million customers worldwide, of which around 8.8 million in the Netherlands. Rabobank and all its subsidiaries have 43.822 employees (2019) and a net profit for 2019 amounted to 2.2 billion euros (Rabobank, 2021). 'Rabobank Nederland' head office is located in Utrecht. Rabobank has provided the organization chart below:

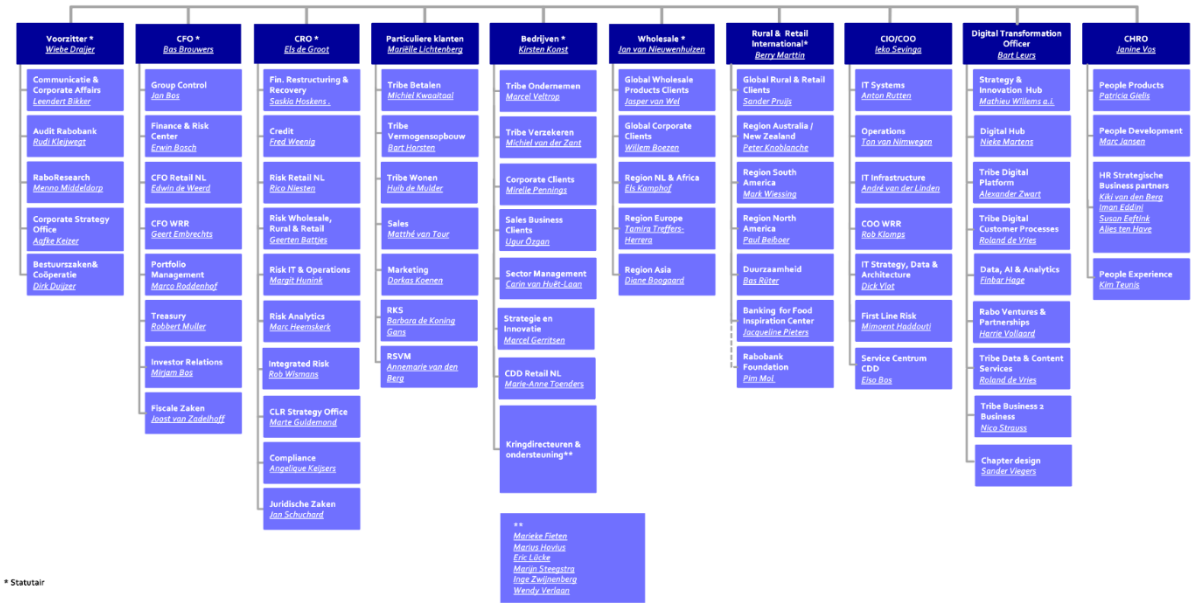


Figure 3: Organization chart Rabobank

This study is conducted within the department: ITSystems. ITSystems is responsible develop, maintain and decommission all IT systems for consumer use. On the chart above ITSystems is shown in line of CIO/COO. The department is made up out of seven sub departments (also called domains) and two supporting departments as shown in figure 4. ITSystems has 5.039,8 FTE and a budget of €2.8 billion (2021). While introducing this study at the Rabobank, this department described a large-scale implementation of a BI&A-technology (PowerBI) visualizing mainly personnel and financial matters and mentioned they are willing to participate in this research.

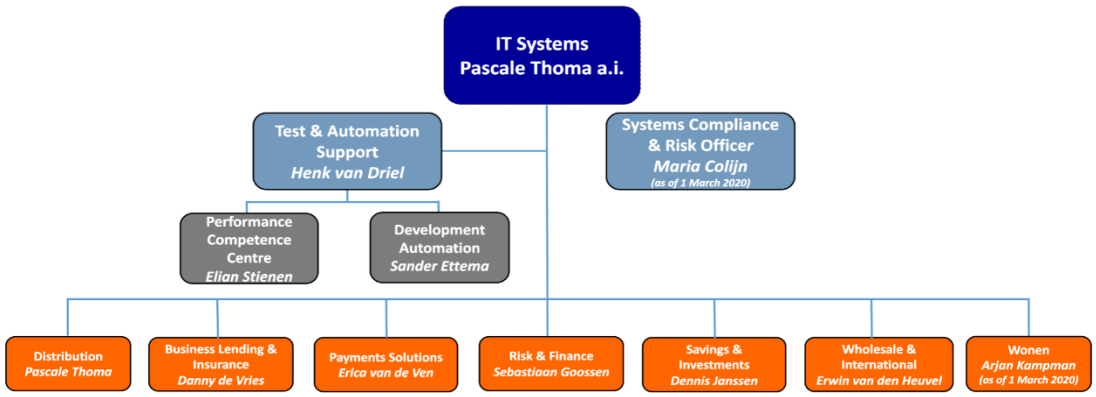


Figure 4: Organization chart ITSystems 11-2020

Appendix 9 - Example of table used for coding transcripts

Interview transcripts are coded in a structured way using the table presented in this appendix. Within this table, the question asked, a short answer and the elaboration is included. In the column: 'Extra remark', the codes and the Likert-score given by the interviewee are noted.

Generic information		
Date, time and duration of interview		
Name of interviewee		
Name of the organization		
Department and function		
Educational level		
Years of work experience in function		
Years of work experience in industry		

	Question item	Short Response	Elaboration (why)	Extra remark
Introduction	…	…	…	….
	…	…	…	…
Main body	…	….	…	…
	…	…	…	…
Closing part	…	…	…	…
	…	…	…	…

Appendix 10 - Tables used for coding transcripts

Interviewee #1

Generic information	
Date, time and duration of interview	05-10-2021, 16:30h, 49:04min.
Name of interviewee (anonymized)	Interviewee #1
Name of the organization	Rabobank
Department and function	Domain Business lending & Insurance. - Sr. Domain Support Officer
Educational level	Higher
Years of work experience in function	Almost 4 years
Years of work experience in industry	Almost 4 years

	Question item	Short Response	Elaboration (why)	Extra remark
Introduction	What is your function title and what department are you in?	Senior Domain Officer Business Lending and insurance.		
	How long do you already work in this specific function?	Almost four years.		
	What are the main responsibilities of the Domain Officer role?	We are responsible for all the financial stuff that goes on in the IT domain and the sourcing mix and some tasks that are not recurrent but come occasionally like redesign, housing etc..		
	Are you working with business intelligence software PowerBI?	Yes.		
	Based on your experience, do you consider the implementation of this software successful within your department?	Yes, although the previous system (Qliksense) was more flexible and easier to work with.		Flexibility of the BI-technology

Main body	Management Support and it is described as an engaged and supportive management. Management is really recognizing and understanding the benefits of PowerBI or the Business Intelligence software. And is empowering the employees to work with it and encourage them to adapt it. For you, is this a relevant CriticalSuccessFactor?	No, I don't think it's really relevant. So I would place it as a three on the scale.	I do think that if there was more management support in the beginning, we would have had better dashboards or more people who could work with the dashboards, build them and make them better. And we lack that people in the Rabobank or there are too few people who can do it.	Management Support Likert score 3
	Data quality defines itself as the quality of the source data. It must be high integer, reliable and adequate and then in this case also feasible for you or reachable for you. Is this one a relevant Critical Success Factor?	Yes of course very, very relevant.	Because if you can't trust the output of the data then then it's useless. Then you don't have to have a dashboard.	Data Quality Likert score 5
	Business champion is described as an individual who is supporting the project, creates awareness, has a positive impression of the project, recognize the usefulness and provides information, materials and support or political support for those who are involved. It sounds a little bit like the guy you're referring to starting in November. Is a business champion a relevant CriticalSuccessFactor for you?	I don't think it's a really CriticalSuccessFactor, but it helps a lot if you. If you have a business champion.		Business champion Likert score 1
	External support is described as support findable outside of the company like outsourcing; somebody else is building the project or the dashboards for you. But it's also includes training and assistance during the implementation. On a scale on one till five, how relevant is this?	I think it's pretty relevant because we also used it.	We hired an external company to give courses and to help with how to build the first financial dashboards that we would want to use. I think if you if you don't have the knowledge within the company then it's definitely a four because I think we couldn't have done it without the external company.	External support Likert score 4
	Technological readiness is described as a preparedness of the firm. It defines skills and knowledge from the business analytics software, is this relevant for you?	Yes, it's definitely relevant.	Its relevant but also depending on the knowledge within the company. We have a lot of knowledge within Rabobank how to build dashboards, how to use the data that we have and a very great databases so you it's just plug and play then on the database. But you have to know how and also know how to present the data towards the end users and how to get the right data. So to get the right data out of the dashboard, you need some skills for that.	Technological readiness Likert score 3

	I also discovered that user group or user involvement is important, for example you as a user and how you were involved with the with the PowerBI development. How relevant is this involvement for you as an end-user to the development of the dashboard itself?	I think it's really important because as an end user you know what you want the dashboards to look like and what data is needed for all the reports that we make.		User group(s)/-Involvement Likert score 5
	Organizational Characteristics, for example, culture of the organization, size, sector. Do you think the sector, or these characteristics of an organization are relevant for implementation success?	I guess.	Because we are a bank and we are used to work with data, dashboarding and doing a lot of stuff with data, maybe another company like an hospital or a city hall use data very differently. So, I do think it's important although the urgency of translating data into information may differ as well. That influence the Likert score.	Organizational Characteristics Likert score 2
	Regulatory support is the external support given by the government (or de-support), It's based on rules or policies regulation. Do you think regulatory support from the government is relevant for an implementation of a successful implementation?	No, not at all.	I don't think there are any regulations or laws that I know of that are relevant here.	Regulatory support Likert score 1
	Competitive pressure is the degree of stress or pressure that other companies have on the Rabobanks decisions for PowerBI. Do you think, based on your experience, any competitive pressure was placed on implementing this tool (PowerBI)?	No, I don't think so.	I think we use PowerBI because it's quite easy to use and It's quite easy to build and I think it's cheaper than others and you can use it very widely. But I don't think there was any competitive stress from other companies to use it.	Competitive pressure Likert score 1
	Benefits and costs are described as benefits in money (revenue) but also in visualizations, views, work practice and benefits while managing things. Benefits and even cost is included because costs are normally seen as an investment aiming to be beneficial. How do you think benefits and costs are relevant for the implementations that the Rabobank went through?	I think it was a very important factor to buy this tool.	Because of what I said with the question before; it's quite easy to use, you can build it yourself if you want, you can learn it within a few days. I don't know what it costs but I think it's way cheaper than all the different dashboard licenses we had before.	Benefits and costs Likert score 5

	Vision defines itself as something that you want to achieve, so it's actually the answer on the question: 'What do we want to achieve?' The vision needs to be clear, well aligned with other visions or the company's vision. Do you think vision for implementing is a relevant CriticalSuccessFactor?	I think you want to know beforehand what questions you want to answer with the PowerBI dashboards. So, you have to have some kind of vision to get some the output that you want.	You can build a dashboard on all kind of data but if it doesn't answer a question or only 'really stupid stuff' nobody is going to use it, so you must have some kind of vision.	Vision Likert score 4
	Strategy is the: 'How do we achieve our vision?' Is this item also relevant or is the 'how' less relevant comparing it to the 'what'?	I don't know	If you have a goal that you want to achieve and you want to measure that with the dashboard within the whole company everything is measured at the same level or at the same time on this way you show the same data. It's very useful but still it's only data but doesn't say anything yet.	Strategy Likert score 2
	Organizational readiness is the preparedness of an organization before starting the implementation. Is this relevant for successful implementation? Or can you also do it for example cold turkey?	I think it helps when you do not do it cold Turkey.	Because the thought behind what you want to do with the data is the most important so if you want to measure stuff then you probably have a plan what you're going to do with the output. To make yourself better or faster, or smarter or more efficient.	Organizational readiness Likert score 3
	According to you, what are the most relevant ones on this list?	Business champion, vision, data quality.	-	Business champion, vision, data quality.
Closing part	Is it a complete list or are your missing anything?	I don't think something is missing.	I found it very interesting to talk about this because I never thought about what the CriticalSuccessFactor was of PowerBI or any BI application. So, it makes me think. No, if there's something missing, I will send you an email when I get something later tonight. But no, I don't think so, no.	
	Did you have the feeling that you had the opportunity to mention it all and did you feel comfortable during the interview?	Very comfortable, yes.		

Interviewee # 2

Generic information	
Date, time and duration of interview	06-10-2021, 08:30h, 36:22min.
Name of interviewee (anonymized)	Interviewee #2
Name of the organization	Rabobank
Department and function	Domain Office Wholesale and Rural, Business manager
Educational level	Higher
Years of work experience in function	11 years
Years of work experience in industry	25 years

	Question item	Short Response	Elaboration (why)	Extra remark
Introduction	What is your function title and what department are you in?	Business manager of IT systems wholesale and rural.		
	(How long do you already work in this specific function?)	I've been in this function not for this department, but in the function for 11 years now. So, before that I did a lot of other jobs withing Rabobank. I have been within the Rabobank for 25 years. Actually, last month 25.		Question is not asked but answered
	(What are the main responsibilities of your job?)	I'm the manager of a very small department, three people called domain support officers. They look at the financials of a specific tribe. We have three tribes and each Domain Officer is responsible for one tribe. Beside managing, I help with the financial stuff of the biggest tribe (the London part) because that tribe is 115 million in the budget. So that's too big just to look at for one person. Lastly helping the head of our department.		Question is not asked but answered
	Recently PowerBI was implemented, do you often use PowerBI?	We have access to the FLR cost and FTE dashboards, but we can't use it as we would like. So, we create our own PowerBI dashboards as well.		

	Based on your experience, do you consider the implementation of this software successfully implemented within your department?	Yeah, I would say it is.	We have our own PowerBI dashboard which we publish in teams every month. So, we make a direct cost overview per tribe and area and then we also make one on a WBS level.	
	Do you consider the implementation of the Business Intelligence software within ITSystems, the General Department, less or more successful comparing it with your department?	I would say it's the same.	Same because I think for the retail purposes the cost and FTE dashboard is probably sufficient. But for us, it's very difficult because we have two locations of our department. So about 200 people of our department are in London, so they are in a different entity of Rabobank and not in the 5460 department (but in this 6004 department). So, we always have to combine two entities to get our report. Also, it has different finance and control departments because London has its own department and the PowerBI costs and FTE dashboard I can't use at the moment because the budget is incorrect.	Flexibility of the software
	PowerBI was implemented about one/one and a half, two years ago, I guess. What contributed to this success within the department, but also within ITSystems?	Good communication. So, we had like a working group when it was implemented; looking at, what needs to be in it, what should it look like, what should not be in.	A working group was looking at it. So, people from all departments were involved.	

Main body	I heard you talk about the international operation of the of the firm and it reminded me a little bit of the organization in characteristics. It is described as a firm size culture sector, but also geographical features and locations are included. On a scale from one to five. How relevant is this?	I think very relevant. I think the yeah.	The bigger the company and the more locations you have, the more difficult to this too implemented well.	Organizational Characteristics Likert score 5
	User groups- or user involvement refers to the people who are working there, they must be involved and know how to work with it. Is this one relevant for you?	Yeah, definitely, and I think that's one of the things that really went well with the whole implementation.	. I Think she's normally the chairman/chairwoman. We have a biweekly meeting where we discussed the RFCs for the PowerBI report's and see if everybody agrees with the RFC's. I think it's called: 'Standardized reporting' workgroup on behalf of <name>. So user-involvement and the group that actually does the implementation is going really well.	User group(s)/-Involvement Likert score 4
	Management support refers to an engaged and supportive management with the implementation or the decision about the business intelligence software. The management recognizes and understands the benefits and strategic values of the software involved. Is management support, is that relevant?	No, I don't think so.	Because I don't think management cares what software you use or what a product or how you come to your report, as long as they get a report that shows what the budget is and what they're spending. And whether you do it on a piece of paper or in an IT software, they don't care.	Management Support Likert score 1
	There's also a CriticalSuccessFactors called vision and this one defines itself by answering the question: 'What do we want to achieve?' So that's really the 'What side'. How relevant is this for you?	Yeah, that is relevant.	Because if you don't know what you want to achieve with something, then you might as well not do it.	Vision Likert score 5

	Strategy is answering: 'How do we want to achieve this vision or this goal?'. Is strategy relevant for implementation success?	Think less than the vision.	Because the vision is the 'what' but the 'how' you can do in different ways with different products with different methods.	Strategy Likert score 2
	Benefits and costs are actually a combined so the benefits of course should be noticeable or in revenue or in cost decrease, but also can be noticeable in visualization, work practice or well managing for example costs are included because normally when you make cost, you aim better results. Is benefits and costs a relevant factor?	Yes.	I think that's relevant for every implementation we do within Rabobank. So, we have to make sure that the costs are outweighed by the benefits cause otherwise you shouldn't do it.	Benefits and costs Likert score 5
	Often is referred to a business champion. It's some sort of individuals who actively supports the project, creates awareness and recognizes the usefulness and is a certain cheerleader for the project. Often, it's one or two persons within a team. Did you have any kind of person for this?	Yes, within FLR and within the team.	There were several but not on the management or control level. It's important, but not essential.	Business champion Likert score 3
	Data quality is the quality of the source data. It must be high reliable integer and adequate. You already gave it a five, stays the same after the explanation? And why is this?	Yeah	Because we can't use the dashboards at the moment because the data is incorrect. And that immediately makes a makes it less usable.	Data Quality Likert score 5
	The degree of stress or pressure that company experienced by other competitors. So, for example, if the ABN or the ING is doing something with a certain PowerBI or business intelligence software, does this influence the implementation according to you?	No, I don't think so.	I don't think we look at competitors for those type of implementations. I think it's purely internal.	Competitive pressure Likert score 1
	Regulatory support is the external support given by the government, but it can also be regulations, demands or requirements. Is this, for any means reliable for implementation success of this business intelligence software?	I don't think so	We only use it for internal use, so regulators don't look at it. I think for the official report that we have to do to the Dutch National Bank or the ECB we don't use PowerBI, but	Regulatory support Likert score 2

			it would be more relevant if they would support it.	
	Organizational readiness; is more the preparedness of the organization. It expresses itself in the availability of organizational resources like money, assets, knowledge, qualified and experienced employees and so on. It's this preparedness of the organization, is this a relevant for and implementation success?	Yeah, I think if you're not prepared it will never work.	You need people who can work with tool. You need people that can train other people.	Organizational readiness Likert score 4
	The technological readiness: this one is more described as the skills and the knowledge of the business intelligence application and reliability. So, if the source systems will intertwine or communicate with each other. is this a relevant for and implementation success?	Yeah, yeah. I think that's also important also a four.	Yeah, so not that every five minutes you get a Microsoft error, so that's important. But also, that you can interlink it with your own systems. If you have to do everything manually then it's too much work.	Technological readiness Likert score 4
	External support is described as outsourcing, third party support and includes training and assistance during the implementation. Did you experience any external support?	Yeah, it may be a three.	Yeah, I did a PowerBI training. That was from an external guy, I think but you can also do it within your own department or get the training from the FLR department who is doing the implementation, so it doesn't have to be external.	External support Likert score 3
	Which one were the most relevant?	For me data quality is most important.		Data quality
Closing part	Did you miss anything on the list?	No, I don't think so.		
	The list discussed, is it clear and where the definitions used sufficiently explained?	Yep. Yep, very, very good.		
	Did you feel comfortable and free to answer the questions how you want it?	Yep, definitely.		
	Are there anything missed, or do you want to add anything?	No, not. It was all clear.		

Interviewee #3

Generic information	
Date, time and duration of interview	06-10-2021, 14:30h, 31:31min.
Name of interviewee	Interviewee #3
Name of the organization	Rabobank
Department and function	CFO Retail NL Leiding & Staff, Business Controller
Educational level	Higher
Years of work experience in function	2,5 years
Years of work experience in industry	15 years

	Question item	Short Response	Elaboration (why)	Extra remark
Introduction	What is your function title and what department are you in?	My function title is business controller. Which means that as a financial counterpart I'm situated in two management teams within the systems domain. The retail environment: 'distributions' and the second one is 'wholesale rural'.		
	(What are the main responsibilities of your job?)	Main focus is more or less the traditional business control items, like for example budget, setting budgets, looking forward, like forecasting. But nowadays it's also more and more like in the financial advice concerning strategic decisions we as a bank may make as well. So that's three-fold. And as a side specialism, I'm also part of this sourcing board which may handles mainly the sourcing, strategic decisions. And, in the current difficult sourcing situations it's also very interesting.		Question is not asked but answered
	How long do you already work in this function?	now two and a half years; for IT systems. But my previous role was also business control, but then for the IT infrastructure.		
	And in the industry in general?	I now work 15 years for the Rabobank, and always within the CFO domain.		

	I heard the business intelligence software, 'PowerBI' recently is implemented do your work often with this software?	Yes.		
	And do you think the software is successfully implemented within the Rabobank or in within ITSystems?	I think if you look at the software at least it gives you more and more insights in parts you want to analyse and makes sure that based on these analyses or financial advice for strategic purposes is possible. And so, in that sense it suits well, yeah.		
	Is there a difference between the successfulness of the implementation within the Rabobank or within ITSystems, compared with your department?	No, we look on the same data and PowerBI environments. So there's no difference.	There are possibilities to slice and dice this however you want and how you arrange it 'under the under the motor cab' there are a lot of possibilities, yeah.	Flexibility of the BI-technology
	What factors contribute to the success or failure of this implementation according to you?	First of all, I think the success is into the base of introducing PowerBI into the bank. I mean it's way faster than I'm used to, but in the end it stands or falls with the accuracy of the source you use. So, the more accurate the data is you put in an environment and then you can use tooling as efficient as possible.	Introduction basis, faster/performance and data quality	Organisational readiness, feature of the BI technology and data quality
Main body	Data quality is described as the quality of the source data. It must be high, integer, reliable and adequate. On a scale from one till five, where one is 'not at all relevant' and five is 'very relevant', how relevant is this data quality for you on this scale?	Its key is the most important of everything, so it's a five definitely, yeah.		Data Quality Likert score 5
	Management support is that the management should recognize the value and the and the benefits of the business intelligence software. So PowerBI this case it's this relevant for you?	I think it's.	It is relevant, of course, because what you want is that it's used so if in the end management support is not there or the management is not using, in this sense the tooling, then it failed.	Management Support Likert score 4

	Another one is business champion, it's an individual that is supporting the project and creates awareness. But also recognize the usefulness and is some sort of cheerleader for the project. Was there such a person within the implementation on your team?	Yeah, to be honest, I think so. There wasn't one in my team but when you look at PowerBI from a broader perspective (ITSystems), there was.		
	Is this relevant for you to have, or can you also be successful in the project without having this?	I think it's good to have a cheerleader person to make sure the tooling is implemented correctly. And, to collect the criticism concerning the tooling as well.		Business champion Likert score 2
	There's often spoken about Vision or Strategy. Actually, there are a lot of theories who see them separately. So first starting with vision. Having a concrete vision for implementing contributes to the success. And vision is the answer on: 'What do we want to achieve?" Is this a relevant factor?	No, I think in these types of tooling it's less relevant	I mean what you want is already known because you want to have steering information and steering information for your strategy. And if the environment adds value then it's used and if not, then it's not. So I think to have a vision is less important in my opinion.	Vision Likert score 1
	And for strategy, the same question?	No, it doesn't.	Present management information can be used to develop the strategy of a department or the bank as a whole or part of the bank as a whole or maybe even individual cases. You need the data to support the decision making in an environment. So, the strategy is already known. I do not see any other reasons to present management information.	Strategy Likert score 1
	Benefits and costs are combined because costs aim to be beneficial in general. Benefits can be in euros but also in visualizations, work practice or while managing things. This benefits and costs, is this a relevant CSF for a successful implementation according to you?	Of course, I should say yes now because I'm a business controller, but I think it depends on the size of a of a company.	If you have a small company, the money you pay for a business intelligent tooling system is more relevant than if you have a multinational, where; of course you pay more. But it doesn't have a	Benefits and costs Likert score

			direct impact on the cost sizes. I mean you cannot earn money with a business intelligence tooling as we use it for management information. The only thing you can do is to make sure that you, improve your decision/strategy of your own business or department. So, in Euros there is no benefits in my opinion, using business intelligence tools, tools like we do.	
	Organizational characteristics was also one that pops up quite often in theories. It's size, sector or culture of the firm. It can have a significant impact on the on the implementation. Is this also true for you? How relevant it can be those characteristics?	Size I would say 4. Sector wise, I think it's less relevant because you always steer on a on a couple of Key Performance Indicators. Cost is always one and profit is also another one. And depending on the sector, you have different areas. But then the sourcing I think is more important than the tooling to provide management information to the audience. Sector I think is less. Culture wise it's the same as a sector wise. So size matters in my opinion.		Organizational Characteristics Likert score 3,3 (size 4, sector 3, culture 3)
	Organizational readiness is described as the preparedness of the firm itself. The availability of resources like knowledge, qualified, experienced personal or employees and so on. Organizational preparedness is this relevant during implementation?	Not that relevant.	I think we are all quite skilled and otherwise, you can easily learn it quickly to use business intelligence tooling's, especially the outcome. You need in-house knowledge to implement it, and it's a different one then using it. But for using, I think everybody should be capable from a certain level in the organization to use business intelligence as the tooling for management information.	Organizational readiness Likert score 2

	The other one is technological readiness. This is more defined as the tooling that are talking with each other or communicates.	I think that one has more an impact.	if the source systems are talking with each other or connects to each other, it's easier to implement and easier to use it in a quick way. So, then you'll also be able to show to your audience the benefits of tooling in terms of accurate management information.	Technological readiness Likert score 4
	External support is outsourcing third party support, maintenance and updates. But also includes trainings and assistance during the implementation. Is this support a relevant CriticalSuccessFactors during the implementation?	Yeah, As a start-up, yeah.	If you trained several employees within the organization, then they can make sure that it's spread as an oil dot in the organization.	External support Likert score 3
	'User group' or 'user involvement' is that the users are involved during the implementation process. And also, the users are willing or are capable of working with the intelligence software. Is this a relevant during the implementation?	Yeah	Because then you make it organizational proof. So you have your standard package, but it doesn't mean that it shows exactly how the organization want to see it. And this user group is important in that sense to make sure that at least all relevant items are shown on a correct way.	User group(s)/-Involvement Likert score 4
	Competitive pressure is the degree of stress or pressure that companies experience by other competitors. For example by ING or ABN. Is this pressure in some way relevant regarding the implementation success?	No, not in our situation no.	the implementation of the PowerBI tooling is not driven by any competition no. Not as far as I'm aware of, no.	Competitive pressure Likert score 1
	Regulatory support It's also kind of an external support but given by the government or maybe even by Europe. It refers to some standard rules, policies or regulations. Is this relevant for the implementation success?	It's not relevant in deciding what kind of BI tooling you are going to implement, or even are you going to implement a PowerBI to or BI tooling. No.	I would say no, because regulation has never set to use, for example, PowerBI tooling or what kinds of tooling whatsoever, but you can use it for regulatory purposes. So that's a different approach. So, it's not relevant in deciding what kind	Regulatory support Likert score 1

			of BI tooling you are going to implement, or even are you going to implement a PowerBI to or BI-tooling no. It's never regulatory driven.	
	What is the most relevant CriticalSuccessFactors for implementation if you heard all those options?	Data quality		
	Were there any items missing?	No, not at the moment	Because within bi-tooling environment we are using, you can; based on the relevant items slice and dice, present graphs, you name it, you can show it. Maybe, you need to adjust a little bit in the tooling, but in my opinion it works fine.	
Closing part	Did you feel good during the interview? No pressure from of me?	No, no pressure.		
	You said the list is complete and accurate so there are no more additions to this to this list?	No.		

Interviewee #4

Generic information	
Date, time and duration of interview	08.10.2021, 14:00h, 31:35min.
Name of interviewee	Interviewee #4
name of the organization	Rabobank
Department and function	Domain Payment Solutions, Domain Support Officer
Educational level	Higher
Years of work experience in function	4,5 years
Years of work experience in industry	4,5 years

	Question item	Short Response	Elaboration (why)	Extra remark
Introduction	What is your function title and what department are you in?	Domain support officer in Payment Solutions.		
	And how long do you already have this function?	For four years now.		
	And before that, was it in the same industry?	Yes. Before that I also worked at the Rabobank. But as a financial advisor, so I gave advice about mortgages and investments.		
	And for Domain Officer, what are your main responsibilities in this job?	Finance and budgets, we support the managers with their budgets. Make sure they keep on track during the year and at the beginning of the year we helped them with the budgets to administrate them well in the systems, and that's also what we do during the year. So, administrative tasks but finance is the main part.		
	Recently the business intelligence software 'PowerBI' was implemented in the Rabobank in general and especially also in your department. You consider this implementation successful within your department Domain Office Payment Solutions?	Yes, I think it is.	We were already used using a similar program which was called Qliksense, and I think that helped with implementing it within the team because PowerBI is quite similar. So yeah, I think it was successful.	
	Do you consider it successful implemented within ITSystems as well?	Yeah, but not as successful as we did within our team.	I think it's very dependent on a different program we use, for	

			forecasting (Logis). I think the two programs, they work together, and they complement each other. We were also used to working with Logis. I think other departments did that less. Therefore, I see differences with the departments that also uses Logis. I think the other departments which already used Logis were more successful in the implementation of PowerBI than the others.	
	What was contributing to this success according to you?	The connection between the forecasting tool (Logis), the communication between those who make the dashboards and those whom going to use it.		Technological readiness and user group/ - involvement
Main body	'Management Support' is described as an engaged and supportive management. The management recognizes and understands the benefits of the business intelligence software, so PowerBI in this case, and it is also giving assets or the support for implementing such a software. Is management support a relevant CriticalSuccessFactors for you during implementation?	Yes, very so.	-Management as a user, because they eventually need to work with the PowerBI. We support them in using PowerBI, but they eventually need to work with it and they're also responsible for the budget. So yeah, it's key that they support us in using this software. -Management as a manager of the team; our manager was very supportive and I think we as a domain, because of the support of the manager we are quite up front and we embrace changes. So yeah, the support of the manager helps very much.	Management Support Likert score 5

	Business champion is described as an individual who actively supports the project, creates awareness and as a positive impression of the project, but also recognize the usefulness of the of the project he or she provides information, materials and also supports those who are involved. Was my assumption, right? Was this your role in the team?	Yes, yeah.		
	So, a little bit biased maybe, but how relevant is such a person in a project?	I think you need one person or maybe two, that are starting with the change and being involved with it and to make sure that they are enthusiastic to the team.	Because team eventually needs to use the program. And if you would have meetings with the whole team and also with other teams from different domains, then you will get too many people. I think it's very important to just give that to one person or a maximum of two (depending on the amount of people within the team).	Business champion Likert score 4
	The next two is vision and strategy, but please answer them separately. First vision; vision defines itself by the 'what-question'. So: 'What do we want to achieve?' of course this must be clear, it could be aligned with the company's vision or the project can also have a vision of itself. Is this a relevant CriticalSuccessFactors for you?	Yes.	I think for the for the project or program itself, it's important to have a vision because you'd need to know where you are working towards. You need to know which information is needed in the dashboard. Because dashboard can easily contain too much information. So, if you don't have a vision you will get a dashboard with a lot of information where nobody will use it because it's too much information. So with a clear vision, I think you can get the right information and not too much.	Vision Likert score 4

	And for strategy, it is the 'How do we want to achieve our vision?' So it's more the way, and the other one is more the goal. It can be a be a broader strategy or just smaller strategy for the for the implementation itself. Is this a relevant one for you?	I think this is for me less relevant.	The 'how do we get there?' I think it's a bit in the Agile way of working. So if you have a goal, you know where to work towards but the way, how to get there, I think there are a lot of possibilities. You can get to the goal in very different ways, and I think the goal is more important and not the 'how'.	Strategy Likert score 2
	Organizational readiness' defines itself as the preparedness of the organization and expresses itself more in example of availability of resources like assets or knowledge or qualified and experienced employees. So this organizational readiness is more the human sides compared with the technical technological readiness. First organization readiness based on a scale from one to five, how relevant is this for a successful implementation?	It's very important	I'm thinking about the department of reporting they need to build a dashboard. In that case, it's very important that you have the right assets or people that know how to build the dashboards and do have the time to build a dashboard and make changes to the dashboard.	Organizational readiness Likert score 5
	Technological readiness, it defines more the yeah technical side from the implementation. So the application should be reliable and the connection or the interlining between different systems, like you already discussed it a bit in the intro. For example, Logis should be connected or communicating with the PowerBI software or the business intelligence software. Could you indicate this also on the same one to five scale?	Yeah, I think a five as well.	Because we experienced, at least in the beginning we experienced some technical issues and then you see it doesn't work. Because management needs their information, and they need it in time. So if the system doesn't work, then they don't get their information in time and we saw that, or at least I saw that some managers were finding different ways to get their information so they were not using PowerBI because technically it had some issues, so they were using other programs, or different ways to get their information.	Technological readiness Likert score 5

	Data quality is probably familiar; It's the quality of the source. It must be high integer, reliable, and adequate. is this one relevant for an implementation?	Yeah, it is very! This one, well, maybe should be even a six or seven. This one, I think this one is the most important.	The first thing managers ask is where is this information coming from and is this information correct? So that's always the first question. It has to be correct. If not, you can just throw the whole dashboard away.	Data Quality Likert score 5
	Organizational characteristics, the explanation is quite simple; it's culture, size, sector or maybe a location as well. Does this influence on the implementation according to your experience?	It doesn't matter.	I think it has some influence on the speed of the implementation, but I don't think on the implementation itself. I think there are a lot of companies using PowerBI and they all have different cultures and everything, so I don't think it's that that important, but I think it's important for the speed of implementation. If you have a smaller company, with smaller departments, I think they can implement everything easier. With a big organization like we have, we have all the different kind of departments, all different kind of data sources which have to be connected to each other. Different kind of systems, applications, which all makes it harder. So, making a comparison between a big organization and for example small organization I think they have less data, and you can easily implement it. You have less people to meet with or discuss things with. So in that way, I think the speed of the implementation is affected.	Organizational Characteristics Likert score 2

	‘Benefits and costs”. Benefits should be noticeable so it can be in money. But most of the times it's not specified in money. But more noticeable in visualizations or work practice. Maybe while managing, as you already described for the for the managing you working for. Benefits and costs are combined as one CriticalSuccessFactors. Because ‘costs’ aim to be beneficial eventually, so yeah, benefits and costs is this one a relevant one according to you?	I think it's relevant for the for the organization, for the Rabobank and that's mainly because of the costs.	I think it is cheaper because we because we use a license of Microsoft that we already had. So that’s why it gets less costs. And the other benefits; I think they are especially for the managers who use the dashboard. Because they can get the information they need very quick and in a nice way. If it's nicely visualized.	Benefits and costs Likert score 3
	The next one I wanted to discuss, is ‘user groups or user involvement’. This is closely intertwined with the human side of the organizational readiness that we earlier discussed. Not only the people must be able to work with the technology. But it also must be fitting to the demands of the people who are going to work with it. So the users. User groups and user involvement; is this relevant during an implementation?	Yes, this is important.	Because eventually the dashboard is made for the users, so if they don't use it then you put a lot of effort and time while nobody is using it.	User group(s)/-Involvement Likert score 4
	Competitive pressure describes itself as the degree of stress or pressure that companies experienced by the competitor. How does competitive pressure influence the implementation success? Did you experience any competitive pressure during the implementation?	And who could be competitors? i.e.: ABN, ING. I think it's not important at all.	Not in the departments we work in. We are just focused on the internal communications and I don't feel any pressure from the outside.	Competitive pressure Likert score 1
	External support is also support findable outside of the company. But it's outsourcing, third party support, maintenance, updates and trainings. Is this relevant during for a successful implementation?	Yeah, I think it's important that Microsoft, the owner of PowerBI, that their support is very good.	Because if they are making the program and you have to work with that program so that's very relevant. And also trainings are I think especially in the beginning, very relevant on how to build dashboards and how to use PowerBI.	External support Likert score 4
	Regulatory support, it is about regulations from external companies, governance and so on. It could be strict regulations or policies, but it also can be steering	No, I don't think it's relevant.	Because we are just working for the internal departments. We do have some cases with the authorizations because we work with sensitive	Regulatory support Likert score 2

	regulations. Do you think this is relevant during the implementation?		information. So maybe that could make it a little bit important, but It's not very important. So, I would say it two.	
	If you reflect on this list; what are the most relevant CriticalSuccessFactors if you only include the ones on the list?	Data quality and management support.		
Closing part	The list discussed; is this clear and are the definitions used, sufficiently explained for you?	Yes, they are.		
	What is your opinion about this list comparing to your practical experience?	I think they were all very recognizable. So there were no surprises or anything. All the subjects, I think I noticed them all in the implementation.		
	Is it a complete list or do you want to add more?	No, I think it's complete.		
	Did you had the feeling that you can mention all you wanted, and did you feel comfortable and safe during the interview?	Yes		

Interviewee #5

Generic information	
Date, time and duration of interview	12.10.2021, 16:30h, 48:08min.
Name of interviewee	Interviewee #5
Name of the organization	Rabobank
Department and function	Banking-as-a-Service/ Area IT-Lead a.i.
Educational level	Higher
Years of work experience in function	2 years
Years of work experience in industry	12,5 years

	Question item	Short Response	Elaboration (why)	Extra remark
Introduction	What is your function title and what department are you in?	My function title is IT-Lead in Banking-as-a-Service, that's our Area within the B2B tribe. And because of leaving off the area Lead I'm also doing the area Lead role at interim.		

	What are the main responsibilities of this job or both jobs actually?	Let's focus on the IT-lead job because the rest I'm doing in my free time. As an IT-lead I'm responsible for the IT-part of the area. We have the business part and chapter IT, in our case that's almost everyone at banking service. We have all IT-members. And I'm focusing on the development of scale for people. But of course, also hiring the people, the GROW of the people and also the architecture. So of course not doing the architecture myself but being responsible for a good architecture in the teams. But also, we have a lot of things that we get from other departments like security measurements, administration and all things like that. So IT is smooth in the area.		
	How long do you already have this job?	Two years from now.		
	And before that it was in the same industry or?	In total twelve and a half year.	Before that I was a solution architect for payments, so for my last part was Geldmaat; to get it done and that it was connected to Rabobank on IT part. And before that we did a transformation from one platform to the other platform for all the pin traffic to transaction processing of your debit card and later also the credit card.	
	I heard recently the business intelligence software PowerBI was implemented. Do you consider this successfully implemented within your department Payment solutions?	Yes		
	Do you consider the implementation of the business intelligence technology PowerBI successful within Rabobank in general?	Yeah, I don't know if it's successful but at least my experience as a manager is that I use a lot of reports and I think they are very powerful.	What's not good in the implementation, is that you always have to search for some kind of report. So there's not an overview	Features of the BI-technology, standardization

			page or whatever that can help you as a manager to decrease the overload of dashboards. I think if you have some standardization that it can help to get more out of the report then we currently have.	
Main body	'Management support', It's really focused on the role as manager, and it's described as an engaged and supportive management. The management recognizes and understands the benefits of the strategic values of this business intelligence project. Is this relevant? And could you scale it on a one to five scale?	I think for every success factor you need management support, so if there's no management support you can stop already, or you first need to convince your management because otherwise there's no reason to start.		Management Support Likert score 5
	The second one is Business Champion. Business Champion is an individual who actively supports the project and creates awareness and has a positive impression of the project. Was there such kind of role during the implementation?	No, not that I know. I think it's not relevant. I say, let's say two; for a success, because it's not always in a person.	It could also be Google or YouTube, or an index page over there for a confluence page where its easily to find information about how it works.	Business champion Likert score 2
	Vision it is the question: 'what do we want to achieve with this implementation of PowerBI or business intelligence software?' On a scale from one to five, how relevant is having a vision during an implementation?	I think it's always good to have some kind of a vision	You need to first start with creating a dashboard to see what PowerBI really capable of and then you change your vision right away. I think it's more like that.	Vision Likert score 3
	Strategy is 'how do we want to achieve it', it already sounded a little bit like strategy. Was that correct or?	yeah, I think so.	You need of course a vision and know about who are the users? And who are the creators? and how you can bring them together? So that's one part of the vision and then later on in time you can also change it. So with different users and different creators, but also maybe some boundary, some standardization, etc.	Strategy Likert score 3

	Benefits and costs. Benefits should be noticeable in example by visualizations, work practice, or while managing a task. It also includes costs, so it's benefits and costs. Since costs normally aim to be beneficial. How relevant are benefits and costs during implementation?	I think that's maybe everything in the current situation.	Costs and benefits they go well together and are important for all software's, and PowerBI of course, also. You can have a free trial for so many tools. So as the word already says: 'it's a free trial', so you can try it for, let's say three months and then it's not needed to be very clear, efficient, clear strategy or what to do. But let's say we will try and error what to do with it but then you have to pay, and we have to pay a million a year for PowerBI, then you will think about what are the benefits? Do I benefit from this? And I think that's the thing you need to find the right balance in.	Benefits and costs Likert score 5
	Organizational characteristics in theory they say they influence the implementation success. Characteristics are for example, culture, size, sector and so on. Do you consider this relevant during implementation?	Not sure	I have not really a strong opinion about this one.	Organizational Characteristics Likert score 3
	Data quality it is the quality of the source data. It must be high integer, reliable and adequate. On a scale from one to five, how relevant is correct data for you?	A 10.	If you don't have reliable data, then you cannot do anything with the dashboards. And it also should be real time. So if you look through the data you want to current situation and not the situation of yesterday because a lot can already happen. Of course it's not true for every report. For example, if you talk about the 'bank oat', I don't need real time data but, on a day, or two-day basis. But	Data Quality Likert score 5

			most of the reports needs to be real time.	
	Organizational readiness is the preparedness of the organization. So it expresses itself in assets, knowledge, qualified and experienced employees. How relevant is this preparedness during implementation?	To have some it's a five.	It is relevant to have the correct people at the right time, but it's not relevant to have all people already educated at the start of the implementation. So it's relevant to have at least a couple of people that are specialist on these kinds of dashboards.	Organizational readiness Likert score 5
	Technological readiness is more the readiness of the technology. So, for example, that software one is communicating with the other software or software's. Or the software's are communicating with each other.	Yeah, it's very important that on one hand good user experience and on other hand the back end also needs to be very smooth and that you can add multiple data sources and shares very easily, and then of course your real time updates.		Technological readiness Likert score 5
	User groups or the user involvement, they have to be involved with the implementation and they can adapt the technology or the software. And is this relevant one for you?	I think that's very relevant.	So there are also two sides. One is the user experience and users that use the system. So how can you use it and what kind of dashboards are there. And on the other hand there should be information on how to build reports and how you can do it by yourself. What are the guidelines where to start that kind of function?	User group(s)/-Involvement Likert score 5
	Competitive pressure, it's the degree of stress and pressure that companies experience by other competitors. Is this according to you, relevant during the implementation of a PowerBI?	Who do you mean with competitors? In general; for example ING or ABN? No, I don't think that's relevant.	Use your own strength	Competitive pressure Likert score 1
	Regulatory support are the regulations from the government or the ECB or the European Bank. Regulations were its mandatory to fulfil certain standards but based on regulations from the government. Did you experienced any regulations or	No	Not by myself, but I suppose there are a lot of regulations because we use data you have to work with GDPR, right? So how to store? what to store? And can you see the data?	Regulatory support Likert score 5

	support given from the government or another institutes?		But I have nothing to do with it from my side.	
	External support is not regulations or pressure, it's support findable outside of the company. So for example, in this case Microsoft. But it could also be outsourcing FLR tasks for example. Outsourcing third party support, maintenance, updates, based on a one to five scale. How relevant is this for successfulness of the implementation?	It's important to think about it.	I think it matters what kind of knowledge you have in a company and how you set up your support structure. So for example, if you don't have any knowledge, you need to get the support thing going and a good contract and everything.	External support Likert score 5
	We addressed all thirteen, which one/ which ones are the most relevant during an implementation?	User group/ user involvement, technological readiness and data quality.	I think about the question about the user experience but both sides. So how to create dashboards and things like that? And how about the user experience? I think that are two main things. But also the connectivity and the technology behind it. So if connections to other systems are not working, then it's a little bit annoying and at the end nobody will use it anymore. But of course the most important thing is that the data is reliable	User group/ user involvement, technological readiness and data quality.
Closing part	Where there any items missing on this list?	No, I don't think so.		
	Do you have anything to add still or?	No, not no.		
	Did you had the feeling you had the opportunity and the freedom to mention it all? And was there are no pressure felt from out me? or suggestions throughout me?	Nope.		

Interviewee #6

Generic information	
Date, time and duration of interview	19.10.2021, 14:00h, 44:54min.
Name of interviewee	Interviewee #6
Name of the organization	Rabobank
Department and function	Domain Distribution, Domain Support Officer
Educational level	Higher
Years of work experience in function	2 years
Years of work experience in industry	>25years

	Question item	Short Response	Elaboration (why)	Extra remark
Introduction	What is your function title and what department are you in?	Officially, I am still an engineer. My role, on the other hand, is domain supporter. But originally my job title is still technical engineer. I work in distribution under Pascale Thoma.		
	What are the main responsibilities of this job?	I'm responsible for making sure that all Sr. IT leads and IT leads and Pascale get to see the right numbers, financially, well both; financially and out of pocket in particular, so they can steer and take the right decision-making. And in addition, based on all the figures, you also make analyses where you will inform Sr. IT-leads or Pascale about. So they know where to pay attention, or where to look or think about. That's about the half of my time, the other half of my time I deal with contracts. See if we can save money from contracts. I make business cases for architecture and IT-leads in collaboration with the technicians and engineers to see what we can do differently or can do better. For example the entire Cloud		

		migration project, that is what I am dealing with.		
	And the role as domain officer, how long do you work in this function?	Since half of January last year.		
	And before that as a technical engineer, right? How long do you already work within the industry?	I have been working for Rabo for 15 years now. Before that 10 years at Robeco; a subsidiary of Rabobank. And before that, I was in homecare and nursing-help; to set up the ICT there. And before that, I was a psychiatric nurse.		
	Do you consider the implementation of PowerBI successfully implemented within your department and within ITSystems of the Rabobank?	Yes and no.	Yes, it is a very nice tool. You can get a lot out of it. But that is also the pitfall. If you not clearly define what you want to get out of it, all with the same definition. The goal is not clear, and you don't know what information you need, you will get a lot out of it that will drive you crazy because you just cannot link it together. Also you have to define the wishes of the users.	Vision, user group/ -user involvement.
	And is there a difference between, for example, your department compared with ITSystems or the Rabobank, or is it all the same factors contributing to the successfulness of the implementation?	No, it is, it is the same.	Everything I work on is not just for distribution but for all ITSystems. And even for infra in general. We go further with this. For example, if I look at the EMIs, it is for the whole of Rabobank.	
Main body	'Management support' is described as an engaged and supportive management. So it's your manager in this case, Pascale I assume, she recognizes and understands the benefits and strategic values of PowerBI or business intelligence software. Do you think this is relevant that a manager supports this implementation?	She leaves that to us and says arrange it.	For Pascale and the Sr. IT leads it's about one thing only and that is that they get their information. And they don't care how they get the information, as long as it's easy. I think you should look at it from that perspective instead of Pascale saying: 'We all need to go to PowerBI.' No, Pascale wanted the right information. And how? She	Management Support Likert score 3

			leaves that to us and says arrange it. And it would be nice, if it could be done quickly.	
	Business champion is an individual or a few individuals that actively supports an implementation, the project. They create awareness, has a positive impression of the project and recognizes the usefulness. It can also be providing information, materials, and so on. Did you have anyone who is supporting the project in your department?	Yeah. We have had multiple.	You know; it's new. A lot is possible and it is nice that someone can think along to steer it in the right direction.	Business champion Likert score 5
	Vision is what do we want to achieve is this relevant during implementation?	Yes.	Without a vision, you can't get anything. Very simple. Without vision, without knowing where to go; you just don't get clarity and then you can develop the different ideas about which you might make the wrong choices.	Vision Likert score 5
	Strategy answers: 'How do we want to achieve our vision?' Is this relevant during implementation?	Yeah, I think so.	No, I really think vision and strategy are the basis. And if your base is not good, forget it. Then it is garbage in equals garbage out.	Strategy Likert score 5
	Benefits and cost is one CriticalSuccessFactors because costs aim to be beneficial eventually. So benefits can be noticeable in money but also in visualizations, work practice, like indirect benefits. On a scale one to five, is it the relevant during implementation?	Yes.	In our organization we may even lead too much to costs and perhaps not enough about the benefits across multiple departments. For me benefits and costs are important, but benefits do not always have to be hard in money.	Benefits and costs Likert score 4
	Organizational readiness is the preparedness of the organization in availability of people, qualified and experienced employees, knowledge and so on. It's also, a little about, data quality and availability but yeah like if it is there. So not the transactions or the use of it, but only about if it is there. Organizational readiness, is this an important one?	Five. A Five!	Perhaps the most important. If your teams or your people don't want it, it's never going to work out. You can't force it.	Organizational readiness Likert score 5

	'Technological readiness' is actually one you said in the introduction. It is described as systems that communicate or can be linked and that they must be reliable and so on. Also very important I assume based on what I heard?	Yes, is also very important.	Because technology changes by the quarter. So yes, you can now say, we will use it for about 60 or 70%, and then I can maybe use it for 80% over three quarters. Those developments are going so fast. You just need to know as an organization that you are going to use it for what it is for. And in the condition in which you will use it. You know, you can say we are going to use it in a way that a supplier doesn't deliver at all. Then you can stand on your head but then you can't get it done. But you can say for now it is important that we implement it, we are going to let it settle down so that everyone can get used to it. But… we can't do everything with it yet, because that will only be possible in six months or a year. Well you can do it like that, if your expectation management is good. I actually think that's more important. And then you end up with organization again.	Technological readiness Likert score 4
	Organizational characteristics. It's size, culture, sector and so on. Is this relevant for an implementation?	Yes, it is important but is not the most important.	if you are a very small organization and you want to do a successful implementation, I assume that you adjust your planning and communication accordingly. So if you have your organization and communication in order and that goes well, I think this is of minor importance. Or at least less important.	Organizational Characteristics Likert score 3
	Data quality it is the quality of the source data. It must be high, integer, reliable and adequate. How important is data quality for the implementation?	For the implementation itself it doesn't matter for the results you want to achieve its super important.	You can have the most beautiful tool where the data is outdated or has not been kept up to date or it is not correct. Then you're gone. Then you did it for nothing. Either, perhaps for good reason; you have demonstrated	Data Quality Likert score 5

			that the data is not usable and that you cannot control it.	
	User groups or user involvement it is that the users are involved with the dashboards, the implementation and that there are working groups to fine tune. Is this relevant during implementation?	Yeah five.	For example, if there is an apple ordered and the users need a green apple but receive a red apple. It's important to include the users.	User group(s)/-Involvement Likert score 5
	Competitive pressure: it is a pressure that is described as the degree of stress and pressure that other companies have on your own company. I don't know if you experienced any competitive pressure from, for example, the ING or the ABN during an implementation of, for example PowerBI?	No, I'm not doing that	. You could perhaps extend this item to the rules of DNB and the ECB. We run into that sooner, at my level than that I have to deal with what the competitor colleagues are doing.	Competitive pressure Likert score 1
	Regulatory support is the one that you just said. It describes rules given by the government or other instances. Is this relevant during the implementation?	Yes, certainly.	In addition to your vision and strategy, you also have some arrowheads such as rules and legislation. And you have to give a combination of that.	Regulatory support Likert score 5
	External support is outsourcing, third party support, maintenance, updates, trainings. Is this one relevant during implementation?	Yes, you can do that twofold.	For the level where we are, only the training is interesting. But we don't have to manage it. We use it. For the people who do manage it, I can imagine that this is relevant.	External support Likert score 1
	What are the most relevant CriticalSuccessFactors we just discussed?	Strategy, vision, organizational readiness, I think those are the most relevant. And data quality.		Strategy, vision, organizational readiness, data quality
Closing part	Were there any factors missing on this list? So did you say you have to add this as well?	No, I think you pretty much have the most important things during an implementation. The only one you may have missed is security and then I mean in particular, that as a user, I am aware of what to do with the data? what do you do with the data? where do you		Regulatory support

		store it? And whom do you send it to? So then, you end up with AVG regulations.		
	The definitions and the CriticalSuccessFactors, where they clear and sufficiently explained?	Yep, certainly.		
	Did you felt free and safe to answer everything the way you want to answer?	Yeah, totally.		
	Did you felt comfortable to answer it all? No need to have a hidden agenda or something?	No double agenda. Please no. I am very straightforward.		
	Anything else from your side?	No I liked it.		

Interviewee #7

Generic information	
Date, time and duration of interview	21.10.2021, 14:30h, 28:29min.
Name of interviewee	Interviewee #7
Name of the organization	Rabobank
Department and function	Domain Distribution/ITSystems - 'Head of domain distribution' and 'Head of ITSystems a.i.'.
Educational level	Higher
Years of work experience in function	5,5 years
Years of work experience in industry	>5,5 years.

	Question item	Short Response	Elaboration (why)	Extra remark
Introduction	What is your function title and what department are you in?	Well at this moment I'm wearing two hats, so I'm responsible for the IT domain distribution, which is responsible for the channels of the bank, so the app, web, telephone, chat, video chat and also the local bank applications or the generic applications like Siebel, CRM integration enterprise, Data Lake. So everything which is not product related, like payments or housing or whatever. Besides that, I'm head of systems for almost a year now,		

		basically it's a long interim period of a year almost. So that are my two hats at this moment.		
	You work now one year as head of ITSystems and how long do you already work in the function of distribution?	For 5,5 years now, that's also when I entered Rabobank. Before that, I worked for a number of other companies like Oracle, Accenture mainly at the at the software or consulting side.		
	OK, and for the head as ITSystems, what are your main responsibility when you are wearing this hat?	I'm overall responsible for all application development and maintenance and operations within the bank. So everything which is not infra. And of course, one of the key factors is continuity and security, but also all know development of the bank. Is within my responsibility.		
	I heard recently a PowerBI was implemented and how was your involvement with this implementation?	Zero	Obviously, I am not involved with all application development there. ITSystems is more than 5000 engineers, so it's impossible to know everything that's going on. But maybe in this area you would have expected some involvement so I'm already giving you a hint on my expectations because PowerBI is intended to facilitate management in their decisioning I would say. But I didn't have any involvement at all. I don't know where it was implemented, was it done by FLR?	
	OK and according to your experience, do you think the general implementation is successful, as far as you can say?	I'm a bit critical.	Because for me I think we have some difficulties within Rabobank with the quality of the data in the reports and as soon I see some figures are not correct, I'm totally in doubt of the full report and for me it's the first one that have to be correct	Data quality, quality of the reports

			before I can do anything with it. Because how can I trust the other figures in that report if I see instantly that some numbers are not correct? So is it a good implementation? Yeah, probably the PowerBI tool itself works right. It's kind of out of the box tool set probably, but the success is made after the data and based on the kind of information you create and both can have some improvement. Let's say it like that.	
Main body	Management support is the engagement or and the support of the management. The management should recognize and understand the benefits of the implementation. Is this a relevant one for you?	Of course always management support is relevant in getting a system implemented.		Management Support Likert score 4
	Business champion is some individual within the team or within the project that is supporting and cheering for the project to make it successful. It also provides information. Is this relevant according to your experience?	I'm neutral on that one. Like I guess. I guess it's less relevant,		Business champion Likert score 3
	Vision and it's defined by: 'What do we want to achieve?' Is having a vision during implementation, is that a relevant CriticalSuccessFactors?	It's definitely a five.	if you don't have a vision of what you want to do. Then you might not combine the right data sources or make the right conceptual decisions in in how to implement the system and then later we were not able to get the right steering information out of it. So if you don't know why you are creating this system then you better stop.	Vision Likert score 5
	Strategy, it defines itself with: 'How do we want to achieve the vision?' Is this relevant as well?	Yeah, sure, definitely.	Because it is the way to get buy-in into the new system. If you have early involvement of your stakeholders or your target user groups and then they are able to influence and define their requirements and make sure that the system fits their demands. So I guess; it's very important.	Strategy Likert score 5
	Another one is benefits and costs. And benefits can be direct, expressed in money. But most of the times it's more in; for example, visualizations, work	It depends	I would say it's more related to how you do it. If you have an iterative approach, then you can get feedback from the user group and then you start	Benefits and costs Likert score

	practice, good information. Benefits and costs are combined, because costs aim to be beneficial eventually. Is benefits and costs relevant during the implementation?		influencing the outcome and you make sure you get the right benefits out of it in the end. So I would rather emphasize on how we implement instead of focusing on the benefits and costs during the implementation.	
	Organizational readiness is the preparedness of the organization. It expresses itself in availability of organizational resources, knowledge, qualified and experienced personal and so on. This preparedness; is this relevant for a successful implementation?	I don't see that as a key differentiator or key success factor for a BI project.	The data side is in my opinion one of the key Success Factors. So I would trade that highly. All the other aspects of organization etc are important but I don't see that as a key differentiator or key success factor for a BI project. I wouldn't say that.	Organizational readiness Likert score 2
	And data quality is a five then?	The data side is in my opinion one of the key Success Factors		Data Quality Likert score 5
	Technological readiness it's more that the systems or the other systems. For example, you have PowerBI, but there's also, for example, Logis that they are communicating between each other. Uh, so you could easily link other source systems and so on. Is this relevant during, or for successful implementation?	Yeah, so that has all to do with data, data logistics, data quality	Data logistics and data connectivity and things like that. Sure they are important. Otherwise you don't get right data into your reporting, but you should also start discussing why we have Logis and PowerBI and all those sources anyway, so. We keep on creating sources while it's not always that useful, I think, yeah.	Technological readiness Likert score 4
	Organization characteristics. It's size, culture, sector and so on. Is this relevant during the implementation for the successfulness of the implementation?			Organizational Characteristics Likert score
	'User groups and user involvement' is one that came across in earlier found theories very often. And I think you actually describe this as well.	The user involvement is key, especially in BI. I would say yeah.	If people think that the reports are useful and relevant, then they will probably start using it.	User group(s)/-Involvement Likert score 5
	Competitive pressure. Described as other companies, so for example ABN and ING. Did you experience any pressure from there?	No.	Not relevant.	Competitive pressure Likert score 1
	Regulatory support. It's described as a form of external support given by the government, but also can be rules as AVG, the privacy regulations, for example. Is this relevant?	Yeah, sure.	Because it is related to what kind of authorization you should give to certain people. So and you should make that part of the requirements phase.	Regulatory support Likert score 5

	External support it is described as support findable outside of the company, outsourcing, third party support and maintenance and updates. So for example, in Power BI form Microsoft. Was this relevant?	I think it's kind of neutral	I was not part of the implementation, so I don't know if they had any struggles finding the right people. Of course you need the right experts to build it, but in my opinion, this is not an area which is extremely difficult to source or to learn, so I think it's kind of neutral.	External support Likert score 3
	To summarize; data quality is very important; actually it's key. As well as regulatory support or regulatory requirements. But also user groups and a vision are important. Is that correct?	Yes		Data quality, regulatory support, user groups, vision.
Closing part	Is there something to add?	Maybe it's also interesting to define when the project or implementation is ready.	Because people keep on going and creating more and more reports and stuff while not everybody is using it. So there should be a kind of point that you say, 'OK, this is what we needed'. So it's more and more costs related. Probably it's not a CriticalSuccessFactor, but it's more; creating more information which is not that powerful or maybe.	Vision

Interviewee #8

Generic information	
Date, time and duration of interview	22.10.2021, 14:00h, 42:42 min.
Name of interviewee	Interviewee #8
Name of the organization	Rabobank
Department and function	CIOO. Head of IT Payment Solutions and tribe lead APF.
Educational level	Higher
Years of work experience in function	4 and 2 years
Years of work experience in industry	>4 years

	Question item	Short Response	Elaboration (why)	Extra remark
Introduction	What is your function title and what department are you in?	I'm working in the CIOO department and my function title is head of the IT of Payment Solutions and I have a double function. I'm also responsible for the Account and Payment Factory that's a tribe and there I		

		am tribe lead. But In IT, I'm head of the IT Payment Solutions department.		
	What are the main responsibilities of this job, both functions?	I'm responsible for all the systems are always ON for the bank. I think; it's like about 200 systems. There are 750 people working in the domain. I am responsible that they are involved and engaged. I'm responsible that we implement our strategic themes and that we do that change, for example the cloud migration. But also making sure that we do our IT4IT. So that we automate our own work, making us more effective. That sort of responsibilities.		
	How long do you already do those both functions?	Two years now. And the responsibility in the IT domain is four years. A little bit more than four years now.		
	Recently PowerBI is implemented. Where you involved with this implementation?	Only as a user.		
	For PowerBI, but also for other BI implementations, what factors contribute to the successful implementation of a PowerBI or business intelligence software?	I think the success factor is that we do that together with the department who's doing the data lake. So how do you how, what, which datasets do we make? How do we build up a data governance? We do step by step. So not really big things in one time, but we start building up. And I believe that works in all kinds of implementations. Making sure you start small and then you start building up.		Strategy, vision.
Main body	'Benefits and costs'. So combines as 'benefits and costs'. Since costs aim to be beneficial eventually. Uhm, benefits can be, yeah in euro. So just the money. But also in	Very relevant	Costs, I mentioned that we are decreasing the legacy. That costs a lot of money, so a new solution with less costs and more automated will always help. But also in PowerBI; the fact that I	Benefits and costs Likert score 5

	visualization work practice, managing, while managing task of report. Is this relevant during implementation?		get more insight. For example, on security or whatever that is a benefit as well. So it's very important to take clients with us on our benefits we bring.	
	'Management support' is described as a management that recognizes and understands the benefits, the strategic values and provide as well resource for the implementation. Did you experienced this support during the implementation?	I recognize that it's important	So maybe I didn't see it in the PowerBI, but I recognize that it is important to give that support so when, we have an important implementation and I see that we have to; I'll give that support or make sure that I give resources available.	Management Support Likert score 4
	Business champion. It can be a project manager, but it also can be a team member within the team. Who is, cheering or promoting the project. Do you think this one is relevant during implementation?	Yeah	Not only for motivation, but also to be very clear on priorities and on requirements.	Business champion Likert score 5
	Vision is what do we want to achieve. Is having a vision, relevant during implementation of Business intelligence?	Yes	If you look at Rabobank, you really have to give a clear 'why' and 'what we try to achieve' and then teams can fill in themselves as it can give it. So I believe that it's very important to give it.	Vision Likert score 5
	Strategy is: 'How do we want to achieve the vision?' So the timelines etc. are related to strategy.	They're all important.	I do believe that strategy might be even important. Or more important than the vision. Well, I'll give them both a five.	Strategy Likert score 5
	Organizational readiness is the preparedness of the organization and expresses itself in availability of resources like knowledge, qualified and experienced personnel and so on. How relevant is this one based on a scale from one to five?	It depends how new something is, yeah.	Well, we have been starting up a new projects while we were still building up resources.	Organizational readiness Likert score 4
	technological readiness is more for that, that systems are communicating. But if you don't know where the path is going then you know	Yeah, they're relevant.	Also the technological preparedness doesn't have to be complete, so you are preparing while you are implementing or while developing.	Technological readiness Likert score 4

	of course it's more difficult to prepare that as well.			
	organizational characteristics refers to culture, size, sector and so on and is this relevant according to you?	I can imagine makes a lot of difference.	Culture yes. For example, now in the Rabobank we want to stimulate the culture of moving, and that you can make mistakes. Especially in business intelligence, if you have a completely different culture, where you don't make mistakes, it's more difficult than if you could move and improve. And size; I can imagine that makes a lot of difference as well in business intelligence, because if you make business intelligence for a very small company it's different from the bank where you have to make business intelligence and more difficult.	Organizational Characteristics Likert score 4
	Data quality is that the quality of the source data must be high, integer, reliable and adequate. So data quality refers more to the source data, so the data lake and so on. How relevant is this according to you?	Yeah, very. It is 5.	I can give a good example: In payments data quality is very high but there are domains like lending and mortgages who don't have a high data quality. And then you get really a lot of problems because you really have to do data linages projects to make sure where the mistakes are formed. And you can't trust on anything. So it's a very important one because your users say OK, well it doesn't make sense. I can't trust it and then it's gone, and they don't use it.	Data Quality Likert score 5
	User groups or user involvement this is if users are involved with the development and implementation; and of course they have to adapt and be able to work with this technology or this business intelligence. How relevant is this according to your experience?	It's very relevant.	You can work with the business owner but it's very relevant to have reviews by users. We do that every two weeks, so that's the area review we do so that other clients can give feedback. And it can be also end client, so that works very well. It motivates, but it also works very well to do that.	User group(s)/-Involvement Likert score 4

	Competitive pressure is the degree of stress and pressure that the company experienced by competitors. And this is referring towards, for example the ING or the ABN. Do you experience any competitive pressure during the implementation of, for example PowerBI, but also other implementations?	In PowerBI, no.	But we want to be the first one for example. And then we feel competitive pressure and also the teams, so they want to be the first one then. So they work even harder and on weekends because they want to be the first in the market.	Competitive pressure Likert score 3
	Regulatory support is more referred as a factor that is from the DCB, The Dutch bank or the ECB, European bank. But it can also be other governmental regulations. For example privacy and so on. Is this relevant during implementation of PowerBI? And is it during implementation of another business intelligence software?	Very relevant now	Yeah, it gave a lot of impulse to add implementations. So actually it's the highest priority is on KYC intelligence at this moment. So even more budget and resources were allocated to make it happen.	Regulatory support Likert score 5
	External support is described as support findable outside of the company. It's outsourcing, third party support, maintenance, updates and so on. Is this relevant during implementation from your experience or your side of the implementation?	It is relevant.	If they already give a lot of functionality then it's not so important. But we do for example implementations with a large supplier together. And then they're really important. So they are crucial actually, but it depends a little bit on the phase and the product.	External support Likert score 3
	Which ones were the most important ones for a successful implementation?	Business owner, management supports, have clear benefits, User inputs, readiness and strategy. Then if you have that combination. And data quality.		Business champion, management support, benefits and costs, user group/user involvement, organizational readiness, Technological

				readiness, strategy
Closing part	Was this list complete or do you think anything as should be added as well?	The quality of the team maybe? Who is working on it? You didn't mention that one. Or maybe this is the readiness?		Organizational readiness
	Did you add the feeling, you had opportunity to mention all and how you want it? And did you feel comfortable during the interview?	Yes, I had a feeling I could say anything I wanted, and it was comfortable. It is a little bit difficult to make the nuances in the relevance, but I could say everything.		

Interviewee #9

Generic information	
Date, time and duration of interview	26.10.2021, 10:00h, 54:25min.
Name of interviewee	Interviewee #9
Name of the organization	Rabobank
Department and function	CFO. Business controller
Educational level	Higher
Years of work experience in function	2 years
Years of work experience in industry	>25 years

	Question item	Short Response	Elaboration (why)	Extra remark
Introduction	What is your function title and what department are you in?	I'm within the CFO domain. That's the financial department of the Rabobank's retail part. And the official title is business controller. But it is business partner in control, you can choose which one. But for the CFO domain retail; I am dedicated as a business controller. And for Payment solutions and account payment factory. That's more or less the main job; and the other things, the hobbies I have within CFO,		

		is more general for ITSystems. So Payment Solutions is one of the domains within systems, and I do also some jobs, some reporting jobs, for systems, in total level for systems level also.		
	What are the main responsibilities of your function?	Mainly financials are my focus area. But they asked me also to do the non-financial parts. That's the reason why I'm sitting always in the in the MT from payment solutions. But the main part is reporting, the budget the actuals forecasts. That's the financial part. But there is also sort of non-financial part in it: for example the IBM agreement where we once in a three year do a negotiation about hardware, software and services from the in the mainframe we use from IBM. And that's not only a financial thing.		
	How long do you already work in this function?	Two years now.	I started two years ago within our bank and before that I worked, I think 2 and a half years for Nationale Nederlanden. I did the merging from a department from pension. Financial administration and reporting department. I integrated the National Nederlanden organization. And before that I worked, I think 11 or 12 years for Achmea, which is also on cooperation from the Rabobank organization. And in that period, I did a lot of financial and managerial jobs within the organization and different parts in the organization. And before that I worked at 10 or 11 years in in consultancy ad interim at companies original from PwC; I don't know if you have heard of them. The Price Waterhouse Cooper organisation, on the consultancy part.	

	In what way were you involved with implementation of business intelligence or PowerBI within Payment solutions?	I'm not really involved in that implementation. But I see what's happening because we are using PowerBI with the CFO organization of Payment Solutions department on the IT side. And what I see is that we do a step-by-step implementation, using a normal standard report in power, and PowerPoint. And now we make a transformation to PowerBI slides and integrated in our regular monthly report cycle, right. So that's what that's what I'm seeing so far.		
	What factors contribute to this success?	Data quality or quality of the source, but also having people from practice that are thinking along with what do we want to develop and so on.		Data quality, organizational readiness, user groups/ user involvement.
Main body	Management support is described as an engaged and supportive management and recognizes the value of the usages and the benefits of the of the PowerBI or the business intelligence software. Do you think this support of the management and engagement of the management, do you think this is relevant during implementation?	It is not the most important.	I think the last few months we work too much in a silo and forget to talk to the management.	Management Support Likert score 4
	business champion. It's an individual or individuals that actively supports the project. They create awareness and also provide, for example, information and materials and so on. Do you think having a business champion is relevant during implementation?	Yeah	Then you have to add that you always have some people in your organization who will take the lead to make things better or change something. And if I look into my own group I work for, I think there is always a person who likes to do that. and that's why I think is relevant.	Business champion Likert score 4

	Vision is ‘what do we want to achieve?’ So the goal from the PowerBI or the business intelligence software. Is it relevant to have a clear vision during the implementation?	Yes	It's good to have a vision on how do we going to organize that? And in a better way so it takes less time? Right, so we do it cheaper, faster etcetera. So it's good to have a vision	Vision Likert score 3,5
	Strategy is more defined as the; “How do we want to achieve our vision?’ Is this relevant during the implementation?	Yes	Related to the strategy on how you going to have to use some tools for it, if they are available, then it's the question; ‘What kind of tools?’ So the danger in this is we choose for the how, and not the correct or the most efficiency tools for example.	Strategy Likert score 3,5
	Benefits and costs; benefits should be noticeable. this can be in money, but can also be in visualizations, work practices or while managing task and so on. Benefits and costs are combined as one CriticalSuccessFactors, since costs aim to be beneficial eventually, of course. Uhm, how relevant are benefits and costs during an implementation?	I'm not sure about this.	It depends on how many costs you would like to pay for data quality related to what you want to achieve as a bank.	Benefits and costs Likert score 2,5
	Regulatory support, this is a form of external support or regulations given by the government or the DNB or ECB, by rules policies, regulations. For example, in KYC or in privacy for example. Is this relevant during implementation?	It depends on what kind of project, but this is relevant.	For example in the KYC project it is quite relevant.	Regulatory support Likert score 3,75
	The organizational readiness defines the preparedness of an organization; and expresses itself in example in availability of organizational resources. So knowledge, qualified personal, experience personal. It's more the human side. This organizational readiness, is this relevant according to your experience?	Yes and no.	Lots of people think well: ‘I have a job. I start at 9:00 o'clock and going 5:00 o'clock at home.’ And within our organization the same. So, the point is should we wait for an organization when they are ready for it? And my answer to that question is: No, you know you have to go forwards.	Organizational readiness Likert score 3

	Technological readiness, besides the preparedness of the people we also have to prepare the technological side. It is not the data quality only because data quality is coming afterwards. It's really the technology. So for example, Logis have to communicate with SAP or communicate with PowerBI. So the communication between the systems should be aligned.	This is important one, I think.	Systems should be aligned with each other, or should be decommissioned, or should be stopped and when not been used. And now we're moving to for example to the cloud area and let's say it is at three and half in that way. Yeah, I think yeah, even I think; make it a four of it, yeah.	Technological readiness Likert score 4
	Data quality you already described it by yourself a little, but it's quality of the source data. It must be high, of course the integrity must be high, and it have to be reliable and adequate.	Make a five of it.	If our data quality is on top level, I think it is much easier to do our job, to monitor what's happening, to get the signals, etcetera, etcetera. So in that way I think good data quality is important. Also, our regulators ask those questions.	Data Quality Likert score 5
	Organizational characteristics, it's culture, size, sector where we are in. How relevant is this during implementation of PowerBI or any other business intelligence software?	In certain way it's important.	But the culture within the bank is quite relaxed (sometimes to relaxed) so I think this is difficult.	Organizational Characteristics Likert score 2,5
	One that you already mentioned; was a user groups/user involvement., this is a what do we want to receive as a user? Is this relevant having user groups or user involvement while implementing?	Yes, absolutely yeah.	We did some user group involvement but not after a year now for example, in this case. Well, I think we go too fast in that way. We forgot our user group in that way. So, yes at the beginning and then afterwards in several moments. So I think it's a four.	User group(s)/-Involvement Likert score 4
	Competitive pressure. It's the pressure of, for example ING or ABN. Did you experience any pressure or stress from out other companies during an implementation of, for example PowerBI or other business intelligence implementation?	I think there is.	Because if I'm looking through the costs and benefits side of the bank organization. We should work more efficiently than other ones, so be cheaper than other ones because at the end the products we sell, people have to pay for it, so if you can lower our costs in a certain way. And do some benefits compared to the other banks, yeah then there is one.	Competitive pressure Likert score 3,5

	External support: It's described as a support findable outside of the company like outsourcing, third party supports, but also maintenance and updates. So for PowerBI for example for Microsoft. Do you think this is relevant during an implementation having this?	Yes.	In the beginning. Afterwards, I think, our organization Rabobank should be facilitate it by its own.	External support Likert score 3,5
	We discussed all thirteen. What are the most relevant ones?	The first one, the second one, User group. Data quality technological readiness		Management Support, Business champion, User group(s)/-Involvement, Data quality, Technological readiness
Closing part	Did you experience the enough freedom and comfort to answer all the questions you wanted?	Yes, Marco, I think so. It was a nice interview		

Interviewee #10

Generic information	
Date, time and duration of interview	29.10.2021, 13:30h, 60:02min.
Name of interviewee	Interviewee #10
Name of the organization	Rabobank
Department and function	CITO, Head of reporting and Analytics (FLR)
Educational level	Higher
Years of work experience in function	1,5 years
Years of work experience in industry	>10 years

	Question item	Short Response	Elaboration (why)	Extra remark
Introduction	What is your function title and what department are you in?	My function within the Rabobank is head of reporting and analytics within the first line risk organization, which falls within the CITO domain. We manage IT risks for the	There are three layers of capabilities. One is reporting in a business sense of the word. So building reports with data driven insights to support the formal in control meeting cycles.	

		Rabobank, including global responsibility for business continuity management information, security, cloud outsourcing and data management currently.	The second layer is a more operational and technical insights, really on the on the systems and those are directly and daily refreshed from the underlying systems. That is reporting dashboarding, etc. which we provide using PowerBI. And the third and most complex layer of capability is the analytics part. Where we try to provide more predictive of forward-looking insights into some datasets.	
	How long do you already work in this particular function?	I joined the Rabobank for this function one and a half year ago. June 2020.		
	Before you started at the Rabobank. You were working in within the same industry, or did you do something totally different?	No I was working within the same industry. I was business objects consultant, so reporting, BI reporting consultant for 10 years with in Ordina, and after an I left the consulting business, I did line management for BI teams; one within ABN AMBRO and one within ING. And most recently, I was part of the Deloitte Innovation team, and we built text mining solutions and that we sold it in a spin off. So we started our own company were I was part of for two years before I left for the Rabobank.		
	PowerBI recently was implemented about one year, one and a half year ago I believe. In what way were you involved with this implementation?	So we I consider myself, and my department as a user of the PowerBI platform. So I did not implement the PowerBI platform myself, but we kind of rolled it out to our user community as part of the migration from Qliksense to PowerBI.		
	OK. And do you consider this implementation successful within ITSystems?	Yes, absolutely. I consider it successful, yeah.		
	Is there a difference between the successfulness; for example within	Yes, absolutely	It's kind of the buy in I would say. So users can be really consumers, or they can be Co-creator. Then there is a	

	ITSystems or security or other areas where you implemented it?		sense of ownership they feel about the information they consume. And I think the more people feel that they own the thing the better or proactive they are, the more willing they are to help and signal problems and the more constructive relationship and the more successful the implementation. Absolutely yeah.	
	What factors contribute to successful implementations?	Data literacy: I think it is very important. Also data availability for me is a success criteria.	Data literacy. So are people actually able to appreciate the data serve and able to read it properly?	Organizational readiness, data quality.
Main body	Management support is described as an engaged and supportive management. The management is recognizing the value and understands the benefits and the values of business intelligence software that is implemented. Management support, is this relevant during an implementation according to your experience?	I did not experienced it but it is very important that there is management support and that there is a clear perspective on how those insights are being used for continuous improvement.	I would say that for the insights we are now providing on a security to ISRA and then of course if the management does not support it and proclaims the signals that declares that the signal source of truth. Yet people start doubting it, not using it, ignoring it, providing alternative insights etc. So with building some solutions or new insights. Very important that there is management support and that there is a clear perspective on how those insights.	Management Support Likert score 3
	Vision is defined as: 'what do we want to achieve?' So that is really the end goal. How relevant is having a vision for the implementation success?	I would say that is really high	It is extra effort, or it is a change of how you do your job. It is a change one-way or the other and then the 'why' and 'what' are very important. Well: 'Why do we need to make the change?' and "What is in it for me?' So that is very important, yeah.	Vision Likert score 5
	Strategy is more; 'How do we want to achieve this vision?' How relevant is this for the implementation success?	And strategy that is probably a four.	Because a strategy people can agree with or not, like the buy-in. But they generally do understand the 'why'. They get why you want to do something?' They're very tolerant in that sense. The how is where the hard decisions take place. And people tend to disagree already a little bit more on that level. And sometimes it is just because. Like, I see, there is no choice. Even if they understand it or not. So I would say strategy is a little bit less important.	Strategy Likert score 4

	Business champion: so that is an individual who is supporting the change or the project. He or she creates awareness, has a positive impression, so it is really a sort of cheerleader for the project. Is such a role relevant during an implementation?	Yes. Absolutely	Having super-user, somebody who knows the advantages and knows how to create value from the change and can really have a dialogue on the user level. Yeah, like well yeah you win something. It is always a win/lose but someone who can clearly explain what you win and what you lose. I think that is very important, so it is super users/champion. A sponsor who sees the value and knows how to translate that into day-to-day practicalities of the job.	Business champion Likert score 5
	Benefits and costs. Benefits should be noticeable in example money, but as well and indirect benefits. So visualizations work practice, managing task and so on. Benefits and costs are combined as one CriticalSuccessFactor, since costs aim to be beneficial eventually. Are benefits and costs relevant during implementation?	That highly depends on your management context,	In general, I think it is accepted that business cases don't make sense at all, and that people or project managers do things to reach its business cases. so, I am not a strong believer in business cases but of course, if you are in a business case context you need to have solid case, otherwise the project would not even start but once there was a kick-off. Yeah, who cares about costs and benefits? But at least make them SMART. I believe in value, but it turns out that value is also very often intangible and not always a tangle value.	Benefits and costs Likert score 2
	Organizational readiness are resources like assets, knowledge, qualified and experienced employees. That is more the preparedness of the firm or organization so the organization preparedness, is this relevant for you?	Yeah, that is very important.	And I think that is also the presence of business champion and having a little bit of data literacy, etc. So I would say organizational readiness that is foremost important? Yeah, that should be a six.	Organizational readiness Likert score 5
	Technological readiness is more described as the preparedness in skills and that sources communicate between each other. I this relevant during/for successful implementation?	No not at all.	That's all really manageable. Like if the organisation is ready, then if you can get data or not it is just the management that comes down to a decision. And that decision is an easy one. If the management agrees that it should be done, you know. And also all technical technological stuff, well not all but most of the technical technological stuff, is really in control, explainable, executable it is really not that difficult I would say.	Technological readiness Likert score 1

	The quality of the source data must be high, integer, reliable and adequate. Is this relevant?	Data quality is important	It's important but if you provide insights into and people and if people understand it. Like with your car dashboard. If you just see the pointer and it's wrong. Yeah, your done and it's becoming a dissatisfier. But as soon as you know how the car works and why there is probably some variants in it; like with fuel. You understand that it's not the exact measure.	Data Quality Likert score 4
	Organizational characteristics are for example culture, size of the firm, the sector where we in. Is this relevant during implementation of a business intelligence software?	Yes absolutely.	Well if you are in the shop, a MKB store or a small business. Well you do not see sophisticated data gathering or stuff. Also my first management job was with Monsterboard.nl it's a more sales office and the enterprise it's America based. It was very hectic, but all also very excel based and very ad hoc. So you have an adhoc perceives and also a Plant based Enterprises and the more plant it is, the more technology investments you will see and the better for BI. You know, that is almost a prerequisite for BI. But there must be a match between the means and the ends because if in the end somebody only follows his stomach then no Excel can do something about it.	Organizational Characteristics Likert score 2
	User groups and user involvement. I think I already heard you say it a little bit at the introduction. And users, especially end users should be included in the development and they also have to be able to work with the system and adapt at technology and so on. Is this relevant according to you during implementation?	Personally, I strongly believe from yes. So personally, I would give it a five. The thing is that that there are enough cases. Well, look at SAP or there are other systems, and you hear users complain all the way, about systems which are still being used. And kind of successful; or yeah successful despite of all of kind of that, it is completely unworkable, you know.	Because sometimes, if there is enough management or if the systems have kind of a monopoly position. Yeah, there is no way to get around them.	User group(s)/-Involvement Likert score 3
	Competitive pressure is really the pressure from for example the stress and pressure outside of the company's ING ABN, do they	No, I would not say so.		Competitive pressure Likert score 1

	influence the PowerBI or the business intelligence implementation?			
	Regulatory support is given by the government or the DNB or ECB. So it is more insurance, policies and regulations from external parties. Is this relevant?	Yeah, that is in some cases.	So for our risk reporting that is important also, for example Sox financial reporting. So when we look at risk. There are basically there are three domains driving that. And that is risk, finance and KYC.	Regulatory support Likert score 2
	External support, it's described as support findable outside of the company; outsourcing, third party, support, maintenance and updates. Is this relevant according to your experience?	Yeah, it is very relevant. I am surprised actually; how relevant this is.	Regretfully the employees within the Rabobank do not often learn as fast or as quick then we would like. So we are a little bit more laid back, it seems on the learning side.	External support Likert score 3
	What are the most relevant ones according to you?	Organizational readiness, vision, user groups and having a champion		Organizational readiness, Vision, Business champion.
Closing part	Is it a complete list or did you missed any particular things?	The way it's implemented, so the implementation approach. I think with the PowerBI, we really took an agile approach. I missed in that sense.	Q: can it also be related to strategy? A: Yeah, that could be part of your strategy.	Strategy
	Did you had the feeling that you had the opportunity to mention all you wanted during the interview?	Absolutely		

Interviewee #11

Generic information	
Date, time and duration of interview	2.11.2021, 11:30h, 40:53min.
Name of interviewee	Interviewee #11
Name of the organization	Rabobank
Department and function	FLR. Product owner
Educational level	Higher
Years of work experience in function	1,5 years
Years of work experience in industry	23 years

	Question item	Short Response	Elaboration (why)	Extra remark
Introduction	What is your function title and what department are you in?	The department I am in is within the CITO domain, first line risk and IT department name is reporting and analytics and my current function is product owner for our team and that means that I am responsible for managing our backlog. So I decide the priorities of all the different requests we receive, that will be executed. But before I started in the role of product owner I, I have been working as a functional business consultant for a couple of years.		
	How long do you are already in this function?	For one and half year, I guess. Since April 2020.		
	Before that, you were business consultant. How long are you already working within the industry?	I have been working for Rabobank for almost 23 years. Started out at a local bank and after a while I switched to a central office and started working within the IT domain where I had had different roles. Also, a project management supports kind of similar like what you are doing right now. And after a while, we focus more on reporting and analytics as a department, and I started in a role of business consultant.		
	Recently the business intelligence software PowerBI was implemented within ITSystems. But I believe even broader, so at the Rabobank in in general. How were you involved with this implementation?	Well; first of all, we used Qliksense as BI-tool. Before that, we use click-few. But I was involved in a way that Rabobank became strategic partner with Microsoft and within those contract negotiations, they negotiated a companywide license for PowerBI. So basically, we as reporting department using Qliksense as BI-tool. We were confronted with the fact that PowerBI Power apps became the leading BI software within		Benefits and costs, management support, vision.

		Rabobank. And because of cost reductions, we were asked to decommission the Qliksense product, and to rebuild all of our products into PowerBI. So basically, we had no choice. it was based on a management decision to decommission Qliksense.		
	Do you consider the implementation within your department but also within ITSystems successful?	I do yes.		
	What factors do contribute to this success according to you?	The fact that we were able to rebuild all of the current products into new BI-tool PowerBI and also the fact that PowerBI is an easy-to-use tool for everybody. But also the support that has been given, for instance by the BAPS team within 'Workplace Services' made it possible to really get up to speed with using this tool. And on the downside, using a new tool also means you have to educate people in how the tool works. You have to overcome different problems that you run into, like differences between you know tool A and tool B. In tool A something works in a certain way, but in tool B it works differently. So you also have to do a lot of investigating and figure out how things work. But luckily, there is always Google you can ask for help. There are forums that you can consult where you can ask questions. There is also the BAPS-team what I mentioned. There are also, you know external consultants that can help getting up to speed with PowerBI. So we kind of use them all.		Organisational readiness, technological readiness, management support, external support, user groups- user involvement.

Main body	Management support, in general is described as an engaged and supportive management what recognizes the values and understands the benefits and strategic values. Is this relevant during the implementation?	I think so, yeah.	First of all, it is an investment not only in costs but also in time. The resources you have available, so the people, the developers need to spend their time on rebuilding the products we have within a different tool. So is your manager prepared to allocate the time and resources to rebuild it. So that it is very important.	Management Support Likert score 4
	Business champion is described as an individual actively supports the project and creates awareness, but also supports materials and political support and so on. Uhm, is having a business champion with or business champions, are they relevant during an implementation?	Yes, I think so.	I think what a business champion does on the one hand is support developers in how to use the tool, but he could be like a linking pin to customers. As a customer, how do you use, you know the new dashboards? How does it work? Where do you click? What are the options? So I think he has an important role and if I would skill that on a Likert scale one to five, I would say a tree.	Business champion Likert score 3
	Vison is the 'what do we want to achieve?' So it is needs to be clear and what are we going to do during the implementation. Is having a vision relevant during implementation?	yes, of course	I think you need to not only look at the tool itself, but also to the bigger picture. That what do you want to achieve in the end? And as a reporting department, we want to be able to provide our customers with good insights. And of course when implementing a tool; you do some kind of a tool selection and within that phase, you are going to decide which tool suits your strategy and vision best. In our case, however, a Rabobank decided for us. What was best for Rabobank? Because Microsoft and Rabobank became a strategic partner. So I presume that the negotiation team took all these aspects in mind in the strategy. Microsoft does not provide us only a BI-tool, but the whole platform. So they have a dashboard functionality, but also, they have the power apps in which you can automate your business processes in, you know, a very easy way. So I think it is definitely important for implementing a BI-tool to have a vision and strategy.	Vision Likert score 4

	Strategy is more the 'How do we want to achieve the vision?'. So the way to go, what would you score this on the scale one till five?	I think they are both very important.	See elaboration of vision.	Strategy Likert score 4
	Another one that I already heard you say a little, its benefits and costs. Or I heard you say cost in the introduction. Uhm benefits and costs are combined, since cost aim to be beneficial and you implement it probably to receive any or to create any benefits. In theory was described that benefits should be noticeable in example visualisations, work practice, managing task, but it can also be just in euros for example. Benefits and costs, is this a CriticalSuccessFactors for you?	Yeah, of course. I would be lying if I said it was not.	Because resources are not unlimited, so always as an organization you need to look at the costs and especially Rabobank.	Benefits and costs Likert score 5
	Organizational readiness refers to the preparedness of the organization, but the human side of it. So Knowledge, experienced and qualified personal, but also the preparedness of the data quality there. It is not data quality itself, because that is another CriticalSuccessFactors, but it is the preparedness of the organization. Is this organizational readiness, is this relevant during the implementation?	Yeah, I think so.	If you implement the tool, knowing that the rest of the organization is not ready to adopt a new tool. Then it might turn out to be disinvestment.	Organizational readiness Likert score 2,5
	The technological readiness. It is more that the communication between different systems are aligned. Is this relevant during implementation?	Yes	Because you could end up having a lot of challenges and therefore a lot of problems. Of course you want to continue your current service level. And if you have any doubts about you know like the technological readiness you should do some more research otherwise you might run into problems and your implementation could be postponed, take much more time than anticipated and be more costly than	Technological readiness Likert score 4

			you anticipated. So I think that is also quite an important factor.	
	Organizational characteristics it's the culture, size, sector and so on. Is this relevant during implementations of a business intelligence technology?	Yeah, it could be.	What we experienced in using BI-tools is that people tend to fall back, for instance on Excel rather than to go to the dashboards and rely on the figures over there. So culture readiness is very important. Because you want your customers to use your products, and what we experienced in the past is that people would go to certain dashboards, export data to Excel and make their own report out of it. And that is kind of double work. And that is where a business consultants role gets in: What do you need to help you do your job without any extra steps.	Organizational Characteristics Likert score 3
	Data quality is the quality of the source data, and it must be high, integer, reliable and adequate. How would you indicate this data quality on a scale from one to five?	For the quality of their reports it matters. In relation to your implementation does not matter.	I think regardless of the implementation, your data quality should always be high. With a BI-tool you just present data. So if the data in the source system is not adequate, it is bad. It does not matter what tool you use it stays bad.	Data Quality Likert score 1
	Another one is user groups. I've already heard you a little about user satisfaction in the introduction. But user-groups/user-involvement is how people are involved. So if it communicates with the demands of the users. But also, the users must be able to adapt the new technology. User involvement; is this relevant during implementation?	Yeah, absolutely	For the adoption of a new tool, it is absolutely important to inform your users, to help them, to guide them in how to use, you know like a new BI-tool to inform them about the possibilities but also about the impossibilities because you know. For people it is a change. And change is always scary. It is always: 'Oh, what is happening?', you get people out of their comfort zone, so they cannot, you know do something they were doing for years. But they need to use a new tool now. And how does it work? And can I get the information out of the tool that I want, that I need? So I think that is very important as a success factor.	User group(s)/-Involvement Likert score 5

	Competitive pressure is described as a degree of stress or pressure that we, as Rabobank experienced by other competitors. So ABN or ING for example. Was this relevant during the Microsoft PowerBI implementation?	No, not at all.	I think you always look at your competitors to see what kind of products they use for their day-to-day business. It could be a risk management tool, or it could be... It is not like ABN or ING are always competitors. They are also very supportive towards each other solving problems or how to deal with certain regulations or something like that. So, you might look at a competitor and get inspired. What tool do you use? And why? And what value does it deliver for you? And also have you thought about other BI tools? And just to learn from them. So, it can be inspiring.	Competitive pressure Likert score 1
	External support is support findable outside of the company like outsourcing, third party support, maintenance and updates but also trainings and assistance during the implementation. Is this relevant during implementation?	Yes.	What support can you get from, for instance, your suppliers? Most suppliers have strategic partners who give trainings. So who can we consult to train our people? That is of course very important otherwise you have to figure it out all by yourself and that's going to take a lot of time.	External support Likert score 4
	Regulatory support, it's support given by the government or other instances like AFM, DNB, ECB the European and Dutch banks. Does support like rules, policies and also requirements or regulations influence the successfulness of the implementation?	No, not at all. Not in my experience.		Regulatory support Likert score 1
	What are the most relevant CriticalSuccessFactors for an implementation success?	Costs and benefits and management support.	Because I think investments are all always costs, so what value for money do I get. And as an organization, you need to have a critical look, so you don't overpay for value that nobody is going to use for instance. And once you make a decision you need full management support to say we are going to do this and everybody you know, go to the right and just follow us.	Benefits and costs, management support.

Closing part	Is this a complete list or are there any things to add?	Not that I could think of. By scoring my number one's. I think it was kind of over complete.		
	Do you say you could skip some of them, because that is not relevant at all or...?	Let me put it this way. If you need transportation to take you from A to B, you can buy a Fiat for $1000. But you can also buy Rolls Royce for $25,000. If your goal is to come from A to B why overpay for functionality you don't use? Do some good research in what a tool needs to do and not what it can do.	Q: so you're actually saying besides this thirteen CriticalSuccessFactors, also pay attention to the correct fit between the system that you're going to implement and the demands? A: Of course	Features of the BI-technology
	Did you had the feeling you could mention all you wanted, and did you feel comfortable during the interview?	Absolutely		
	Did experienced comfort during the interview?	Yeah.		

Interviewee #12

Generic information	
Date, time and duration of interview	11.11.2021, 11:30h. 32:27 min.
Name of interviewee	Interviewee #12
Name of the organization	Rabobank
Department and function	ITSystems. Sr. IT lead
Educational level	Higher
Years of work experience in function	2 years
Years of work experience in industry	23 years

	Question item	Short Response	Elaboration (why)	Extra remark
Introduction	What is your function title and what department are you in?	Senior IT-lead within ITSystems and my Cluster focuses on data integration and output.		
	How long are you already work in this senior IT-lead function?	For two years.		
	Before that were you working for a longer time already in this industry?	I work now for two years for Rabobank, before that 11 years for PGM and PGMS pensions.		

		And before that Deloitte consulting, I also did that for around 10 years. Especially on IT.		
	Recently, PowerBI was implemented within Rabobank. Were you involved with this implementation?	Not personally but my teams work with the business, and they set up PowerBI.	We set up the data for everyone to use and regardless of whether it is Excel, Power BI or any other tooling. And PowerBI, of course is one of the major tools that our users use. I myself use PowerBI only for reports, HR compliance, for example, and other risky compliancy reports. So that is where my direct use is, yeah.	
	Do you consider the implementation within ITSystems successful?	Yeah, I think so.	It is static, at least to us. It shows you the information. And in that way, it is fine. It's the same every month because with PowerBI it's more template driven, so then you can keep the format the same and with that it's much more understandable, so I would say that's the benefit of using a PowerBI is mainly in that standardization for us.	Benefits and costs (Standardization which leads to more understandable reports)
	What contributes to the success or failure of an implementation?	Using standard templates, consistency throughout the month. It is easy to use. Could be faster. And the data you put in. if this is not completely usable then the results out of PowerBI will be I to.		Benefits and costs (Standardization which leads to more understandable reports), features of the BI-technology, data quality.
Main body	Management support is an engaged support of the management and the management recognizes and understands the benefits and the strategic values of the PowerBI, or the business intelligence implemented. Is management support	Yes.	Because it is always a change and, in the beginning, what you get is usually less than what you got. So you are used to get all these reports in Excel and in PowerPoint that they will be elaborate. And of course the first report on the same subjects in Power BI, it will always be less elaborate. So	Management Support Likert score 4

	relevant during implementation according to you?		management needs to support the direction and also explain where we are going and that eventually it will become better than what you had because otherwise people just have the loss of reporting richness and not the benefit and then they do not use it.	
	Business champion. This is an individual that actively supports the project, creates awareness as a positive impression and so on. It also can provide materials, political support and so on the business champion is more one of the team. Is this relevant during the implementation?	Not. We didn't have it and we actually we did not miss it but that could also be because we are a data department. So it kind of goes without saying that you use it. So for us it was not relevant. In general terms I would score it also a four. But that is more in general terms, but it is with us, we didn't need one.		Business champion Likert score 4
	Vision is: 'What we want to achieve?'. The vision needs to be clear, aligned and well established. It can be the bigger Rabobank vision, but it also can be just a vision for the project itself, for example only with implementation of business intelligence. Is having a vision relevant?	Yeah exactly.	We ourselves have the vision 'Creating value with data'. And it aligns very closely to what you would say in a BI in PowerBI implementation.	Vision Likert score 5
	Strategy it's more to how do we want to achieve our vision? Is this relevant?	I would say the vision is a five and the strategy is a tree	Because if the vision is clear people are more motivated to adopt. They find their own strategies to adopt. And of course, you should still need to support that, but it is less important than you know the first one. Having that clear vision.	Strategy Likert score 3
	Organizational characteristics referred as a culture size of sector. Is this also relevant, during an implementation according to you?	Yeah, could be relevant.		Organizational Characteristics Likert score 3
	Organizational readiness is the preparedness of the organization. So the availability of organizational resources, assets, knowledge, qualified and	Yeah.	Because you need to be ready to use it. In our in our case we were.	Organizational readiness Likert score 2,5

	experienced person employees but also having the sufficient amount of data. It is not about data quality, but it is more about sufficient amount of data available. Is this organizational preparedness relevant for successful implementation?			
	The technological readiness: it is more like the skills and the knowledge of the systems, so the applications or the source systems communicate with each other. So for example we had at payment solutions, we have Logis and PowerBI. Logis has to be prepared or technological ready to communicate with PowerBI for example.	That needs to be in place otherwise it does not work.	If it does not work, you can't use it.	Technological readiness Likert score 4
	Benefits and costs, I heard you say a few benefits already. Benefits should be noticeable in visualizations or work practice. Or while managing tasks. It can be of course in euros, but it also can be in indirect costs. Cost and benefits are combined as one since cost often aimed to be beneficial eventually. Benefits and costs, is this relevant?	Yes, otherwise you won't proceed, so that would be a four.	If there were no benefits, why go through...?	Benefits and costs Likert score 4
	Data quality. I heard you say something during the introduction part already about data quality, about the garbage in, garbage out principle. The data quality must be high, integer, reliable and adequate. Is having a good data quality, relevant for successful implementation?	Yes.	Yes.	Data Quality Likert score 4
	User groups or user involvement, it is intertwined with the human side of the organizational readiness. So not only the	No user groups no.	Q: Do you consider having user groups or user involvement with implementation relevant?	User group(s)/-Involvement Likert score 3

	people must be able to work with the technology, but they also help with the development of it. So as you said, for example, you get less, but then the working groups are there, and they make it more like how they want it to be. Did you experienced any user groups or were you in any user groups?		A: Yeah, in this case. We are going to implement the standard product. So no. In general terms, a user group could have a three. You know if there are more features that you can adapt, but with PowerBI, that is very little that you can adapt in the actual tooling.	
	Competitive pressure, this pressure is described as the pressure or degree of stress that companies experience by other competitors, for example the ING or the ABN. Is this relevant to during the implementation of PowerBI or a business intelligence software?	No, this is too standard, this PowerBI.	We want to use as much as we can out of the box, but that is not driven by competitive. That's more driven by our own interest to reduce the complexity of our organization	Competitive pressure Likert score 1
	External support is described as support findable outside of the company like outsourcing, third party support, maintenance but also updates. It also includes trainings and assistance during the implementation. Did you experience any of this and this? And is this relevant according to you?	No this was a relatively standard to use tool. So with this it is relevant to keep sure that it runs. So I would give it a three.		External support Likert score 3
	Regulatory support and this is an external support given by the government in rules, policies and regulation, but also for the AMF and the DNB for example. All those sorts of regulations that they can demands from the bank. Do you consider this relevant during implementation?	No, a one.	But normally we would get that support internally, not from the government itself. So normally I would say three.	Regulatory support Likert score 3
	According to you what were the most relevant CriticalSuccessFactors during an implementation?	Communication where to find what? Getting the right authorizations that kind of stuff also		User group/-involvement, technological

		was very important. And vision is the most important one.		readiness, vision.
Closing part	If we reflect on the list, do you consider this list of thirteen CriticalSuccessFactors as a complete list?	Yes, this is a lot all already.		
	Nothing is missed?	No.	I can imagine that you can have a shorter one if it's a smaller implementation but in general I would think that this covers for quite a few implementations.	
	Do you think this list of CriticalSuccessFactors is useful during implementation? For example in your organization or in your department?	Yeah, I think. If you set up an implementation and make sure that you are very conscious about what's important for my success, that is very important to do so you can shape your project in a way that it can succeeds with the highest possible probability.		
	Did you felt comfortable and had the opportunity to mention all you want it during the interview?	Yes		
	There was no pressure from me to convince you to answer in some sort of way?	No		
	Do you have anything to add a on the interview?	No		

Appendix 11 - Relevant CSFs for successful implementations (introduction phase)

During the introduction phase of the interviews, the interviewees were asked what, according to them, are relevant CSFs for an implementation success. In the table below, the interviewee, role and CSFs named was set-out and in the last column the existing theoretical found CSF is combined with the CSF the interviewee mentioned. Several interviewees referred towards features of the BI-technology like: 'Flexibility', 'performance', 'standardization' and 'useability'. These are coded with a new code 'Feature of the BI technology'. Within the table below the CSF named and the combined theoretical found CSF are linked and coloured showing the relation between them.

Relevant CSFs for successful implementations (introduction phase)	Role	Relevant CSFs for successful implementations (introduction phase)	(Existing theoretical) CSF
Interviewee #1	Staff	Flexibility of the BI-technology.	Feature of the BI Technology.
Interviewee #2	Management	Flexibility of the BI-technology.	Feature of the BI Technology.
Interviewee #3	Supporting department	Flexibility of the BI-technology, faster/performance, introduction basis and data quality.	Feature of the BI Technology, organisational readiness, data quality.
Interviewee #4	Staff	Connection between other systems, communication.	Technological readiness, user group/ -involvement.
Interviewee #5	Management	Standardization.	Feature of the BI Technology.
Interviewee #6	Staff	Having a goal, defined user wishes.	Vision, user group/ -involvement.
Interviewee #7	Higher/Top management	Data quality, quality of the reports.	Data quality, organizational readiness.
Interviewee #8	Higher/Top management	Start small and building up the Wow (way of working).	Vision, strategy.
Interviewee #9	Supporting department	Data quality, quality of the source, practical skilled people.	Data quality, organizational readiness.
Interviewee #10	Higher/Top management	Data literacy and data availability.	Organizational readiness.
Interviewee #11	Supporting department	Cost reductions, management decision, decommission QlickSense.	Benefits and costs, management support, vision.
Interviewee #12	Management	Standardization> understandable reporting, easy to use, performance, the data.	Benefits and costs, feature of the BI Technology, data quality.

Relevant CSFs for successful implementations (introduction phase)

Appendix 12 - CSFs scoring most relevant (main body)

After discussing the theoretically found CSFs one by one during the interview, the interviewee was asked about the most relevant CSFs on the list. Within the table below an overview of CSFs mentioned per interviewee.

Most relevant CSFs (main body)	Role	Most relevant CSFs (main body)	Code
Interviewee #1	Staff	Business champion, vision, data quality	Business champion, vision, data quality
Interviewee #2	Management	Data quality	Data quality
Interviewee #3	Supporting department	Data quality	Data quality
Interviewee #4	Staff	Data quality and management support	Data quality and management support
Interviewee #5	Management	User group/ -user involvement, technological readiness and data quality.	User group/ -user involvement, technological readiness and data quality.
Interviewee #6	Staff	Strategy, vision, organizational readiness, data quality	Strategy, vision, organizational readiness, data quality
Interviewee #7	Higher/Top management	Data quality, regulatory support, user groups, vision	Data quality, regulatory support, user groups, vision
Interviewee #8	Higher/Top management	Business owner, management support, clear benefits, user inputs, readiness and strategy, data quality	Business champion, management support, benefits and costs, user group/ -involvement, organizational readiness, technological readiness, strategy
Interviewee #9	Supporting department	Management Support, business champion, user group/-involvement, data quality, technological readiness	Management Support, business champion, user group/-involvement, data quality, technological readiness
Interviewee #10	Higher/Top management	Organizational readiness, vision, user groups and having a champion	Organizational readiness, vision, business champion
Interviewee #11	Supporting department	value for money, management support	Benefits and costs, management support.
Interviewee #12	Management	Communication, operational factors, vision	User group/-involvement, technological readiness, vision.

Most relevant CSFs discussed within the main body.

Appendix 13 - Relevant CSF additions (closing part)

During the closing part a question was asked to check if there were things to add to the list. Most often was mentioned that the theoretical list was complete and found an empirical foundation. A few suggestions came up which could be tracked down to one of the earlier found theoretically CSFs. Within the table below an overview per interviewee.

Relevant CSFs to add (closing part)	Role	Relevant CSFs to add (closing part)	Code
Interviewee #1	Staff	-	-
Interviewee #2	Management	-	-
Interviewee #3	Supporting department	-	-
Interviewee #4	Staff	-	-
Interviewee #5	Management	-	-
Interviewee #6	Staff	AVG regulations.	Regulatory support.
Interviewee #7	Higher/Top management	Create DoD (definition of done).	Vision.
Interviewee #8	Higher/Top management	The quality of the team.	Organizational readiness.
Interviewee #9	Supporting department	-	-
Interviewee #10	Higher/Top management	Implementation approach.	Strategy.
Interviewee #11	Supporting department	-	-
Interviewee #12	Management	-	-

Relevant CSFs additions.

Appendix 14 - Likert-scores and average score per CSFs

During the interview, the interviewees were asked to score the relevance of an CSFs based on a Likert-scale (were 1 is not at all relevant and 5 is very relevant). These results are displayed into one table below. Based on the average of all twelve interviews data quality also scores the highest with a 4,5. The other three highest scores are: user group/-involvement (4,3), vision (4,1) and benefits and costs (4,1) which is interesting since benefits and costs was mentioned only twice in the question about 'most relevant CSF'. Unfortunately, a few scores were not given in during the interviews. This is shown within the table with a: '-'.

CSF	Interviewee #1 Score on Likert scale	Interviewee #2 Score on Likert scale	Interviewee #3 Score on Likert scale	Interviewee #4 Score on Likert scale	Interviewee #5 Score on Likert scale	Interviewee #6 Score on Likert scale	Interviewee #7 Score on Likert scale	Interviewee #8 Score on Likert scale	Interviewee #9 Score on Likert scale	Interviewee #10 Score on Likert scale	Interviewee #11 Score on Likert scale	Interviewee #12 Score on Likert scale	Average score
Management support	3,0	1,0	4,0	5,0	5,0	3,0	4,0	4,0	4,0	3,0	4,0	4,0	3,7
Business champion	1,0	3,0	2,0	4,0	2,0	5,0	3,0	5,0	4,0	5,0	3,0	4,0	3,4
Vision	4,0	5,0	1,0	4,0	3,0	5,0	5,0	5,0	3,5	5,0	4,0	5,0	4,1
Strategy	2,0	2,0	1,0	2,0	3,0	5,0	5,0	5,0	3,5	4,0	4,0	3,0	3,3
Benefits and costs	5,0	5,0	-	3,0	5,0	4,0	-	5,0	2,5	2,0	5,0	4,0	4,1
Organizational readiness	3,0	4,0	2,0	5,0	5,0	5,0	2,0	4,0	3,0	5,0	2,5	2,5	3,6
Technological readiness	3,0	4,0	4,0	5,0	5,0	4,0	4,0	4,0	4,0	1,0	4,0	4,0	3,8
Organisation characteristics	2,0	5,0	3,3	2,0	3,0	3,0	-	4,0	2,5	2,0	3,0	3,0	3,0
Data quality	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	4,0	1,0	4,0	4,5
User group(s)/-Involvement	5,0	4,0	4,0	4,0	5,0	5,0	5,0	4,0	4,0	3,0	5,0	3,0	4,3
Competitive pressure	1,0	1,0	1,0	1,0	1,0	1,0	1,0	3,0	3,5	1,0	1,0	1,0	1,4
External support	4,0	3,0	3,0	4,0	5,0	1,0	3,0	3,0	3,5	3,0	4,0	3,0	3,3
Regulatory support	1,0	2,0	1,0	2,0	3,0	5,0	5,0	5,0	3,8	2,0	1,0	3,0	2,8

Likert-scores and average score per CSFs.

Appendix 15 - Frequency of 'most relevant CSFs' and 'average Likert-scores'

During the interviews thirteen theoretically found CSFs are presented and discussed to the interviewees. The interviewees were asked to elaborate on them and score them relevant or not and score them on a Likert-scale (were 1 is not at all relevant and 5 is very relevant). These scores are collected, and an average is calculated in appendix 14. After discussing and scoring all the thirteen CSFs in-depth, the interviewees were asked, what the most relevant ones were according to their experience and if there were any additions on the list. These finding are displayed into appendix 12 and appendix 13. Within this appendix, the frequently named and averages Likert-scores are combined into one table making is easier to reflect on those interview results.

CSF	Frequency of most relevant CSFs + additions	Average score on Likert scale
Data quality	6	4,5
User group(s)/-Involvement	4	4,3
Vision	5	4,1
Benefits and costs	2	4,1
Technological readiness	4	3,8
Management support	4	3,7
Organizational readiness	3	3,6
Business champion	4	3,4
External support	0	3,3
Strategy	3	3,3
Organisation characteristics	0	3,0
Regulatory support	1	2,8
Competitive pressure	0	1,4

Frequency of most relevant CSFs and average Likert-scores per CSFs.