

# **Designing a dashboard for the sales department of Company X**

**D.G.M. Franken (Dagmar)**

**23-09-2022**

Bachelor thesis

Industrial Engineering and Management

## Research Information

# Designing a dashboard for the sales department of Company X

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Author: D.G.M. Franken (Dagmar)  
d.g.m.franken@student.utwente.nl

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Supervisors: University of Twente:  
Gayane Sedrakyan, Assistant prof. dr.  
Martijn Koot, PhD Candidate

Thesis company:  
Anonymous

## Preface

Dear reader,

In front of you lies my bachelor thesis which I have written to conclude the Bachelor of Industrial Engineering and Management. Starting from March 2022, I have been working on this research for half a year. Working on such a big project by myself was a challenging experience which taught me a lot about myself, and about bringing my knowledge and academic skills to practice. Next to that, I enjoyed working on this project and learning more about the company for which I have been conducting this research. I want to thank everybody who has supported me during the process of conducting this research and writing this bachelor thesis.

First, I want to thank all the employees I got to know at Company X. It was a great pleasure to get to know everybody and learn about the work everyone is doing. The work environment they provided was very pleasant and open, which enabled me to ask all the questions I had. A special thanks goes to my two company supervisors, who supported me a lot at Company X. I am grateful for the way they thought along with me and were open to my questions and input.

Secondly, I want to thank my supervisors from the University of Twente, Gayane Sedrakyan and Martijn Koot. Gayane Sedrakyan has been my first supervisor and has guided my research process from the start. Thank you for helping me through moments where I was stuck with the research, for motivating me to keep going, and for all your feedback which provided me with lots of ideas every time. Martijn Koot was my second supervisor and joined the process halfway. Thank you for the interesting talks we had which provided me with new insights, for the feedback you provided and for taking the time to be my second supervisor.

Finally, I want to thank my family and my friends for their support and for being there for me. A special thanks goes to Marrit Flach, who has been my buddy during this period. Thank you for all the feedback and critical questions which helped me to deliver this thesis.

Dagmar Franken,

September 2022

# Management Summary

This research is performed at Company X.

## Problem definition

Company X has introduced a new business intelligence (BI) system called Power BI, but experiences that sales employees are not using the system. This research is executed to solve the two core problems causing Power BI to not be used to its full potential:

- Missing insight into which key performance indicators (KPIs) are relevant for the sales department.
- The complicated design of dashboards in Power BI.

The first core problem now results in a lack of relevant KPIs being displayed in dashboards in the new BI system. The second core problem results in employees not being able to use the dashboards properly, as the information displayed on the dashboards is difficult to find and understand. This influences the degree to which the employees accept the new BI system, which is measured by measuring the user acceptance. Solving these core problems is expected to result in a higher user acceptance, which will result in employees using the new BI system more. Solving these problems is expected to improve the usage of dashboards in Power BI for monitoring and improving sales performance. To solve the company's problems, the following research question was formulated: *'How can Company X design its business intelligence for the sales department to increase usage for monitoring and improving its performance?'* Two sub-goals have been specified which have been aimed for in this research:

1. *What KPIs need to be included for the sales department to monitor and improve sales performance?*
2. *How do the dashboards need to be designed to improve user acceptance?*

## KPI selection

Research for the first sub-goal has been executed following the research cycle defined by (Heerkens & van Winden, 2017). A systematic literature study resulted in a list of KPIs defined by literature for sales departments in general businesses. The sales teams within Company X defined KPIs that they found relevant for their work at Company X during interviews and validated the KPIs resulting from the literature review. Company X's sales business managers validated the list of KPIs resulting from the interviews with the sales teams. A final list of relevant KPIs was constructed containing KPIs which are relevant for the sales teams of Company X. This list (see Table 8) presented the answer for the first sub-goal.

## Measuring the current user acceptance

To answer the second sub-goal, the current user acceptance must be measured. The Unified Theory of Acceptance and Use of Technology (UTAUT) defined by (Venkatesh et al., 2003) is used to measure user acceptance. A survey was spread among the sales employees in which they rated statements about the current dashboards in Power BI. The results showed that employees valued Power BI as a useful tool in their job. They felt supported by the management and organisation to use the system in their work. However, the dashboards were unclear and not easy to use, and the employees felt that they did not have the required knowledge to use the system. Improving on these points is expected to result in a higher user acceptance.

### **Setting up designs for dashboards**

Dashboard designs had to be set up to answer the second sub-goal. First, a theoretical framework was set up based on theories from (Sedrakyan et al., 2019), (*Tips Voor Het Ontwerpen van Een Geweldig Power BI-Dashboard - Power BI*, n.d.), and (Evergreen, 2017) which guided the choices for the visualisation of KPIs. Next to that, general guidelines for designing dashboards were defined. Four dashboards were designed for the sales teams of Company X, each serving its purpose. During the design process, the answer to the first sub-goal was used as content for the dashboards. The dashboards were designed according to the theoretical framework and the additional guidelines.

### **Evaluation**

The dashboard designs were presented to the sales teams. Afterwards, the expected user acceptance was measured using the same questionnaire as when measuring the current user acceptance. The employees were asked to fill in on how they expect to rate these statements after the implementation of the presented dashboards. The results of the questionnaire showed an expected improvement in user acceptance.

### **Conclusion**

Based on the results from the sub-goals, Company X should design dashboards for the sales department as presented in this research. This is expected to increase user acceptance and is therefore expected to increase usage by the sales department. However, one must note that these results are based on expectations and can differ from the results once the designs are implemented. Next to that, one must consider time limitations, limited access to literature and limited data availability.

### **Recommendations**

From the conducted research, the following recommendations are given to Company X:

1. Implement feedback rounds on the dashboards designs and its content and redesign the proposed designs from this research if necessary, following the framework in Table 11.
2. Implement the designed dashboards and evaluate the user acceptance using a similar method as used in this research.
3. Construct and maintain documentation with consistent definitions of abbreviations, terms and KPIs used in the dashboard design.
4. Investigate possibilities for improving the support system; this includes providing suitable training and providing support when employees encounter problems.
5. Revise existing dashboards for the sales department using the theoretical framework set up in this research.
6. Investigate which insights can be further defined and included, which have so far not been included in the research results.

# Table of Contents

Research Information .....	2
Preface .....	3
Management Summary .....	4
Table of Figures .....	8
Table of tables .....	8
List of abbreviations.....	9
1 Introduction.....	10
1.1 Introduction to the company.....	10
1.2 Problem identification.....	10
1.2.1 Norm and reality .....	10
1.2.2 Action problem.....	11
1.2.3 Problem cluster .....	11
1.2.4 Core problem and research question .....	11
1.2.5 Research scope.....	12
1.3 Problem-solving approach.....	13
1.4 Sub-questions and research methods.....	14
1.4.1 Research cycle .....	14
1.4.2 Design Science Research Methodology .....	15
1.5 Definition of key constructs .....	17
2 Defining KPIs.....	18
2.1 KPIs for sales established in literature .....	18
2.1.1 Literature review .....	18
2.1.2 Results.....	18
2.2 Interview results .....	20
2.2.1 KPIs defined by sales teams .....	20
2.2.2 Validation results literature review .....	22
2.3 Validation by business managers.....	23
2.4 Conclusion .....	24
3 Current user acceptance of dashboards in Power BI .....	27
3.1 Measurement of current acceptance.....	27
3.2 Questionnaire results .....	27
3.3 Conclusion .....	32
4 Guidelines for designing dashboards.....	33
4.1 Theoretical framework for selecting a suitable visualisation .....	33

4.2 Guidelines for dashboard design .....	34
4.2.1 General guidelines .....	35
4.2.2 Guidelines Company X .....	36
4.3 Conclusion .....	36
5 Designing dashboards for Company X .....	37
5.1 Chart type selection per KPI .....	37
5.2 Designed dashboards .....	38
5.2.1 Financial insight in area .....	39
5.2.2 RFM model .....	40
5.2.3 Order analysis.....	40
5.2.4 Self-analysis.....	40
5.3 Conclusion .....	41
6 Evaluation.....	42
6.1 Measuring the impact .....	42
6.2 Questionnaire results .....	42
6.2.1 Expected performance expectancy .....	43
6.2.2 Expected effort expectancy .....	44
6.2.3 Expected social influence.....	44
6.2.4 Expected facilitating conditions .....	45
6.2.5 Expected self-efficacy .....	46
6.2.6 Additional comments .....	46
6.3 Conclusion .....	46
7 Conclusion, recommendations, and discussion.....	48
7.1 Conclusion .....	48
7.2 Recommendations .....	49
7.3 Limitations .....	50
7.4 Scientific relevance and further research.....	51
8 Bibliography.....	52
9 Appendices .....	54

## Table of Figures

Figure 1: Problem cluster .....	11
Figure 2: Organisational structure sales department .....	13
Figure 3: Research cycle (Heerkens & van Winden, 2017).....	14
Figure 4: Design Science Research Methodology (DSRM) (Peppers et al., 2007) .....	14
Figure 5: Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) .....	15
Figure 6: Current situation user acceptance .....	28
Figure 7: Current performance expectancy .....	28
Figure 8: Current effort expectancy.....	29
Figure 9: Current social influence .....	29
Figure 10: Current facilitating conditions.....	30
Figure 11: Current self-efficacy .....	31
Figure 12: Expected user acceptance .....	42
Figure 13: Comparison user acceptance .....	43
Figure 14: Expected performance expectancy .....	43
Figure 15: Comparison performance expectancy.....	43
Figure 16: Expected effort expectancy .....	44
Figure 17: Comparison effort expectancy .....	44
Figure 18: Expected social influence.....	44
Figure 19: Comparison social influence .....	45
Figure 20: Expected facilitating conditions .....	45
Figure 21: Comparison facilitating conditions.....	45
Figure 22: Expected self-efficacy .....	46
Figure 23: Comparison self-efficacy.....	46

## Table of tables

Table 1: KPIs defined in literature .....	18
Table 2: List of KPIs resulting from SLR .....	19
Table 3: KPI rating system .....	20
Table 4: KPIs defined by sales teams .....	21
Table 5: Insights defined by sales teams.....	22
Table 6: Validation results literature review .....	22
Table 7: Comments from business managers from validation.....	24
Table 8: KPIs selected for a sales department.....	24
Table 9: Rating system questionnaire.....	27
Table 10: Additional comments from questionnaire current user acceptance .....	31
Table 11: Theoretical framework for selecting a suitable chart type .....	33
Table 12: Chosen chart type for selected KPIs .....	37



## List of abbreviations

B&I – Building and installation

BI – Business intelligence

C&I – Civil and infrastructure

DSRM – Design science research methodology

KPI – Key performance indicator

PE – Polyethene

PP - Polypropylene

PVC – Polyvinyl chloride

RFM – Recency, frequency, monetary

UTAUT – Unified Theory of Acceptance and Use of Technology

# 1 Introduction

This chapter introduces the company for which this research is conducted, and the problem statement is given. Next to that, research questions and methods are defined.

Section 1.1 introduces the company, and in Section 1.2, the problem is identified using a problem cluster. Next to that, the main research question for this research is formulated, and the research scope is defined. In Section 1.3, the approaches used to solve the defined problem are described. After that, the sub-questions used to execute this research are formulated in Section 1.4. Lastly, the key constructs used for measurements in this research are described in Section 1.5.

## 1.1 Introduction to the company

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## 1.2 Problem identification

In the past, Company X used a business intelligence (BI) system called SAP BI, which should enable one to gain insight into the company's data via dashboards (Sarıkaya et al., 2019). Multiple dashboards have been set up in SAP BI for the employees to use. However, throughout the years, calculations of measurements have changed which results in different values for measurements with the same definition in different dashboards. Next to that, SAP BI is a slow system, and cannot handle a lot of data. Because of these issues and the need for a modern system, Company X switched to another BI system called 'Power BI'. Power BI is a BI system which can be used for similar purposes as SAP BI but is much faster and offers more opportunities as it can handle much more data. The system should give multiple departments insight into their data and support their ability to monitor and improve performance through data-driven decision-making. One of these departments is the sales department, which will be focused on in this research.

### 1.2.1 Norm and reality

The problem addressed by the company reflects the difference between the norm and reality. The norm represents the desired situation, whereas the reality represents the situation as it is (Heerkens & van Winden, 2017). The company set up several dashboards for the sales department to visualise some data which became available in July 2021. The norm is that sales employees make use of these dashboards for monitoring and improving sales performance, whereas reality shows that many employees do not use Power BI and go back to using SAP BI often. This results in a situation where the sales employees do not use Power BI to its full potential. During informal talks with different sales employees with different functions, three main reasons were mentioned for this:

- The currently available dashboards do not provide insights using suitable key performance indicators (KPIs) that can support the sales employees in their work.
- The dashboards are too complex because of an overload of available filters.
- There is a lack of (suitable) training to use the dashboards in their work.

Because of these reasons, sales employees avoid Power BI and go back to SAP BI when they need quick insight into the data.

### 1.2.2 Action problem

“An action problem is a discrepancy between the norm and the reality, as perceived by the problem owner.” (Heerkens & van Winden, 2017) This means that the action problem must reflect the problem which needs to be solved. The action problem is therefore formulated as follows:

*‘The dashboards in Power BI are not used to their full potential for monitoring and improving sales performance.’*

### 1.2.3 Problem cluster

Starting with the action problem, a problem cluster is set up, which is a tool that helps to find all relations between problems (Heerkens & van Winden, 2017). The problem cluster visualises the problems that are experienced and their connections. The connections in the problem cluster are based on causality, where the arrow points to the problem that is caused by the problem on the other end of the arrow. Problems experienced by the company concerning the action problem were identified during a meeting with a sales business manager and the BI developer, from which the problem cluster Figure 1 was created.

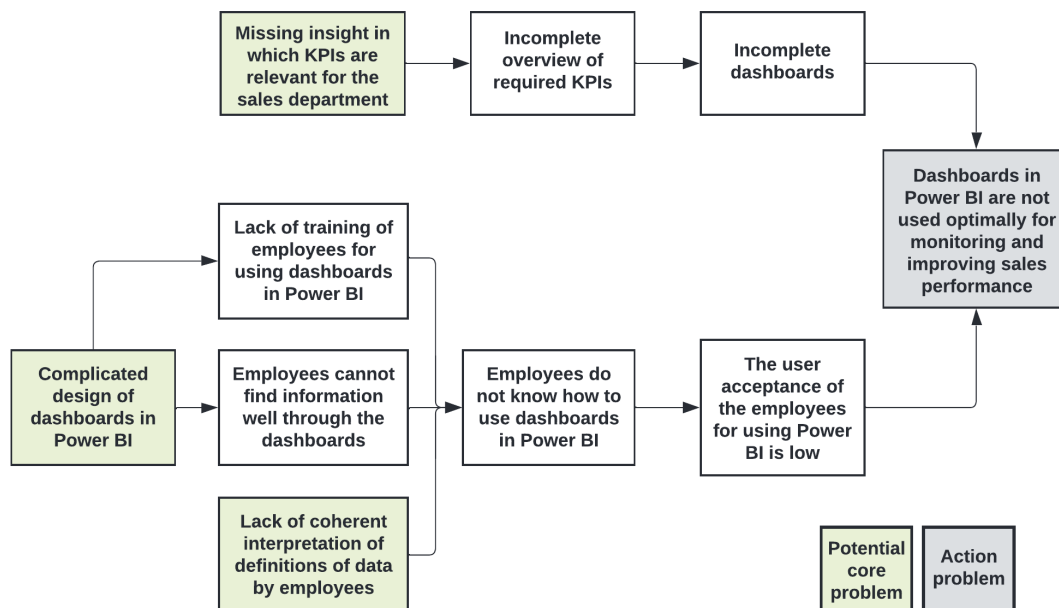


Figure 1: Problem cluster

### 1.2.4 Core problem and research question

As shown in the problem cluster (see Figure 1), three potential core problems are identified:

1. Missing insight in which key performance indicators (KPIs) are relevant for the sales department.
2. Complicated design of dashboards in Power BI.
3. Lack of coherent interpretation of definitions of data by employees.

The number of chosen core problems that are solved during the research should be limited, as it is better to solve one problem sufficiently than to not completely solve multiple problems. Therefore, one must choose the most important problem to be solved. It is expected that solving the first and second core problems will have the biggest impact. These two problems are experienced by all employees, so solving these problems will improve the current situation for all employees. The third problem is experienced by all employees but is expected to have less impact than the first two core problems. Therefore, the first and second core problems are selected for this research, whereas the third core problem is excluded.

The goal of this research is to provide Company X with KPIs that must be included in dashboards in Power BI. Next to that, this research must provide Company X with dashboard designs which will increase the user acceptance of the employees. User acceptance is relevant for the success of information systems, where a high user acceptance will result in a more successful information system (Davis, 1993). Providing suitable dashboard designs is expected to improve the user acceptance such that the employees have a positive attitude towards the system, which is currently not the case.

Because of all that is mentioned above, the main research question is formulated as follows:

*'How can Company X design its business intelligence for the sales department to increase usage for monitoring and improving its performance?'*

In particular, the following sub-goals will be aimed for by this research:

- 1. What KPIs need to be included for the sales department to monitor and improve sales performance?*
- 2. How do the dashboards need to be designed to improve user acceptance?*

In the research question, 'monitoring' means getting insight into data to gain an overview of the current situation within sales. The company expects that improvements can mainly be achieved by data-driven decision-making, for which monitoring of the data is important.

### 1.2.5 Research scope

As mentioned in Section 1.2, this research will focus on the sales department of the company. However, focussing on the whole sales department would result in a project that is too big for this bachelor assignment. Therefore, the decision is made to focus on a specific part of the sales department. First, an overview of the structure of the sales department is given in Section 1.2.5.1. After that, the selected section is described in Section 1.2.5.2.

#### 1.2.5.1 Structure sales department

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#### 1.2.5.2 Selected section of the sales department

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### **1.3 Problem-solving approach**

The core problems that are chosen for this bachelor assignment address a lack of knowledge at Company X about relevant KPIs for its sales teams. Solving this knowledge problem results in a list of KPIs that are relevant to these teams. Based on this list, a design is made which should be followed when setting up the dashboards in Power BI.

The first sub-goal of the main research question concerns a knowledge question, which will be solved using the research cycle for knowledge questions which is presented in Figure 3. This research cycle formulated by (Heerkens & van Winden, 2017) presents a systematic approach for solving knowledge questions and can be used for all kinds of knowledge questions. The first two phases of the research cycle have been described in Section 1.2. The third and fourth phase can be found in Section 1.4.1, whereas the latter four phases are described in Chapter 2.

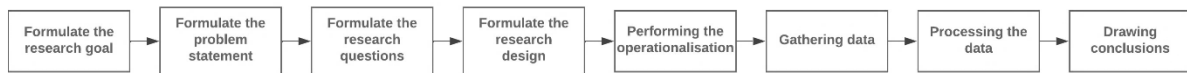


Figure 3: Research cycle (Heerkens & van Winden, 2017)

The second sub-goal of the main research question requires a design research process. The research will be performed according to the Design Science Research Methodology (DSRM). This methodology is suitable for design science research in information systems, which fits well to this research about designing dashboards in an information system. This method consists of six steps, which are presented in Figure 4.

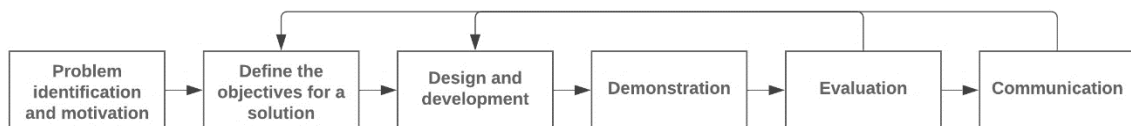


Figure 4: Design Science Research Methodology (DSRM) (Peppers et al., 2007)

Sub-questions have been defined for the phases of the DSRM. These sub-questions and the research methods followed to answer them can be found in Section 1.4.2.

## 1.4 Sub-questions and research methods

For each sub-goal mentioned in Section 1.2.4, several sub-questions have been formulated. In Section 1.4.1, the sub-questions and research methods are described for answering the first sub-goal of the main research question. In Section 1.4.2, this is done for the second sub-goal of the main research question.

### 1.4.1 Research cycle

The first and second phases of the research cycle have been described in Section 1.2.4. The third and fourth phases are described in this section. Two sub-questions are formulated to answer the first sub-goal of the main research question, and the research methods to answer these sub-questions are defined.

First, research must be done on which KPIs are relevant to monitor and improve sales performance in general. To obtain this knowledge, the following sub-question has been formulated:

*‘What KPIs are established in literature for a sales department in general for businesses?’*

A qualitative literature study is conducted to construct a list of KPIs that are valued as relevant for a sales department in general for businesses. However, this list does not yet provide a list of KPIs which are relevant within the company context of Company X and its sales teams. For this, the following research question is formulated:

*‘What KPIs are relevant within the sales teams in the company context according to its sales employees?’*

The employees of the sales department of Company X know their business very well and have a lot of knowledge about the market that they are operating in. Therefore, this sub-question will be answered by conducting interviews with the sales employees as they will know best what is relevant in their work and what is not relevant. The selected sample of participants contains all employees within the selected part of the sales department for this research (see Section 1.2.5.2) and is therefore representative for the department within Company X.

During the interviews, the employees are asked to define the KPIs that they find relevant to their work. The interviews will be semi-structured, as this will give room for follow-up questions which will increase the understanding of what is said during the interview. At the end of the interviews, the results from the literature study will be validated by the sales employees to assure the relevance for the sales teams within Company X.

The results of the last four phases of the research cycle can be found in Chapter 2.

### 1.4.2 Design Science Research Methodology

The DSRM consists of six phases which will be followed to answer the second sub-goal of the research question. The sub-questions and research methods are described per phase.

#### 1.4.2.1 Phase 1: problem identification and motivation

In Section 1.2, the problem is identified and the motivation for solving the core problems is given. The goal of Company X is to increase the user acceptance of the dashboards in Power BI for the sales teams, as defined in the second sub-goal. Insight into the current situation must be gained to know the impact that the research can have. Therefore, the following sub-question must be answered:

*‘What is the current user acceptance of dashboards in Power BI for the sales teams at Company X?’*

This sub-question requires evaluative research to assess the acceptance and abilities to use current dashboards for monitoring and improving sales of the sales teams’ employees. For this assessment, a questionnaire is conducted among the sales teams’ employees. This questionnaire is based on the theory of the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003), which can be seen in Figure 5. The results of the questionnaire are analysed and can be found in Chapter 3.

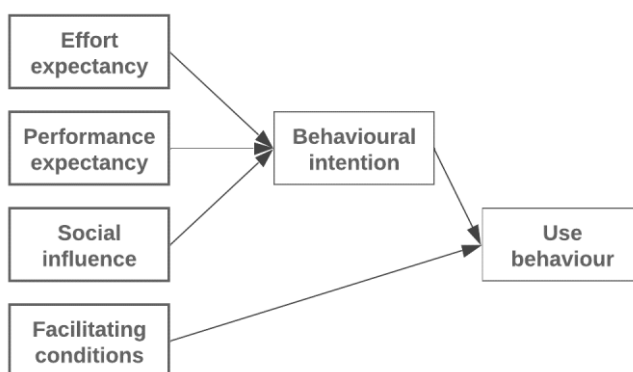


Figure 5: Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003)

This theory formulates a unified model with constructs that (in)directly influence the user acceptance of technology and the user’s behaviour (Venkatesh et al., 2003) and is selected for this research as it includes most constructs that are relevant to this research. The key constructs from this theory that are relevant for this research are further defined in Section 1.5.

#### 1.4.2.2 Phase 2: define the objectives for a solution

To design a solution for the problem, the objectives for the solution must be defined. The objective of this research is to increase the ability and acceptance of sales teams' employees to make data-driven decisions and monitor sales performance by identifying and recommending optimal instruments such as relevant KPIs, and the design of a dashboard allowing to track those KPIs. As the objective for the solution is known, no sub-question is formulated for this phase.

#### 1.4.2.3 Phase 3: design and development

Before designing dashboards, an overview must be made of the available visualisations in Power BI and the suitable objectives they can be used for. Therefore, the following research question must be answered:

*'Which visualisations in Power BI are suitable for which visualisation goal?'*

To answer this research question, a theoretical framework is set up. This framework is meant to guide the choices that must be made to design the dashboards for Company X. Next to that, the framework is available for Company X to (re-)design dashboards. The framework can be found in Chapter 4.

Next, designs must be made for the new dashboards that are required. Now, it is unknown what the dashboard designs for Company X should look like. The content of the dashboards is set by answering the sub-questions from Section 1.4.1. For the designs of the dashboards, the following sub-question is formulated:

*'What should the design of the dashboards for the sales teams of Company X look like?'*

The dashboard design will be set up according to the results from the sub-question from Section 1.4.1 and the first sub-question of this section and will be presented in Chapter 5.

#### 1.4.2.4 Phase 4: demonstration

Once the dashboards are designed, the designs must be demonstrated to the end users. During this presentation, prototypes of the dashboards are shown to the employees and the functionalities that must be included in the dashboards are explained. During the demonstration, employees get time to ask questions about the designs.

#### 1.4.2.5 Phase 5: evaluation

Once the design is demonstrated, it is important to evaluate whether the design meets the expectations and whether it answers the main research question. After the demonstration, it is possible to evaluate whether the design meets the objectives and expectations. The following sub-question is formulated for this phase:

*'To what extent is the design expected to increase the user acceptance of dashboards in Power BI for the sales teams at Company X?'*

This evaluative study should give an insight into the expected user acceptance. This sub-question will be answered by conducting the same questionnaire as in phase 1 (see Section 1.4.2.1) and comparing these results with the results from phase 1. These results and the comparison can be found in Chapter 6. The user acceptance of these designs must be measured again after the implementation of the designs. This will give a more accurate result of the improvement of user acceptance. Because of time limitations, this measurement cannot be performed within this research and will therefore be included in the recommendations to Company X.



#### 1.4.2.6 Phase 6: communication

For this phase, no sub-question is formulated. This is because this phase is about the communication of the research. As a thesis report is written and a presentation will be given, the communication strategy for the research is already set.

### 1.5 Definition of key constructs

As mentioned in Section 1.4.2.1, constructs from the UTAUT method are used to measure the acceptance and ability of employees to use the dashboards in Power BI for monitoring and improving sales performance. Another construct that is not included in the UTAUT but has also been found relevant for this research is also included.

*Effort expectancy* is a construct that is defined as “the degree of ease associated with the use of the system” (Venkatesh et al., 2003). This construct has a direct influence on the user’s acceptance of technology according to the UTUAT. This construct is relevant for this research as the intention of employees to use the system is directly influenced by the effort, they must put in. Based on talks with employees, it became clear that they must put in a lot of effort to be able to use the system properly, which holds them back from using it.

Another construct that directly influences the user’s acceptance and behaviour, is the *performance expectancy*. This construct measures the degree to which an employee perceives the usage of the system as useful within their job (Venkatesh et al., 2003). Once employees feel that their performance will improve by using this system, they will be more likely to use it.

A third construct that has a direct influence on behavioural intention is the *social influence*, which is defined as the influence of the opinion of other individuals on whether an individual should use the system (Venkatesh et al., 2003). The relevance of this construct erodes over time in cases where the use of a system is mandated. Although the system has been in use for some time, this construct is still relevant. Once the results of this research are implemented, a new ‘system’ will be used. For this new structure, *social influence* is relevant.

The fourth construct is the *facilitating conditions*, which are defined as “the degree to which an individual believes that an organisational and technical infrastructure exists to support use of the system” (Venkatesh et al., 2003). This construct has a direct impact on the final use behaviour. The user behaviour will be lower compared to the behavioural intention when *facilitating conditions* are low, as an individual does not believe that there is enough support to use the system.

The last construct, which is *self-efficacy*, has no direct impact on the final acceptance and behaviour according to (Venkatesh et al., 2003), and is therefore not included in Figure 5. However, as employees will have to work with the system themselves on a day-to-day basis, this construct is relevant for this research. *Self-efficacy* is defined as the degree to which an individual can use the system without any help. On a day-to-day basis, this is very important. It would be very inefficient if employees would need to ask around all day for help and explanation.

## 2 Defining KPIs

In this chapter, KPIs are defined which must be displayed in dashboards for the sales teams to monitor and improve sales performance in general. Using these KPIs, the sales teams must be able to see data about their customers and their performance. These KPIs give insight into the general performance and not into a specific strategic goal of the company. The results of this chapter must answer the first sub-goal of the main research question: *‘What KPIs need to be included for the sales department to monitor and improve sales performance?’*

Following the last four phases of the research cycle (see Figure 3), the two sub-questions defined in Section 1.4.1 will be answered using the research designs defined in that section. In Section 2.1 and Section 2.2, the data is gathered. This is done by a literature study as described in Section 2.1, where the following sub-question will be answered: *‘What KPIs are established in literature for a sales department in general for businesses?’* In Section 2.2, data is gathered through interviews to answer the following sub-question: *‘What KPIs are relevant within the sales teams in the company context according to its sales employees?’* The results from Section 2.1 and Section 2.2 have been discussed with the business managers. The additional comments from the business managers are described in Section 2.3. In Section 2.4, the conclusion can be found which presents the list of defined KPIs.

### 2.1 KPIs for sales established in literature

In literature, KPIs are established for a sales department in general to monitor its performance. KPIs measure the performance of an organisation on a certain objective and can be used to detect points for improvement (Slack et al., 2016). A literature study is performed to set up a list of KPIs from literature.

#### 2.1.1 Literature review

The literature selected for review was gathered by conducting a systematic literature review (SLR), for which the process can be found in Appendix A. First, search terms were defined, and inclusion and exclusion criteria were set. After using these search terms and criteria in the search engines ‘Scopus’ and ‘Web of Science’, 110 articles were found. After reading the abstracts of these articles and checking availability, 2 articles were left. As the SLR resulted in only two sources, the ‘snowballing’ technique was used to gather more relevant knowledge. This resulted in four sources, which are described in Table A.4.

#### 2.1.2 Results

In Table 1, an overview is given of the KPIs from literature. As the performance of a sales department is closely related to financial numbers and the customer, KPIs concerning these two matters have been included in the list.

Table 1: KPIs defined in literature

KPI	(Kostin et al., 2021)	(Cristea & Cristea, 2021)	(Ishaq Bhatti & Awan, 2014)	(Jusoh et al., 2008)
Annual organic sales growth	x			
Sales volume	x			
Incoming orders	x			
Contribution margin	x			
Cash flow	x		x	x
Economic Value Added (EVA)	x			x
Return on equity (ROE)	x		x	

Level of value added	x			
Sales to sales and administrative expenses ratio (SAE)	x			
Delivery reliability	x			
Customer Lifetime Value (CLV)	x			
Customer turnover		x		
Budgeted vs. actual sales		x		
Qualified leads value		x		
On-time delivery		x	x	x
Sales			x	
Sales by product			x	
Sales growth (rate)			x	x
Customer loyalty index			x	
Order frequency			x	
Number of complaints	x		x	x
Customers lost			x	
New customers			x	
Sales revenue				x
Return on investment (ROI)				x
Number of overdue deliveries				x
Customer satisfaction	x			x

As can be seen in Table 1, the four articles (see Table A.4) all included different KPIs with different focus points. The first article mainly focusses on the total value of sales and the different financial analyses, whereas the third article is more focussed on orders and on the customers. This shows that these four articles cover different aspects of sales well. Due to limitations, it could be that this list is not exhaustive as not all literature on KPIs for sales was accessible for this research. However, as all articles cover different parts of sales, for this research this list of KPIs is sufficient.

Based on the company context and the specific role of the sales teams, the final list of relevant KPIs was constructed. Note that some KPIs from Table 1 are overlapping and have been combined into one KPI. The KPIs and their definitions can be found in Table 2.

Table 2: List of KPIs resulting from SLR

KPI	Source	Description
Budgeted vs. actual sales	(Cristea & Cristea, 2021)	The actual sales as a percentage of the budgeted sales.
Contribution margin (CM)	(Kostin et al., 2021)	The money that is left over to cover other costs, and which is otherwise profit. This is calculated as the difference between the revenue and the variable costs of a product.
Customer satisfaction	(Kostin et al., 2021), (Jusoh et al., 2008)	The percentage of satisfied customers compared to the total number of customers.
Customer turnover	(Cristea & Cristea, 2021)	The ratio between the number of lost customers and the total number of customers over a month.

Customer Lifetime Value (CLV)	(Kostin et al., 2021)	“The total cash flow generated by the customer during the entire business relationship.” (Kostin et al., 2021)
Incoming orders	(Kostin et al., 2021)	The number of incoming orders during a year.
Number of complaints	(Ishaq Bhatti & Awan, 2014), (Jusoh et al., 2008)	The number of complaints in total.
Number of overdue deliveries	(Jusoh et al., 2008)	The number of deliveries that have not been delivered on or before the requested delivery date.
On-time delivery	(Kostin et al., 2021), (Cristea & Cristea, 2021), (Ishaq Bhatti & Awan, 2014), (Jusoh et al., 2008)	The percentage of orders that are delivered on the requested delivery date.
Order frequency	(Ishaq Bhatti & Awan, 2014)	The average number of orders in a certain time frame.
Qualified leads value	(Cristea & Cristea, 2021)	Total value of all qualified leads which are in the pipeline.
Sales by product	(Ishaq Bhatti & Awan, 2014)	The total value of sales specified per product.
Sales volume	(Kostin et al., 2021)	The total number of products sold during a year.

## 2.2 Interview results

In this section, the results from the interviews with the sales teams and business managers are discussed. First, interviews were held with the sales teams to define KPIs relevant to their work within Company X. The KPIs defined by the employees from the sales teams are described in Section 2.2.1. At the end of the interviews, the results from the literature review were validated by the sales teams. This validation is described in Section 2.2.2. Section 2.3 describes the KPIs that should be included in dashboards for the sales teams. These KPIs were then validated by the business managers during interviews with the business managers. This process of validation is described in Section 2.4.

### 2.2.1 KPIs defined by sales teams

An interview was held with every sales team, which resulted in five interviews with a total of 17 interviewees. During the first part of the interview, the sales teams were asked what KPIs they would need to monitor and improve the performance of sales. The sales teams had an open brainstorm where they were given no limitations so that no KPIs would be left out when exploring their needs. The list of KPIs resulting from these interviews can be found in Table 4. In Table 3, the rating system is shown which is used to rate the relevance of a KPI for which zero is the minimum score and five the maximum.

Table 3: KPI rating system

Rating	---	--	-	+	++	+++
KPI mentioned in # interviews	0	1	2	3	4	5

Table 4: KPIs defined by sales teams

ID	KPI	Definition	KPI mentioned in # interviews
K1	Budgeted sales	The established target which is set for the sales within an area.	+++
K2	Contribution margin	The total left over after deducting the transportation costs and the direct variable expenses from the revenue.	+++
K3	Gross sales	Total of all invoiced sales.	++
K4	Return per customer	The actual money won per customer after deducting all costs.	-
K5	Revenue	The sales after deducting the rebates and cash discounts from the invoiced sales.	+
K6	Sales per product group	The total sales for a specific product group.	++
K7	Sales volume in KG	The volume of sales in kg.	+
K8	Average order value	Average value of orders.	+
K9	Costs per customer	The costs made per customer per order.	-
K10	Costs per service per customer	The costs that Company X makes per service (e.g. making technical drawings, delivery) for a customer.	+
K11	Delayed orders	The orders that are delivered later than the requested date.	-
K12	Number of orders	Total number of orders.	-
K13	Number of orders per type of order	Shows the number of orders per type of order that has been done (e.g. online order, order in-store).	-
K14	On-time-in-full (OTIF) percentage	The number of orders delivered on the requested date as a part of the total number of orders, shown as a percentage.	+
K15	Average number of customer visits per day	The average number of customer visits per day in the current year.	+
K16	Average number of customer visits per week	The average number of customer visits per week in the current year.	+
K17	Growth of contribution margin	Contribution margin current year as a part of contribution margin last year in %.	+
K18	Percentual growth of actively buying customers (sales > €1000 per customer)	The growth of the actively buying customers (customers who bought something in the selected calendar year) for which the total sales are above €1000, shown as a percentage.	+
K19	Percentual growth of revenue	The growth of the revenue, shown as a percentage.	+

Note that a KPI which is not mentioned in little of the interviews is not necessarily irrelevant. It could, for example, be that one group of interviewees thought of a certain KPI where the other group did not while the KPI could be relevant for the work done by the sales teams. To make sure that KPIs are not left out because of being mentioned in little of the interviews, the results from the interviews have been validated by the business managers (see Section 2.3).

Next to defined KPIs, the sales teams described additional insights that would be useful in their work at Company X. For these insights, no KPIs were defined due to limitations (see Section 7.3). In Table 5, the insights described by the sales teams are mentioned.

Table 5: Insights defined by sales teams

ID	Insight	Insight mentioned in # interviews
I1	Some customers are sub-debtors of a main debtor, whereas other customers are a debtor themselves. For the general sales numbers like the contribution margin and the gross sales, it would be useful to see these per customer and per main debtor whenever there is a main debtor.	+
I2	The sales teams' employees all must make a monthly report in Excel. For them, it would be more efficient to easily make this report using Power BI saving them much time.	+
I3	Insight into the activity of customers is useful so that sales teams' employees can act when a customer is ordering less than usual.	-
I4	A survey is held among customers to monitor their satisfaction. It would be helpful to have more insight into these outcomes per customer so that sales teams' employees can act on this and take this with them when talking to customers.	+
I5	Customers from Company X request quotations for projects. Multiple customers can request a quotation for the same project, which might cause multiple area managers from Company X trying to undercut each other's offers. An overview of projects and quotation requests would support the area managers to work together efficiently and could improve the connection between B&I and C&I business, as projects can be intertwined.	-
I6	Projects result in a contract for a number of products that Company X must deliver for a decided amount of euros. Area managers want an overview of the contracts and how much of that contract has been fulfilled, and what still needs to be delivered.	--
I7	The sales teams' employees look at the 10-20 biggest risers and 10-20 biggest descenders when it comes to sales. This insight is very useful to them.	+
I8	Forecasting would be useful to have a better insight into what can be expected, and what the sales teams' employees need to act upon.	-

### 2.2.2 Validation results literature review

At the end of the interviews with the sales teams, the results from the literature review were validated. The KPIs were rated using the rating system from Table 3.

When a KPI was included during the first part of the interview, then the KPI is rated as 'relevant' in that interview. When a KPI was not included yet, the KPI was discussed at the end of the interview, such that all KPIs from the literature study were discussed with the sales teams. The KPIs from the literature study and their ratings are shown in Table 6, as well as any additional comments.

Table 6: Validation results literature review

ID	KPI	Relevant?	Comment
L1	Budgeted vs. actual sales	+++	No comment
L2	Contribution margin (CM)	+++	No comment

L3	Customer satisfaction	- - -	The ratio for customer satisfaction is not relevant for the work of the sales teams. However, customer satisfaction itself is a relevant construct to have insight in.
L4	Customer turnover	- - -	In the system, Company X does not 'lose' customers. However, an insight in the activity of customers and the (potential) loss of customers is useful for the work done by the sales teams.
L5	Customer Lifetime Value (CLV)	- - -	The total is not relevant. It is relevant to see the development of the added value of a customer over time, but this is most relevant when showing the CM over time.
L6	Incoming orders	+ + +	An addition is to see the division of these totals over the different types of orders and to see these numbers per customer.
L7	Number of complaints	+ + +	Additionally, it is useful to see what the actual complaints are. Next to that, it is useful to see the complaints per customer.
L8	Number of overdue deliveries	+ + +	Additionally, it is useful to see which deliveries are overdue and from which customer these deliveries are.
L9	On-time delivery	+ + +	Additionally, it is useful to see this percentage per customer.
L10	Order frequency	+ + +	Additionally, it is useful to see this number per customer.
L11	Qualified leads value	- - -	An overview of potentially upcoming projects is useful and the potential customers for this project.
L12	Sales by product	+ + +	No comment
L13	Sales volume	- -	The sales volume in euros is not always representative as this is dependent on the prices and therefore can give a wrong impression. However, the employees would not want the sales volume to be presented in numbers, but rather in kilograms (kg).

Table 6 shows that the results from the interviews were almost equal for the validation of the literature review results. The KPIs that were rated with 'not relevant' resulted in comments about an insight concerning that topic that is relevant for the sales teams. In conclusion, all KPIs with a positive score are included in the required dashboard content. Next to that, all the comments are considered and included when defining the required dashboard content in that section.

### 2.3 Validation by business managers

The results presented in Table 4, Table 5, and Table 6 have been validated by the business managers during a meeting where the results were discussed. On most KPIs that were defined by the employees, the business managers agreed. For some KPIs, they disagreed with the employees. Also, the insights were discussed. For the insights, some comments have been made by the business managers. Table 7 presents the comments made by the business managers. If a KPI or insight is not included in this table, the business managers had no comment and agreed with the relevance.

Table 7: Comments from business managers from validation

ID	Comment
K4	The business managers do not see the need for their employees to see the exact amount of money made on a customer. Also, this would require many calculations in the background slowing down the system. Whenever this number is needed, the business managers can access it and report it to their employees.
K8 + K10 + K12	The number of orders and the costs made on these orders are closely related to the contribution margin and the profitability of a customer. These numbers can be very relevant to Company X.
K11	Seeing which deliveries are delayed helps the area manager to stay updated on the customers. This can be useful in maintaining the relationship with the customers and is relevant for the area managers.
K13	Different types of orders can be done (e.g. online order, in-store order) by customers. It is relevant for Company X to gain insight into the way customers order so the employees can act upon these numbers.
I2	The business managers are currently not asking for the same monthly report from the different sales teams. They agree that a standard dashboard for the monthly reports would be useful as this would save their teams much time. However, they must first agree on a standard format which will not fit within the limitations of this research.
I3 + L4	Company X has a recency, frequency, and monetary (RFM) model in which customers get a status showing whether the representatives must pay attention to this customer because of low activity. This model is made in an excel file and should be integrated into a dashboard for easy access and use.
I4 + L3+ L7	Company X is setting up a new customer relationship management (CRM) system. Insights into customer satisfaction can better be integrated into this system, as this system is meant to be used for managing the relationship with the customer. It should therefore not be integrated into Power BI.
I5	An overview of quotations and projects fits better in the new CRM system and should therefore not be integrated into Power BI.
I6 + I8	Both can be integrated into a forecasting model that might be interesting to work out in the future. However, first, the basics in Power BI must be set before such projects should be started.

The comments of the business managers should be kept in mind when concluding the set of KPIs that should be included in dashboards for the sales teams.

## 2.4 Conclusion

Table 4, Table 5 and Table 6 present the KPIs and insights that are relevant for the sales teams of Company X according to its employees. The validation by the business managers in Table 7 is used to define the final list of KPIs which are relevant for the sales teams within Company X. Table 8 presents this list and answers the first sub-goal of the main research question: *‘What KPIs need to be included for the sales department to monitor and improve sales performance?’*

Table 8: KPIs selected for a sales department

ID	KPI	Definition
K1+L1	Actual sales vs. budgeted sales	The actual sales as a part of the budgeted sales in %
K2 + L2	Contribution margin	The total left over after deducting the transportation costs and the direct variable expenses from the revenue.
K3	Gross sales	Total of all invoiced sales.



K5	Revenue	The sales after deducting the rebates and cash discounts from the invoiced sales.
K6 + L12	Sales per product group	The total sales for a specific product group.
K7 + L13	Sales volume in KG	The volume of sales in kg.
K8	Average order value	Average value of orders
K10	Costs per service per customer	The costs that Company X makes per service (e.g. making technical drawings, delivery) for a customer.
K11 + L8	Delayed orders	The orders that are delivered later than the requested date.
K12 + L6 + L10	Number of orders	Total number of orders.
K13 + L6	Number of orders per type of order	Shows the number of orders per type of order that has been done (e.g. online order, order in-store).
K14 + L9	On-time-in-full (OTIF) percentage	The number of orders delivered on the requested date as a part of the total number of orders, shown as a percentage.
K15	Average number of customer visits per day	The average number of customer visits per day in the current year.
K16	Average number of customer visits per week	The average number of customer visits per week in the current year.
K17	Growth of contribution margin	Contribution margin current year as a part of contribution margin last year in %.
K18	Percentual growth of actively buying customers (sales > €1000 per customer)	The growth of the actively buying customers (customers who bought something in the selected calendar year) for which the total sales are above €1000, shown as a percentage.
K19	Percentual growth of revenue	The growth of the revenue shown as a percentage.
I3 + L4	RFM-model status per customer	The status of a customer in the RFM model.

For financial insight in the performance of sales, it is relevant to look at some financial KPIs. These include the gross sales (K3), the revenue (K5) and the contribution margin (K2 + L2). Next to that, Company X budgets a sales target every year which must be reached, so therefore insight in the actual sales vs. the budgeted sales (K1 + L1) is relevant for Company X.

Another thing the sales teams need insight in, is more information on orders of their customers. For this, the following KPIs are relevant: average order value (K8), costs per service per customer (K10), delayed orders (K11 + L8), the number of orders (K12 + L6 + L10), the number of orders per type of order (K13 + L6) and the OTIF percentage (K14 + L9).

The sales per product group (K6 + L12) and the sales volume in KG (K7 + L13) are relevant KPIs for the sales teams as they give them a general impression of the business they are performing well in, and which types of products need more attention. They can act upon this when they see a big change in these KPIs.

The performance of the sales teams' employees is measured according to several KPIs. Based on their results, they are rewarded. For the sales teams, it is therefore also relevant to keep track of their own progress. When they notice that they are not on track to meet their goals, they are expected to put

more effort in to reach their goals. Therefore, the average number of customer visits per day/week (K15/K16), the growth of the contribution margin (K17), the percentual growth of actively buying customers (K18) and the percentual growth of revenue (K19) are relevant KPIs for the sales department within Company X.

The RFM-model is used to measure whether a customer is loyal, or whether a customer might need attention to not lose the customer. The RFM-model status per customer (I3 + L4) helps the employees to track which customers need attention. Based on this information, they can decide to contact the customer and discuss possible business with them.

Next to these KPIs, two insights must be considered when designing dashboards with the KPIs from Table 8. Both I1 and I7 (see Table 5) must be considered and where possible be integrated into the design.

### 3 Current user acceptance of dashboards in Power BI

In this chapter, the following sub-question will be answered: ‘What is the current user acceptance of dashboards in Power BI at Company X?’ In Section 3.1, the method for measuring the current user acceptance is described. After that, the results are analysed in Section 3.2. A conclusion on the sub-question can be found in Section 3.3.

#### 3.1 Measurement of current acceptance

To gain insight into the current situation, a questionnaire was sent to the sales teams’ employees. This resulted in 19 potential respondents. The questionnaire contained statements (see Appendix B) that the respondents had to assess for themselves. They had five options to rate the statements with (see Table 9).

Table 9: Rating system questionnaire

Fully disagree	Somewhat disagree	Neutral	Somewhat agree	Fully agree
0	1	2	3	4

The statements that were included were based on the UTAUT (Venkatesh et al., 2003) and measured the five key constructs *performance expectancy*, *effort expectancy*, *social influence*, *facilitating conditions*, and *self-efficacy* (see Section 1.5). For all constructs, a higher score means a better user acceptance in theory. Therefore, a perfect score would be a four on all constructs for all respondents. As a perfect score is not realistic, a goal is set that no score should be below two.

The questionnaire was conducted in Dutch as all employees are native speakers, so the risk of misconceptions of any terms was limited. Respondents had to fill in the questionnaire anonymously, so they could give their honest opinion. For this questionnaire, respondents were asked to rate the statements based on the sales report that is existing now in Power BI.

Of the 19 potential respondents, 17 filled in the questionnaire. This results in a response rate of 89.5%, which shows that there are enough respondents for the survey results to be representative.

#### 3.2 Questionnaire results

The statements from the questionnaire can be found in a table in Appendix B, where they are numbered by ‘S#’. The table shows the average for the sales teams and the percentage of respondents who rated the statement below two. This percentage presents the degree to which the employees disagree with the statements and gives insight in whether the goal (that no score should be below two) is reached for all employees. Next to that, the results are plotted in box plots, in which the dot represents the median. The box plots give a visual insight into whether results are spread.

Figure 6 shows a box plot of the average scores for the respondents for each construct. These scores give an insight into the overall score of the constructs.

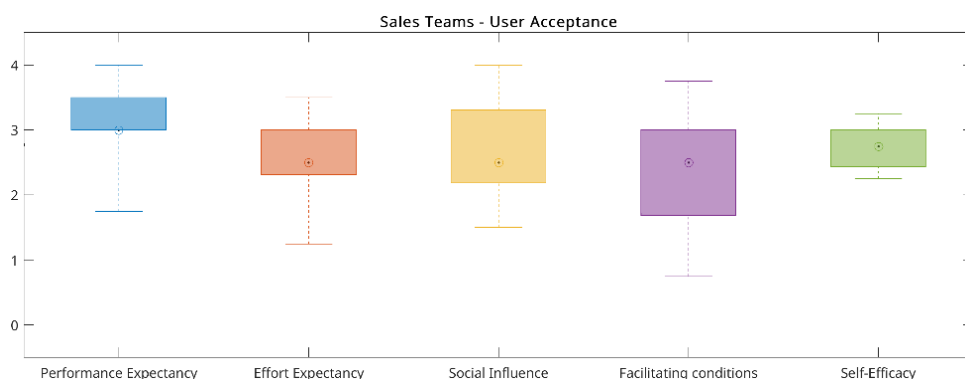


Figure 6: Current situation user acceptance

Figure 6 shows that the only construct for which all averages are higher than two is *self-efficacy*. This indicates that the employees can work with Power BI themselves or with help. For the *facilitating conditions*, more than 25% of the respondents reached an average below two on that construct. This indicates that the employees are not satisfied with the facilities provided by Company X for working with Power BI. A more detailed description of all constructs is given in the following sections, where the scores for each statement are shown in a box plot. This will give a better insight into what must be improved.

### 3.2.1.1 Performance expectancy

The results for the *performance expectancy* shows some very high and very low scores for the different statement (see Figure 7). The score on ‘usefulness’ (S1) is very high, as at least 75% of the respondents rated the statement with a four. This indicates that the employees feel that using dashboards in Power BI would be useful within their job. ‘Efficiency’ (S2) is rated with a two or higher by more than 50% of the respondents, indicating that these employees can perform tasks faster using dashboards in Power BI. However, 25% of the respondents rated the statement with a two or lower, indicating that these employees cannot perform tasks faster using dashboards in Power BI. The third statement, ‘productivity’ (S3), is also rated below two by some respondents, indicating that these respondents feel that Power BI does not increase their productivity. ‘Career opportunities’ (S4) is not rated below two and more than half of the respondents feel that using dashboards in Power BI could help them in getting a raise or a higher job position.

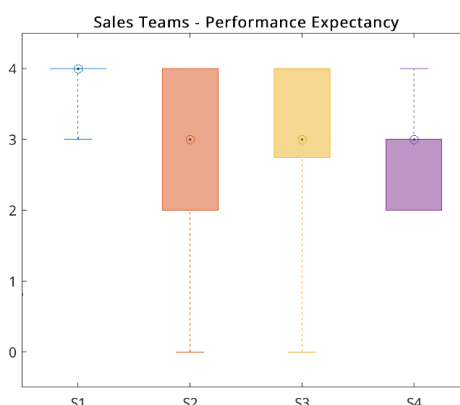


Figure 7: Current performance expectancy

The results for ‘usefulness’ (S1) and ‘career opportunities’ (S4) contribute to a positive attitude towards using dashboards in Power BI, as most employees do see potential in using dashboards in Power BI. However, the responses to ‘efficiency’ (S2) and ‘productivity’ (S3) show that there is much room for improvement for the employees when using Power BI as tasks cannot be performed faster by 25% of the respondents and not all respondents experience an increase in productivity.

### 3.2.1.2 Effort expectancy

Figure 8 shows the ratings for the statements used to measure the *effort expectancy*. At first sight, one can see that these statements are rated below two more than the statements in Figure 7. Starting with 'clarity' (S5), 50% of the respondents rated the statement with a two or lower, indicating that these employees feel that dashboards in Power BI are not clear in use. This could influence the ratings of 'efficiency' (S2) and 'productivity' (S3), as productivity and the duration of executing tasks might be influenced by the clarity of the system used for these tasks. Also, 'ease of use' (S7) might be explained partially by 'clarity' (S5), as 25% of the respondents rated this statement below two, meaning they do not feel that dashboards in Power BI are easy to work with. 'Ability to develop skill' (S6) is not rated below two, meaning that the respondents feel that becoming skilful in using dashboards in Power BI should not be difficult for them. However, when looking at 'simplicity of learning' (S8), at least 25% of the respondents state that it would not be easy for them to learn to work with dashboards in Power BI. This seems controversial but can be explained based on assumptions discussed with an employee. In 'ability to develop skill' (S6), respondents were asked whether they would be able to become skilful at using dashboards in Power BI, which is assumably based on their personal view on their ability to obtain new skills. 'Simplicity of learning' (S8), however, is assumably based on their ability to learn how to work with dashboards in Power BI with the current facilities provided for this. This would mean that the results for 'simplicity of learning' (S8) are closely related to the results for the *facilitating conditions*. The fact that the general results for the *facilitating conditions* are low (see Figure 6) supports this assumption.

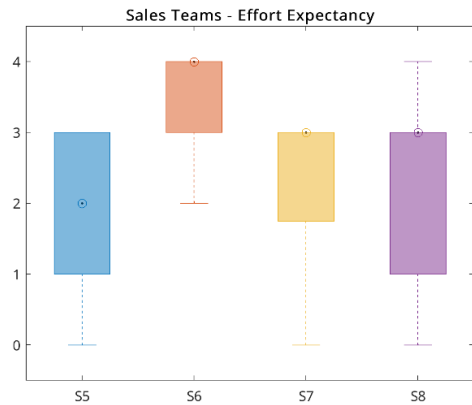


Figure 8: Current effort expectancy

In conclusion, to improve the *effort expectancy*, Company X must improve the clarity of dashboards in Power BI which might not only improve the scores for 'clarity' (S5) but also for 'efficiency' (S2) and 'productivity' (S3). The ability of employees to learn to work with dashboards in Power BI is expected to increase when the *facilitating conditions* are improved. The *facilitating conditions* will be analysed in Section 3.2.1.4.

### 3.2.1.3 Social influence

Figure 9 shows the results for statements measuring the *social influence*. 'Impact on behaviour' (S9) scores the lowest of the four statements, with 50% of the respondents rating the statement with a two or lower. These respondents do not feel that people who influence their behaviour think they should use Power BI. This might be explained by the fact that respondents did not limit this statement to people within Company X, or by the fact that they do not think there are people within Company X influencing their behaviour. The same goes for 'recommended by important people' (S10), where the influence of people who are important to the respondent is assessed. At least 50% of the respondents rate this statement with a two or higher. 'Managerial support' (S11) is rated with a three or higher by at least 75% of the respondents, indicating these employees feel that the management supports them well in using dashboards in Power BI. A few

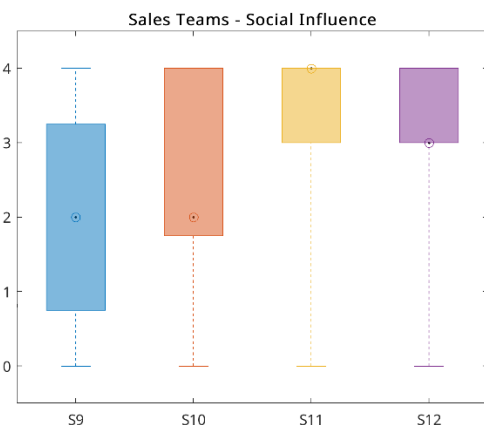


Figure 9: Current social influence

respondents do not share this feeling. A similar situation is presented for 'organisational support' (S12), which shows that 75% of the respondents feel (somewhat) supported by the organisation in general when using dashboards in Power BI.

The *social influence* must be kept in mind, although the relevance of this construct erodes over time as stated in Section 1.5. Therefore, this construct must not be the main priority for Company X.

#### 3.2.1.4 Facilitating conditions

The results for the *facilitating conditions* are low as can be seen in Figure 10. Starting with 'availability of required tools' (S13), at least 50% of the respondents state they have the resources necessary to use Power BI. All employees have a laptop from Company X and an account with access to Power BI dashboards, which enables them to use dashboards in Power BI. Despite this, some respondents disagreed with the statement. This might be in relation to lower scores on 'required knowledge' (S14) (which is about knowledge), as knowledge can be seen as a resource which is necessary to use dashboards in Power BI. 'Required knowledge' (S14) is rated with a two or lower

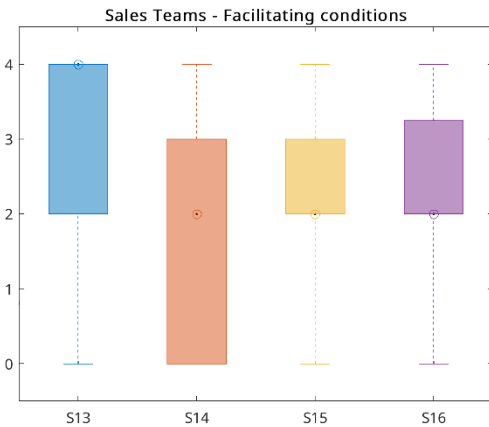


Figure 10: Current facilitating conditions

by at least 50% of the respondents, showing that at these employees do not feel that they have the knowledge which is necessary to work with dashboards in Power BI. 25% of the respondents fully disagreed with the statement. This shows that there is much room for improvement on this specific part of the *facilitating conditions*. At least 75% of the respondents rated 'compatibility' (S15) with a two or higher, indicating that working with dashboards in Power BI is compatible with other systems used by these employees. Some respondents did not agree with the statement, which might be explained by the fact that not all databases are connected to Power BI yet. The lack of available data was mentioned during several talks with employees from the sales teams. Not all databases are available yet as this costs a lot of time and money. 'In-house support' (S16) is also rated with a two or higher by 75% of the respondents. This indicates that most employees do feel that there is someone available for assistance when having difficulties using dashboards in Power BI. Employees rating this statement below two might not know who to contact when having these troubles. Another explanation for this might be that the person they can contact for assistance is also working on other projects and might not be available timewise.

In conclusion, most improvements can be made for 'required knowledge' (S14), assuming this will also resolve the few lower scores for 'availability of required tools' (S13). The lower scores for 'compatibility' (S15) might be resolved once Company X knows what data is needed to provide the dashboard content required for the sales teams, as data can be made available. Company X might want to investigate having more support for using Power BI. However, when using dashboards in Power BI becomes easier for employees, less support might be required which might also improve the results for 'in-house support' (S16) already.

### 3.2.1.5 Self-efficacy

In Figure 11, the statements measuring *self-efficacy* are shown. Starting with ‘individual capability’ (S17), 25% of the respondents rated this statement between one and two, meaning that some of them would not be able to complete a task when nobody would tell them what to do step-by-step. However, the rest (somewhat) agrees with the statement, meaning that they can complete a task when nobody would guide them step-by-step. ‘Request for help’ (S18) is not rated below two, meaning that most employees can complete a task when they can ask someone for help when they are stuck. ‘No time restriction’ (S19) is also not rated below two, meaning that most employees could complete a task themselves when they would have much time for this. When it comes to using the integrated help-facility of Power BI itself, the opinions are divided for ‘help-function in Power BI’ (S20). Around 50% of the respondents could complete a task with help of the integrated help facility, whereas the other half of the respondents could not.

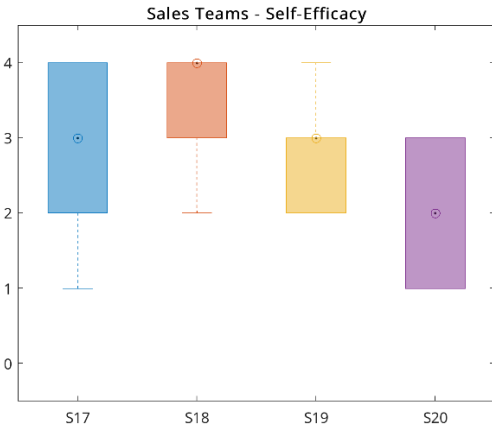


Figure 11: Current self-efficacy

Company X cannot improve the results for ‘help-function in Power BI’ (S20), as Company X is not the owner and developer of the programme itself. However, it is valuable to know that this facility is not sufficient for half of the employees. This could mean that Company X should focus more on supporting facilities within the company. Furthermore, the ability of employees to complete tasks without help and without these tasks taking up much time is related to ease of use, which is earlier described in Section 3.2.1.2. Based on this, it can be assumed that improvements in other statements will improve *self-efficacy*. Therefore, improving *self-efficacy* in specific should not be a priority at Company X.

### 3.2.1.6 Additional comments

At the end of the questionnaire, the respondents were asked whether they had questions or remarks they wanted to share. Seven respondents filled in a comment which can be found in Table 10.

Table 10: Additional comments from questionnaire current user acceptance

#### Comment

Training for users is required, and I would like to work with fixed dashboards.

More explanation on how to work with Power BI which either has to do with our daily work or how to set up a monthly report.

Training is required as soon as possible for an account manager to get insight into his/her area. This could be done as a standard video with settings that we can easily adapt ourselves.

It would be great to have standard tools in BI for requesting the information that is relevant to us. That would make working with Power BI more efficient. It is also sad that the training has been very brief.

Descriptions of the filters are not understandable, which also makes the choice of columns very unclear. Standard reports should be made so that everybody reports the same thing with only the required selection of their customers. Next to that, I cannot use the debtor hierarchy level 1 and 2 together in one report.

Power BI should be more user-friendly for the employee by using terms that are logical when filtering etc.

Abbreviations should be clarified and should fit better with the function. Also, an abbreviation list must be available.

From these comments, several points of attention can be deduced and linked to statements that might be influenced by this. Firstly, the lack of explanation and training on how to use dashboards in Power BI is mentioned. A lack of user training is a problem that is often noticed and can decrease the value of dashboards (Bugwandeen & Ungerer, 2019). These comments can be linked to 'clarity' (S5), 'ease of use' (S7) and 'simplicity of learning' (S8) (*effort expectancy*) and 'required knowledge' (S14) (*facilitating conditions*), which, in their turn, influence 'efficiency' (S2) and 'productivity' (S3) (*performance expectancy*). Secondly, the request for standard reports is mentioned. This can be linked to 'efficiency' (S2) and 'productivity' (S3) (*performance expectancy*), as standard reports enable employees to complete tasks faster and therefore increases efficiency. The last point of attention is the unclarity of terms and abbreviations. This can be directly linked to 'clarity' (S5), as unclear terms and abbreviations contribute to the unclarity of dashboards in Power BI.

### 3.3 Conclusion

Looking back at the sub-question addressed in this chapter, the results from the questionnaire reflect the current user acceptance of dashboards in Power BI well. The results show points where Company X currently performs good, as well as points Company X could improve on.

First, the user acceptance is positively influenced by the positive scores on 'usefulness' (S1) and 'career opportunities' (S4). The employees feel they can use the system in their work to perform better and possibly get to a higher job position. Also, the employees mostly feel that they can become skilful with Power BI, which can be deducted from the high score for the 'ability to develop skill' (S6). Also, the 'managerial support' (S11) and 'organisational support' (S12) score well, showing that the employees do feel supported by the company. In terms of self-efficacy, the employees feel that they can manage to work with the system by themselves, sometimes with some help.

Besides the positive points, there are also points that can be improved. Specific points of improvement are identified for Company X based on the user acceptance and the additional comments through which Company X can improve the user acceptance:

- The clarity of dashboards in Power BI must be improved based on the low score on 'clarity' (S5), whereas the clarification of terms and abbreviations must also be considered based on the additional comments.
- Training must be provided for employees so they can gain the required knowledge to work with dashboards in Power BI, which they are now lacking considering the low score on 'required knowledge' (S14) and the additional comments.
- Data must be available when necessary for required KPIs based on additional comments.
- Consider improving the support facilities within Company X as these are not completely sufficient looking at the results for 'in-house support' (S16) and the additional comments.

By improving these points, the 'ease of use' (S7) is expected to improve as well. All together, these improvements will have a positive impact on the user acceptance within the sales teams of Company X.



## 4 Guidelines for designing dashboards

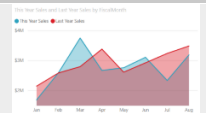


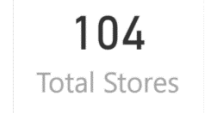


When designing a dashboard, decisions about the design must be made. The following sub-question has been formulated for this and will be answered in this chapter: ‘Which visualisations in Power BI are suitable for which visualisation goal?’ For choosing suitable visualisations, a theoretical framework is set up based on literature. This framework is presented in Section 4.1. In Section 4.2, general guidelines for designing dashboards are discussed.

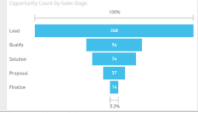











### 4.1 Theoretical framework for selecting a suitable visualisation

Selecting a suitable visualisation for a KPI is one of the key elements of designing a dashboard (Malik, 2005). To help Company X to select the appropriate visualisation for the KPIs they need to include in the dashboards, a framework is set up. This framework guides one in choosing a suitable visualisation for presenting a KPI. As the dashboards designed in this research must be implemented in Power BI, only visualisations available in Power BI are considered.

(Sedrakyan et al., 2019) defined multiple design concepts, which included the objectives of visualisations. These five objectives are included in the theoretical framework. Another objective is added, which is called ‘measurement’ for types of visuals which present the measurement of a single value. Based on (Sedrakyan et al., 2019), (*Tips Voor Het Ontwerpen van Een Geweldig Power BI-Dashboard - Power BI*, n.d.), and the chart chooser sheet from (Evergreen, 2017), the theoretical framework was set up. The framework in Table 11 shows the visuals available in Power BI and for which objectives the visuals are suitable.

Table 11: Theoretical framework for selecting a suitable chart type

Chart type	Example	Description	Comparison	Relationship	Distribution	Trend over time	Composition	Measurement
Area chart		Based on a line chart; the area between the line and the x-axis is filled in.	✓			✓		
Bar chart		Used to look at a value across different categories.	✓		✓		✓	
Column chart		Used to look at a value across different categories.	✓		✓	✓	✓	
Card		Shows a single number value.						✓
Combo chart		Combination of a column chart and a line chart.	✓	✓		✓	✓	
Doughnut chart		Visualise the relationship of parts to a whole.					✓	

<b>Funnel chart</b>		Visualise stages of a process and items that flow from one stage to another.			✓			
<b>Gauge chart</b>		A circular arc which presents the progress towards a goal/KPI of a single value.						✓
<b>KPI</b>		Visualises the progress made toward a specified goal.						✓
<b>Line chart</b>		Shows changes of a value over a period of time.	✓				✓	
<b>Map</b>		Visualises quantitative information which is linked to spatial locations.		✓				✓
<b>Matrix</b>		Advanced table visual which allows a stepped layout.	✓					
<b>Pie chart</b>		Visualise the relationship of parts to a whole.		✓				✓
<b>Ribbon chart</b>		Visualise the rank division between categories over time, whereas the highest value is presented on top.	✓					✓
<b>Scatter</b>		Data points are plotted using a horizontal and vertical axis.	✓	✓				
<b>Table</b>		Contains data presented in rows and columns and can show multiple values for a specific category using visual encodings for the ease of interpretation of larger data.	✓					
<b>Treemap</b>		Consists of differently coloured rectangles from which the size represents the value.			✓			✓
<b>Waterfall chart</b>		Visualises a running total whereas values are added or subtracted.					✓	

Using this theoretical framework, one can choose the visualisation that suits the goal for which the KPI is visualised.

## 4.2 Guidelines for dashboard design

Next to the theoretical framework, there are multiple guidelines established that must be considered when designing a dashboard. Next to that, Company X has established guidelines for setting up its dashboards.

### 4.2.1 General guidelines

The process of developing dashboards can be complex, for which no generic template is available (Bugwandeem & Ungerer, 2019). However, general guidelines and points of attention are established that can guide a design process. According to (Bugwandeem & Ungerer, 2019), the theory focuses on five areas for dashboard design: content, analysis, visual effects, functionality, and platforms. The latter of these five is not relevant for this research, as Company X uses Power BI, and the platform is therefore set.

#### 4.2.1.1 Content

The content of a dashboard must be based on the KPIs which are relevant to the organisation's objectives and performance. To make sure that all users agree on the dashboard content and the definitions, a bottom-up approach fits the development of dashboards well (Bugwandeem & Ungerer, 2019).

The data presented in dashboards must be reliable and must be accurate (Bugwandeem & Ungerer, 2019). (Cahyadi & Prananto, 2015) also emphasises the importance of data quality and availability as this is vital to providing dashboards to the users. The organisational data structure must be suitable or be adapted to provide dashboards with correct data.

#### 4.2.1.2 Analysis

For different purposes, different levels of detail might be required. To enable a dashboard to provide this level of detail as well as a general overview, a drill-down function can be included (Cahyadi & Prananto, 2015). Next to the drill-down function, historical trends should be available for users to identify trends (Bugwandeem & Ungerer, 2019).

(Froese & Tory, 2016) stated that full-size graphs can best be stacked vertically. This allows one to read and compare the displayed data easier than when the graphs are displayed next to each other, as more detail can be read from the graphs. The downside of this is that full-size graphs take up much space in a dashboard, leaving less space for other KPIs to be displayed.

Predictive analysis can be included in a dashboard (Bugwandeem & Ungerer, 2019). However, presenting predictive data must not result in an overload of information for users. Next to that, the users must be capable of using and reading predictive data correctly.

#### 4.2.1.3 Visual effects

According to (Bugwandeem & Ungerer, 2019), a single dashboard must be used. However, according to (Nadelhoffer, n.d.), one must limit the number of visuals presented in a dashboard. (Froese & Tory, 2016) states that dividing KPIs over separate dashboards results in more space on a dashboard which can be used to present more details. However, the comparison of data becomes harder as the charts are not displayed on the same dashboard. During the design process, the best approach for this must be decided upon.

According to (Bugwandeem & Ungerer, 2019), items must be positioned correctly in a dashboard. (Nadelhoffer, n.d.) states that users start scanning a screen at the top left corner. One could use this knowledge by placing the most relevant visualisation of the dashboard in that specific corner.

#### 4.2.1.4 Functionality

Adding functions in a dashboard might seem interesting at first, as users would be enabled to let the dashboard show exactly what they want. This high degree of personalisation, however, should be limited (Bugwandeem & Ungerer, 2019). During the design process, the required degree of customisation should be assessed.

Filters are used to specify a subset of data that the user wants to see in the dashboard (Froese & Tory, 2016). They can be used to let the dashboard answer more specific questions that the user has. (Nadelhoffer, n.d.) also advises one to add filters to a dashboard for this purpose.

Another functionality that allows users to dig deeper into the data, is the 'highlighting' function (Nadelhoffer, n.d.). When this function is turned on, the user can select a section within a visual. Automatically, other visuals will adapt themselves to the selected section of data.

#### 4.2.2 Guidelines Company X

Company X's template for dashboards includes a title for the dashboard in the left top corner. Next to this, the filters for that specific dashboard are presented on the right side of the dashboard. A maximum of four filters per dashboard is wished, as a high number of filters might increase the complexity of the dashboard for the users.

### 4.3 Conclusion

Looking back at the sub-question, the theoretical framework in Table 11 answers the question. The framework must be used when designing dashboards for Company X and can be used by others when designing dashboards. The guidelines mentioned in Section 4.2 are an addition to the theoretical framework and must also be considered when designing dashboards to improve the quality of the designed dashboards. In Chapter 5, this framework is used to select suitable chart types for KPIs in the context of Company X.

## 5 Designing dashboards for Company X

In this chapter, the following sub-question is answered: ‘What should the design of the dashboards for the sales teams of Company X look like?’ In Section 5.1, the chart type selection per KPI is given and motivated. In Section 5.2 the designed dashboards are discussed. In Section 5.3, a conclusion is given.

### 5.1 Chart type selection per KPI

As mentioned in Section 4.2.1.1, the content of dashboards must be defined using a bottom-up approach. In Chapter 2, KPIs are defined by the sales teams. As they will be the users of these dashboards, the results from Chapter 2 are used as content. In Section 4.2.1.3, it is stated that the number of KPIs presented in a dashboard must be limited. As many KPIs are relevant for the sales teams, multiple dashboards will be designed, all with their own purpose. These purposes have been described briefly in Section 2.4, and are as follows:

- **Financial insight in area:** used by sales teams’ employees to have a financial overview of their area. This dashboard should contain financial KPIs to identify gaps, peaks, or trends in their sales which the sales teams can act upon.
- **RFM-model:** used to identify customers which require attention of the employee. The employee can contact customers which require attention to make new deals with these customers.
- **Order analysis:** used to analyse the order behaviour of customers in the area. This dashboard should present KPIs related to orders and should contain the possibility to drill down to a specific customer. This information can be used to optimise the order process and reduce costs for Company X, increasing the profit.
- **Self-analysis:** used to track personal goals within the sales team, which will motivate the sales employees to put in extra effort to reach their goals.

Table 12 presents the KPIs and the selected visualisation based on the framework in Table 11. The first column shows the purpose of the dashboard, after which the KPIs for the dashboards are given. The fourth column presents the objective of the KPI. Based on the framework constructed in Table 11, the chart type in the last column is chosen.

Table 12: Chosen chart type for selected KPIs

Purpose	ID	KPI	Objective	Chart type
Financial insight in area	K1+L1	Actual sales vs. budgeted sales	Measurement Comparison	Gauge chart Combo chart
	K2 + L2	Contribution margin	Trend over time Comparison	Column chart Matrix
	K3	Gross sales	Trend over time Comparison	Column chart Matrix
	K5	Revenue	Trend over time Comparison	Column chart Matrix
	K7 + L13	Sales volume in KG	Trend over time Comparison	Column chart Matrix
RFM-model	I3 + L4	RFM-model status per customer	Composition Comparison	Treemap Table
	K2 + L2	Contribution margin	Comparison	Matrix
	K3	Gross sales	Comparison	Matrix
Order analysis	K13 + L6	Number of orders per type of order	Composition	Doughnut chart

Self-analysis	K6 + L12	Sales per product group	Comparison	Matrix
	K8	Average order value	Measurement	Card
	K10	Costs per service per customer	Comparison	Table
	K11 + L8	Delayed orders		Table
	K12 + L6 + L10	Number of orders	Measurement	Card
	K14 + L9	On-time-in-full (OTIF) percentage	Measurement	Gauge chart
	K15	Average number of customer visits per day	Measurement Trend over time	Card Combo chart
	K16	Average number of customer visits per week	Measurement Trend over time	Card Combo chart
	K17	Growth of contribution margin	Measurement	Card
	K18	Percentual growth of actively buying customers (sales > €1000 per customer)	Measurement	Card
K19	Percentual growth of revenue	Measurement	Gauge chart	

Many KPIs have the objective to present a measurement. For this, either a card, gauge chart or a KPI visualisation were available. Although these are KPIs, the KPI chart type was not suitable for these measurements. Often, a card presenting a number or percentage suited the KPI best. However, for some KPIs, the gauge chart added an attractive visual effect and could draw more attention than a single number. Therefore, for some KPIs with the objective 'measurement' a gauge chart is selected.

For KPIs with the objective 'comparison', either a matrix or a table was selected. These types of charts are similar, but the matrix allows one to add hierarchies in the table. As this was relevant for some KPIs, the matrix has been selected for these KPIs.

For a chart presenting a trend over time, the column chart is chosen. This chart presents the data in columns, which can easily be compared, and trends can be identified. For some KPIs, it was possible to add a line in the chart which makes it easier to identify the trends. For these KPIs, the combo chart is chosen. This chart combines a column chart with a line chart. The columns give more detail on the actual performance on a certain moment, whereas the line presents the trend. Together, this gives most information to the user.

The last objective that is included in Table 12 is the presentation of a composition. For the RFM-model, a treemap is suitable as the model looks exactly like a treemap. For the number of orders per type of order, one wants to look at a part of a whole. A pie chart could also have been selected, but the doughnut chart has an open middle which makes the dashboard look less full.

## 5.2 Designed dashboards

Throughout the design process, the conclusions from Section 3.3 have been considered. Also, the design guidelines described in Section 4.2 have been considered.

Due to limitations, the designs for the dashboards have been made without correct data and working functionalities. The mock-up dashboards present the design that is advised to Company X but do not present accurate data.

For the employees, only data from their area is relevant. Therefore, a filter must be used to filter all dashboards. This must be done manually, and this setting must be saved as a pre-set filter influencing all dashboards described in this section.

### 5.2.1 Financial insight in area

In Appendix C, the designed dashboard for the 'financial insight in area' is presented. This design includes the KPIs defined for this purpose and can be used by the sales teams to gain insight into their area.

The dashboard title can be found in the upper left corner and the filters added to the page can be found on the right side of the dashboard, which is in line with the guidelines defined by Company X (see Section 4.2). In the upper left corner, the most relevant visuals are displayed according to the guideline defined in Section 4.2.1.3. The combo graph shows a trend over time for the 'Selected Data', which can be selected in a filter. As an insight into a trend over time for different data types is required, this combo graph adapts itself to this filter. Users can choose from the following options:

- Gross sales
- Contribution margin
- Revenue
- Net weight KG
- Quantity

Using this filter, many insights can be combined in one visual. Company X should integrate a drill-down function into this graph. Currently, the x-axis presents the data per month. Users should be able to see this per week or even per day, which allows them to look in more detail (see Section 4.2.1.2 and 4.2.1.4).

Another visual at the top of the dashboard is the gauge chart, which presents the progress to achieving the goal. A budget is set each year, and this budget must be met by the sales teams. This is a static visual which will not be linked to any filters and will not react to the highlighting that must be enabled in this dashboard.

At the bottom of the dashboard, two matrices are presented. The matrices present the contribution margin, and the current value as well as the value last year for the 'Selected Data' over the selected 'Time Data'. Also, a column with the difference between the current and the last year is included, which is based on the 'Selected Data'. This column is added to the matrices to provide insight into I7, which should be considered in the design according to Section 2.4. When sorting the tables from highest to lowest, users can easily find their top 10-20 risers and descenders. These two matrices present the same data, but for a different group of customers. In Section 2.4, it was concluded that insight I1 should be considered. Due to the infrastructure of the data of Company X, two matrices are needed to make this insight possible. As mentioned in Section 4.2.1.1, the data infrastructure of an organisation must be fit for the dashboards that must be made. Currently, the data infrastructure forces the design to include two matrices to include I1 in the dashboard. This same problem with the infrastructure requires two filters which would ideally be integrated into one filter. The matrices contain a hierarchy where the presented data can be viewed per customer, and per customer per product group which allows users to look at more detailed data.

Six filters are included in the dashboard, which is more than the guideline defined by Company X advises (see Section 4.2.2). Two of these filters could ideally be integrated into one filter, which is not possible due to the data infrastructure at Company X. The filters interact with the combo chart and the matrices. Three filters include a search function which allows users to search for specific customers or

product groups. Two filters are not included in the dashboard but are sometimes used by users. This includes the customer groups for B&I and the customer hierarchy for C&I. As these filters are less relevant than other filters, these filters are not included in the dashboard to save space for the current content.

### 5.2.2 RFM model

The dashboard concerning the RFM model is presented in Appendix D. All guidelines established by Company X (see Section 4.2.2) are followed. In the left top corner, the RFM model itself is shown, with the number of customers per RFM status. Right next to the RFM model, a table presents customers and their current RFM status and the status of last month. This table is meant to see the progress of customers. The table below the RFM model shows some data per customer, with a hierarchy added so the data is also available per customer per product group. The table presents the same columns as the dashboard 'financial insight in area' (see Section 5.2.1) does. Only now, I1 is not considered so all customers can be presented in one table. This table is added to make a comparison between dashboards easier, as this might become complicated when KPIs are divided over dashboards (see Section 4.2.1.3). A filter is added with a search function to allow users to look for data on a specific customer. This filter interacts with all visuals on this dashboard. Next to that, the filters 'Time Data' and 'Posting Date' are included again to let users choose the timespan they want to see data from. These two filters only influence the data presented in the table at the bottom of the dashboard.

### 5.2.3 Order analysis

KPIs concerning the order analysis are presented in a dashboard for which the design can be found in Appendix E. The dashboard concerning the order analysis is set up according to the guidelines defined by Company X (see Section 4.2.2). In the left upper corner, the number of orders per type of order is presented, which is the most important KPI for the sales teams next to the average order value, which is presented right next to this KPI. The OTIF percentage is presented right next to the average order value, and the number of orders is given as well. Below the numeric data on the orders, a table presents the delayed orders. Using this table, employees stay up to date with the orders of customers in their area. Again, the same table is included as in the dashboard 'RFM-model', presenting data per customer per product group at the left bottom corner of the dashboard for easier comparison with other dashboards. At the right bottom corner, a table is included which presents the costs made per customer for the different services. All visualisations and filters must interact with each other, so the highlighting function must be turned on.

### 5.2.4 Self-analysis

The self-analysis dashboard presents the KPIs which measure the performance of the employees and can be found in Appendix F. As mentioned in Section 4.2.1.2, graphs can best be stacked when they are meant for comparison. The number of visits is important for employees and is not presented anywhere else yet. Therefore, two graphs are included presenting the progress of the average number of visits per day and week. The exact number for the current average number of visits per day and week is also presented, as this enables employees to easily compare these numbers with their goals. On the right, all numbers are presented which the employees can easily compare to their goals set. The goals themselves cannot be integrated due to privacy reasons, so the comparison must still be done manually. When employees want more detail on their progress on KPIs K17, K18, and K19, the other dashboards can be used for this. Note that this dashboard does not include any filters, as the data is already filtered per employee.



### **5.3 Conclusion**

Section 5.2 presents the dashboard designs that Company X should follow based on theory and the executed research and answers the following sub-question: *'What should the design of the dashboards for the sales teams of Company X look like?'*. The designs must include the functionalities that are described, and the data infrastructure must allow Company X to develop these dashboards. The designed dashboards are based on the KPIs defined by the employees but might need to be adapted once these are in use and problems or deficiencies are noticed.

## 6 Evaluation

In this chapter, the evaluation phase of the DSRM is described. This evaluation phase answers the following sub-question that has been formulated in Section 1.4.2.5: *'To what extent is the design expected to increase the user acceptance of dashboards in Power BI for the sales teams at Company X?'* In Section 6.1, the method of measuring the expected impact is described. Research of this research is described in Section 6.2, and a conclusion is drawn in Section 6.3.

### 6.1 Measuring the impact

A presentation of the results from Chapter 2 and Chapter 5 was given to the sales teams' employees after which they were asked to fill out a questionnaire. As stated in Section 1.4.2.5, this questionnaire was similar to the questionnaire used to measure the current situation. Only this time, respondents were asked to fill in the questionnaire on how they expect to rate these statements after the implementation of the presented dashboards. The same rating system was used, which can be found in Table 9.

Not all employees from the sales teams could be present during the presentation, so fewer respondents filled out the questionnaire compared to the questionnaire in Chapter 3. All employees who joined the presentation filled in the questionnaire, resulting in 10 respondents. As there are 19 employees within the sales teams, 52.6% of them participated in the questionnaire. Although this is lower than the participation for the questionnaire measuring the current situation, this number of respondents is still representative. During the presentation, all different functions within the sales teams were represented and at least one employee from each sales team was present. As they all filled in the questionnaire, the results are representative.

Just as in Chapter 3, a four is a perfect score for a statement or construct. The goal for Company X is for constructs and statements to not score below two. When a score is below two, the employees give the statement or construct a low rating, this means they (somewhat) disagree with the statement. In the UTAUT, this results in a lower user acceptance (Venkatesh et al., 2003).

### 6.2 Questionnaire results

The statements from the questionnaire and their averages can be found in Table H.1 in Appendix G, where they are stated together with the results from the current situation for comparison. The results have been plotted in box plots just as in Chapter 3 so that the results can be compared easily.

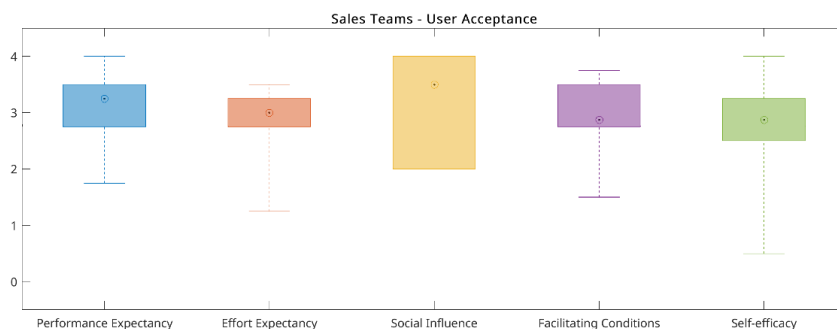


Figure 12: Expected user acceptance

Figure 12 contains a box plot presenting the average scores from the respondents per construct. From Table H.1, it can be concluded that the averages for the five constructs increased, except for *self-efficacy* which stayed the same. Although it seems that the user acceptance, in general, has increased, the percentages of employees rating the constructs below two increased.

For comparison purposes, spider diagrams have been added presenting the average results from the current situation and the expected situation. In Figure 13, one can see that the average scores on all constructs are expected to increase. This means that a higher user acceptance can be expected after implementing the new dashboards. For the self-efficacy, no improvement is visible. However, the score is still above two which is satisfactory.

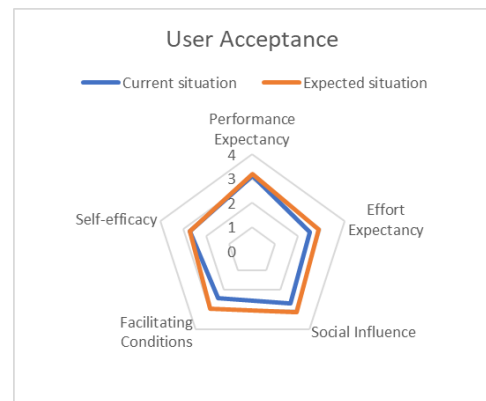


Figure 13: Comparison user acceptance

In the following sections, the developments are discussed per construct.

### 6.2.1 Expected performance expectancy

The results for the *performance expectancy* are expected to improve when the dashboards would be implemented. Figure 14 shows that for 'career opportunities' (S4), 25% of the respondents expect to rate this statement between one and two after implementation of the dashboards, meaning that these respondents feel that using the designed dashboards in Power BI will not help them in getting a raise. When measuring the current situation, all respondents rated this statement with a two or higher. The reason for the lower score on this statement is not clear. 'Usefulness' (S1), 'efficiency' (S2) and 'productivity' (S3) are expected to improve in terms of ratings not being below two. However, the average score on 'usefulness' (S1) has decreased as can be seen in Figure 15. The decrease, however, is very small and is not something Company X should worry about too much.

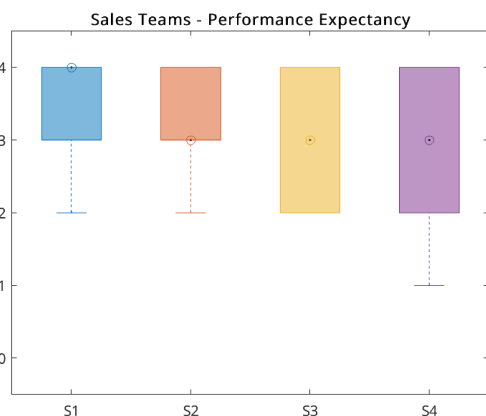


Figure 14: Expected performance expectancy

In conclusion, it is expected that the implementation of the newly designed dashboards will improve the *performance expectancy*. Company X could investigate the lower score on 'career opportunities' (S4) but should prioritise other aspects of the user acceptance first as there are aspects which score lower than 'career opportunities' (S4).

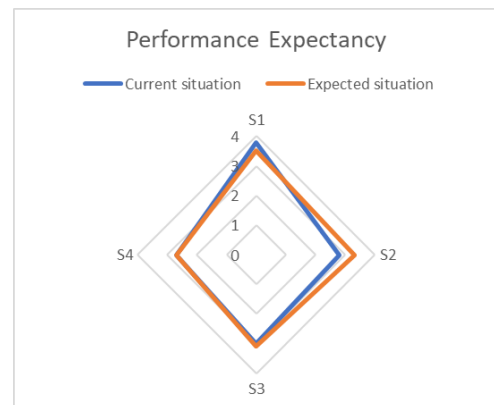


Figure 15: Comparison performance expectancy

### 6.2.2 Expected effort expectancy

Figure 16 shows the expected results for *effort expectancy* after the implementation of the designed dashboards. When comparing these results with the current situation (see Figure 8), an improvement can be seen for three of the four statements. 'Clarity' (S5) is rated with a three by at least 75% of the respondents, which is higher than the percentage for the current situation. This shows that implementation of the dashboards would make using dashboards in Power BI clearer for the employees. The expectations for 'ability to develop skill' (S6) are lower than they are in the current situation (see Figure 17), meaning that respondents expect that it will be harder for them to become skilful at using Power BI than in the current situation. The reason for this is unclear and cannot be deduced from the results of the survey. For 'ease of use' (S7), the results improved. However, 'ease of use' (S7) is still rated below two by some respondents. Despite this, the designs are expected to make it easier for employees to use Power BI based on the results. 'Simplicity of learning' (S8) has been rated with a three by at least 75% of the employees, whereas this percentage is lower in the current situation.

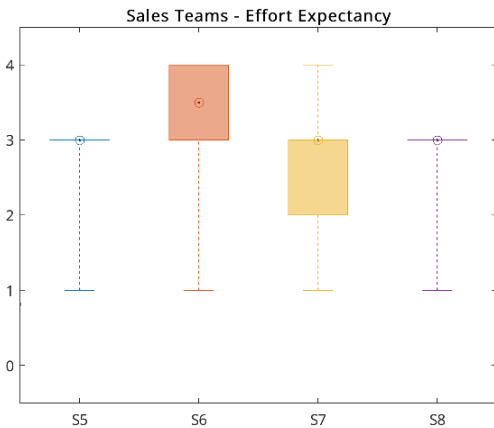


Figure 16: Expected effort expectancy

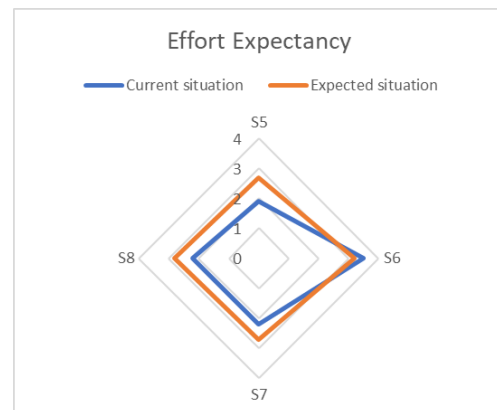


Figure 17: Comparison effort expectancy

Overall, the expected *effort expectancy* had improved as all statements have a minimum score of one, which is zero in the current situation. The result of 'ability to develop skill' (S6) stands out and Company X must investigate this further, as the ability of employees to learn to work with dashboards in Power BI is relevant for the implementation of the dashboards. However, looking at Figure 17, one can conclude that an improvement on the effort expectancy can be expected.

### 6.2.3 Expected social influence

Comparing Figure 18 to Figure 9, an improvement in the *social influence* is seen. For all four statements, the percentage of ratings below two has decreased. Also, the averages for all statements have increased. 'Impact on behaviour' (S9) and 'recommended by important people' (S10) are still rated below two by 10% of the respondents which means one of ten respondents rated the statement with a zero. As this is a significant outlier, it is expected that 'impact on behaviour' (S9) and 'recommended by important people' (S10) are rated this low due to interpretation. As mentioned in Section 3.2.1.3, respondents might have not limited this statement to people within Company X. In that case, Company X should not focus on improving these statements, as these are influenced by factors which are not controlled by Company X. In the current situation, 'managerial support' (S11) and 'organisational support' (S12) were rated below two. In the expected

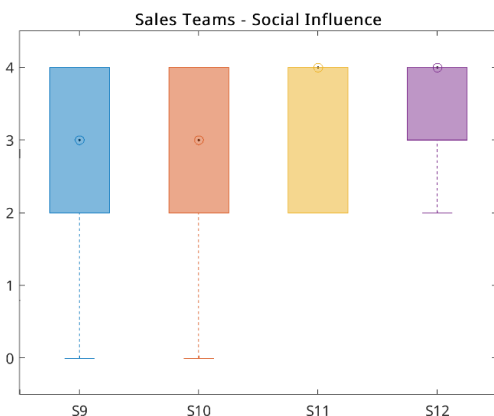


Figure 18: Expected social influence

situation, these two statements live up to the goal as they are not rated below two. This shows that the employees expect to experience more support from the management and the organisation.

Altogether, the *social influence* is expected to improve. 'Impact on behaviour' (S9) and 'recommended by important people' (S10) are expected to contain an outlier which is caused by external factors which Company X cannot control. Therefore, Company X should not put much effort into improving this, especially since there is a big improvement on these two statements when looking at the averages in Figure 19. The improvement on statements 'managerial support' (S11) and 'organisational support' (S12) is very positive and is something Company X should keep on supporting.

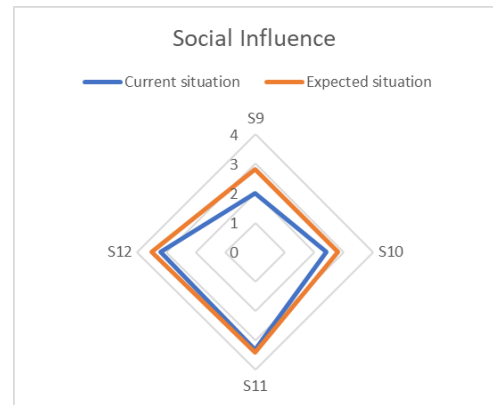


Figure 19: Comparison social influence

#### 6.2.4 Expected facilitating conditions

When comparing Figure 20 to Figure 10, a clear difference can be pointed out. In the current situation, all four statements concerning the *facilitating conditions* were rated with a minimum of zero. In the expected situation, the lowest score for 'required knowledge' (S14), 'compatibility' (S15) and 'in-house support' (S16) is one. 'Availability of required tools' (S13) even meets the goal as it is not rated below two. All averages have increased, and the percentages of ratings below two have all decreased. Based on 'availability of required tools' (S13), all employees expect to have the resources necessary to use Power BI. 'Required knowledge' (S14) shows that most of the employees also expect to have the knowledge to work with the new dashboards in Power BI. Although 'compatibility' (S15) has also improved, Company X could still try to fit dashboards in Power BI better to the way the employees work. The improvement of 'in-house support' (S16) is surprising, as the presented dashboards do not change anything when it comes to the available support.

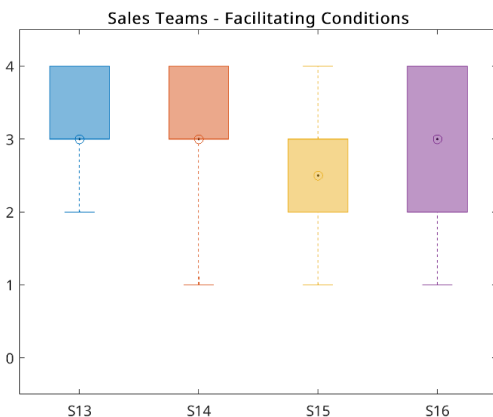


Figure 20: Expected facilitating conditions

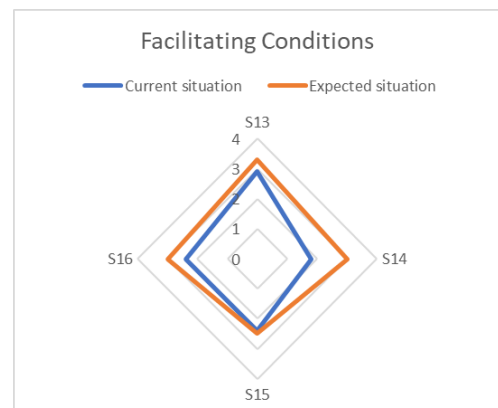


Figure 21: Comparison facilitating conditions

In conclusion, the *facilitating conditions* are expected to improve well, as can also be seen when looking at the averages in Figure 21. Company X should further investigate how the *facilitating conditions* can be further improved.

### 6.2.5 Expected self-efficacy

Figure 22 shows the expected results for the *self-efficacy* of the sales teams, which did not improve as expected. The averages for ‘individual capability’ (S17) and ‘request for help’ (S18) are expected to be lower than in the current situation, and the percentages of ratings below two are expected to increase for ‘individual capability’ (S17), ‘request for help’ (S18) and ‘no time restriction’ (S19). Only for ‘help-function in Power BI’ (S20), both the average and the percentage of ratings below two improved, meaning that employees expect to be able to complete a task when only being able to use the built-in support function.

The built-in help function of Power BI is not managed by Company X and is, therefore, something Company X cannot influence. Therefore, the low results for ‘individual capability’ (S17), ‘request for help’ (S18), and ‘no time restriction’ (S19) are more relevant for Company X to focus on. The statements could be rated low because the dashboards are new and have not been used in practice yet. The employees have not worked with them and first need time to explore the actual functionalities of the dashboards. Once they have used them, they might feel more comfortable using these dashboards and rate the statements higher. Company X must monitor this as *self-efficacy* is a relevant construct as described in Section 1.5.

### 6.2.6 Additional comments

At the end of the questionnaire, respondents were asked whether they had any additional remarks. One content-related remark has been filed: “Explanation of what we see in the dashboards is of great importance.” This remark is in line with remarks filed in the questionnaire measuring the current situation (see Table 10) and must be considered by Company X.

## 6.3 Conclusion

The description of the results from the questionnaire in Section 6.2 reflects the expected user acceptance and therefore answers the following sub-question: ‘*To what extent is the design expected to increase the user acceptance of dashboards in Power BI for the sales teams at Company X?*’ However, one should note that the response rate is much lower than for the measurement of the current situation, to which the expected situation is compared. Also, the results are based on the expectations of the respondents and give no guarantee for the actual user acceptance once the dashboards have been implemented.

When looking at the comparison of the results from Chapter 3 and this chapter, some conclusions can be drawn. In Section 3.3, points of improvement were mentioned which were expected to improve the user acceptance.

The clarity of dashboards had to be improved, which in the current situation led to a low score on ‘clarity’ (S5) negatively influencing the user acceptance. The new dashboard designs are expected to improve the clarity as can be seen in Figure 17, as the average score improved from a 1.9 to a 2.7. As

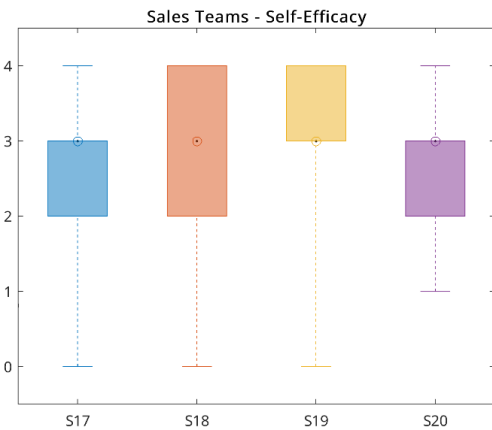


Figure 22: Expected self-efficacy

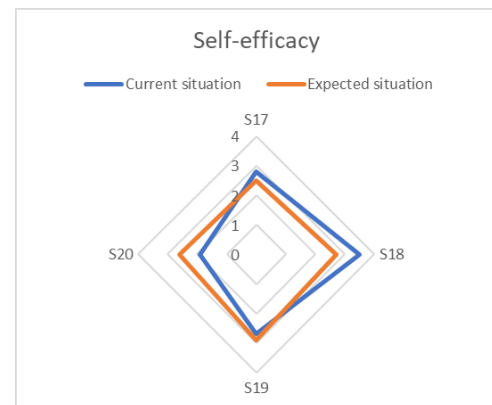


Figure 23: Comparison self-efficacy

advised in Section 3.3, clarification of terms and abbreviations can still be considered to further improve this score.

To improve the score on 'required knowledge' (S14), it was advised to provide trainings. Although the results of this research do not provide any extra training for the employees, the average score for this statement increased from 1.8 to 3.0. Due to the improvement in clarity of the dashboards, the employees might feel that less knowledge is required to work with the dashboards. This could also be a result of excluding additional filters in the dashboards, which most employees find hard to work with.

As can be seen in Figure 13, the total user acceptance is expected to increase and therefore the proposed dashboard designs are expected to improve the situation which was stated in Section 1.2.4. However, one must note that the improvements per construct are small and therefore Company X must look into ways how to improve the user acceptance more.

## 7 Conclusion, recommendations, and discussion

In this chapter, the conclusion to the main research question is given (see Section 7.1). The recommendations for Company X are discussed in Section 7.2. Section 7.3 describes the limitations of this research. The chapter is concluded with the scientific relevance and further research that can be executed (see Section 7.4).

### 7.1 Conclusion

In Section 1.2.4, the following main research question was stated:

*‘How can Company X design its business intelligence for the sales department to increase usage for monitoring and improving its performance?’*

For this research question, two sub-goals were formulated on which this research focussed. For both sub-goals, sub-questions were formulated which should guide this research in answering the sub-goals. First, both sub-goals will be answered separately, after which the main research question will be answered.

#### **1. What KPIs need to be included for the sales department to monitor and improve sales performance?**

Below, each sub-question is discussed after which a conclusion for the first sub-goal is given.

*‘What KPIs are established in literature for a sales department in general for businesses?’*

In literature, KPIs are established which are relevant for a sales department in general for business. A literature review resulted in a list of KPIs that sales departments can use to monitor sales performance. An overview of these defined KPIs can be found in Table 2.

*‘What KPIs are relevant within the sales teams in the company context according to its sales employees?’*

Employees from the sales teams of Company X defined KPIs that they thought are relevant for their work within the company. Next to that, the KPIs from Table 2 were validated. From this, a list of KPIs could be defined including KPIs assessed as relevant by the sales teams. The business managers validated these KPIs after which a final list of KPIs could be defined.

Table 4 presents KPIs which are relevant to the sales teams in the company context. Next to clearly defined KPIs, additional insights are relevant for the sales teams which need to be further defined into KPIs and might be better integrated into the CRM system instead of Power BI.

**Answer to first sub-goal:** Table 8 presents a list of defined KPIs which must be included in dashboards for Company X’s sales department which the employees can use to monitor and improve the performance of sales. Additional insights can be explored by Company X and need to be better defined before implementation.

#### **2. How do the dashboards need to be designed to improve user acceptance?**

Below, each sub-question defined to answer the second sub-goal is discussed after which a conclusion for the second sub-goal is given.

*‘What is the current user acceptance of dashboards in Power BI for the sales teams at Company X?’*

As presented in Chapter 3, the current user acceptance shows that employees from Company X think that Power BI can be useful to perform better. Also, they believe they can become skilful in using the system. Company X as a company is also doing well with the organisational and managerial support.



However, the user acceptance shows that Company X should improve on four main points: clarity of dashboards and terms/abbreviations, availability of training, availability of data, and improvement of support facilities.

*‘Which visualisations in Power BI are suitable for which visualisation goal?’*

Based on the theory defined in the literature, a theoretical framework is set up to guide one’s visualisation choices. The framework can be found in Section 4.1 and presents the visualisations in Power BI which can be used to present data for KPIs. From the framework, one can deduct which visualisations in Power BI can be used for which objective.

*‘What should the design of the dashboards for the sales teams of Company X look like?’*

Using the answer to the first sub-goal as input for the dashboards, four dashboards have been designed for the sales teams within Company X. These four dashboard designs are described in Chapter 5 and are designed following the theoretical framework for selecting appropriate visualisations. Next to the framework, guidelines for designing dashboards have been used in the design process.

*‘To what extent is the design expected to increase the user acceptance of dashboards in Power BI for the sales teams at Company X?’*

By implementing the designs presented in Chapter 5, user acceptance is expected to increase. On average, no construct measuring the user acceptance decreases compared to the current user acceptance. However, as described in Section 6.2, some statements measuring user acceptance have decreased for the expected user acceptance. Overall, still, an improvement in user acceptance is expected.

**Answer to second sub-goal:** The dashboards for the sales department should be designed according to the design proposed in Section 5.2 following the theoretical framework in Section 4.1 and the additional design guidelines from Section 4.2.

***‘How can Company X design its business intelligence for the sales department to increase usage for monitoring and improving its performance?’***

Company X should design its business intelligence for the sales teams within the sales department according to the designs presented in Section 5.2 to increase usage for monitoring and improving its performance. In Chapter 6, results show that these designs are expected to improve user acceptance, which is expected to result in an increase in usage of the business intelligence by the sales department.

## **7.2 Recommendations**

The results of this research provide Company X with designs improving user acceptance and are expected to increase the usage of the business intelligence by the sales department. In this section, the recommendations following from this research for Company X are described.

Firstly, Company X is recommended to implement feedback rounds on the dashboard designs and its content and redesign the proposed designs from this thesis when necessary. Also, Company X could consider proposing different designs to its employees before choosing a definite design for the dashboards.

Secondly, Company X is recommended to implement the designed dashboards (possibly after implementing feedback rounds and adjusting the designs) and evaluate whether the user acceptance increases once the designs are implemented. The user acceptance can be assessed using a similar method as has been done in this research, such that results can be compared easily.

Next to that, Company X is recommended to provide users with a list containing definitions for the data in the dashboards. This enables users to better understand the data presented in the dashboards and decreases the risk of misunderstandings and misinterpretations. Company X could also look into adjusting the definitions and abbreviations used in the dashboards, but due to databases being part of a bigger data system used in multiple countries, this is most likely not possible.

The fourth recommendation for Company X is to investigate the support system for using dashboards in Power BI. This includes both training and support when problems are encountered. Company X must provide training which is available for employees to learn how to use dashboards in Power BI in such a way that this is beneficial when executing their job. Next to that, Company X should evaluate whether there is enough support available when employees encounter problems with Power BI.

The fifth recommendation is to revise the dashboards which Company X has currently designed for the sales department. This should be done using the theoretical framework presented in Section 4.1. Next to that, the content of the dashboards could be revised.

The last recommendation is to investigate the insights which currently have not been included in the research results. In Section 2.2.1, insights have been defined by the sales teams. Company X must investigate what KPIs should be included to provide these insights and Company X must decide on which platform these insights must be included. The insights defined in this research are customer satisfaction, a project overview, forecasting analysis, and the monthly report.

### **7.3 Limitations**

This research has been conducted with several limitations. This section describes the limitations that have been experienced when conducting this research.

One limitation of this project is the available time. This project, excluding the setup of the project plan, is meant to take ten weeks of full-time work, which means that there is only a limited amount of time available for the project to be completed. This might have rushed the process of conducting the research and the thorough understanding of the processes and the organisation. When more time would have been available, the research could have been executed more thoroughly, possibly resulting in a more extensive list of defined KPIs than the list defined in Section 2.4. Next to that, the dashboard designs could not be implemented. Therefore, the results discussed in Chapter 6 are based on expectations and can be different once the designs are implemented. When more time would have been available, this research would have included more design proposals and feedback rounds. Also, the dashboards would have been constructed and would have been implemented after which a better measurement of the user acceptance for the new dashboards could have been executed.

Another limitation is the availability of data. Now, multiple databases are not accessible yet in Power BI, which is the business intelligence tool that the company uses. There are no limitations to making the data available, but this costs time and money, and Company X is partially depending on another organisation for this. This means that now, there is limited data available. Employees are used to the current data availability and might have been held back by this when thinking of KPIs they found relevant. During the interviews, the interviewees were told to not let this be a restriction. However, employees might still have been thinking much within the boundaries of the current data availability. Due to this limitation, KPIs relevant to sales within Company X might have been missed.

The last limitation of this research is the availability of literature. During the literature research in Chapter 2, many sources were not available. The literature referred to in this research had to be obtained either via open access or via institutional access from the University of Twente. As mentioned

in Appendix A, many sources were not available for the literature research. More extensive literature research could result in different or more KPIs in Table 8.

#### **7.4 Scientific relevance and further research**

When executing this research, it was found that not many KPIs were defined in literature that were specifically relevant for a sales department for a component specialist to measure its overall performance. This presents a knowledge gap. During this research, a list of KPIs has been defined with relevant KPIs for a sales department within this sector for monitoring sales in general. The list of KPIs can be used by other component specialists to monitor and improve their performance and adds to filling this knowledge gap. However, this research presents a study executed at a single company. Also, due to limited literature being available, there could be KPIs missing in the literature study that has been executed in this research. Despite this, the report of this research does add to filling the knowledge gap as a list of defined KPIs for sales in general is presented.

This research is executed at Company X. In the future, similar research could be executed within sales departments of other companies. This additional research could add to the results of this research and provide more insight in the KPIs which are relevant in general.

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## 9 Appendices

### Appendix A Systematic literature review

A systematic literature review (SLR) is conducted to answer the following research question:

*'What KPIs are established in literature for a sales department in general for businesses?'*

#### A.1 Defining the inclusion and exclusion criteria

Inclusion and exclusion criteria are important for the SLR, as they set boundaries within which literature will be searched for. For this SLR, two inclusion and one exclusion criteria are used.

There are many types of companies with activities in the field of sales. For different types of companies, the selection of relevant KPIs can be different. This bachelor thesis is conducted for Company X. To answer the research question, it is important to only include literature that is relevant for this type of company. Therefore, only literature concerning a manufacturing/production company is included.

The economy and technology are constantly developing, so the literature must not be too old to be relevant for this research. Therefore, the exclusion criterion excludes articles from before the year 2000.

For this research, only English and Dutch sources are included as other languages cannot be read and therefore not be understood by the researcher.

#### A.2 Defining the databases used

For this SLR, Scopus and Web of Science are the databases that were used. Both databases contain many articles which give much content to answer the research question properly. Also, both databases provide reliable sources and a possibility to insert search queries to find relevant articles.

#### A.3 Describing the search terms and the used strategy

To search for relevant literature that answers the research question, search terms must be defined. These search terms are based on the formulation of the research question. The key concepts are terms that are in the research question and cannot be left out of the research question. The related terms have a similar meaning as the key concept, but another word is used. The narrower terms narrow down the search for literature by making the key concept more specific.

Table A.1: Search terms systematic literature review

Key concept	Related terms	Narrower terms
Key performance indicator	- KPI	- Balanced scorecard
Relevant	- Applicable - Important - Significant	
Sales	- Retail	- Sales performance

In Scopus, the following search query was used:

*( TITLE-ABS-KEY ( "Key performance indicator\*" OR "KPI\*" OR "balanced scorecard\*" ) AND TITLE-ABS-KEY ( "relevant\*" OR "applicable\*" OR "important\*" OR "significant\*" ) AND TITLE-ABS-KEY ( "sales\*" OR "retail\*" OR "sales department\*" ) )*

In Web of Science, the search query is different, but works similarly to the query in Scopus:

*"Key performance indicator\*" OR "KPI\*" OR "balanced scorecard\*" (Topic) and "relevant\*" OR "applicable\*" OR "important\*" OR "significant\*" (Topic) and "sales\*" OR "retail\*" OR "sales department\*" (Topic)*

In Scopus, the terms were searched in either the title, the abstract, and the keywords of the article. For Web of Science, it searched for the terms in the 'topic', which includes the title, the abstract, the author keywords and other keywords from the article.

#### A.4 Listing the number of search results

Once the queries were put in the databases, the search results were as follows:

Table A.2: Number of search results SLR

Scopus	209
Web of Science	90
Duplicates	32
<b>Total</b>	<b>267</b>

After that, the inclusion and exclusion criteria were used. This narrowed down the number of results:

Table A.3: Number of results SLR after inclusion and exclusion criteria

Scopus	99
Web of Science	38
Duplicates	27
<b>Total</b>	<b>110</b>

By reading the titles of these 110 articles, 79 articles were excluded because of a lack of relevance to this research. Another 123 were excluded after reading the abstract. Of the eight articles that were left, six were not accessible, which resulted in two relevant articles.

Using the snowballing technique, two more articles could be selected which are relevant for this review. The four sources are described in Table A.4.

Table A.4: Selected sources

Title	Source	Description
'Determining the KPIs of the German engineering industry based on the evaluation of contemporary business models.'	(Kostin et al., 2021)	Measurement of the relevance of KPIs for multiple types of companies. Relevant KPIs for component specialists are defined in this article.
'KPIs for Operational Performance Assessment in Flexible Packaging industry.'	(Cristea & Cristea, 2021)	In this article, the relevance of defined KPIs is measured for the production industry. In this article, KPIs are established.
'The key performance indicators (KPIs) and their impact on overall organizational performance.'	(Ishaq Bhatti & Awan, 2014)	The relative importance of KPIs is measured within the overall manufacturing sector.
'The performance consequence of multiple performance measures usage.'	(Jusoh et al., 2008)	In this article, the relevance of KPIs within manufacturing companies is measured through a case study on Malaysian manufacturing companies.

## Appendix B UTAUT results current situation

Employees from the sales teams were asked to rate these statements according to the rating system in Table 3. Respondents were asked to read 'dashboards in Power BI' where 'Power BI' was written.

Table C.1: UTAUT questionnaire results current situation

S#	Statement	Average	% ratings below 2
	<b>Performance Expectancy</b>	<b>3,1</b>	<b>0%</b>
S1	Ik zou Power BI nuttig vinden in mijn werk.	3,8	0%
S2	Gebruikmaken van Power BI stelt me in staat om taken sneller te voltooien.	2,8	18%
S3	Gebruikmaken van Power BI verhoogt mijn productiviteit.	3,0	6%
S4	Gebruik maken van Power BI kan mijn loopbaan bevorderen.	2,7	0%
	<b>Effort Expectancy</b>	<b>2,5</b>	<b>0%</b>
S5	Het gebruik van Power BI is duidelijk en begrijpelijk voor mij.	1,9	41%
S6	Vaardig worden in het omgaan met Power BI zou gemakkelijk zijn voor mij.	3,5	0%
S7	Power BI is voor mij gemakkelijk te hanteren.	2,2	24%
S8	Leren omgaan met Power BI is gemakkelijk voor mij.	2,2	29%
	<b>Social Influence</b>	<b>2,7</b>	<b>0%</b>
S9	Mensen die mijn gedrag beïnvloeden vinden dat ik gebruik zou moeten maken van Power BI.	2,0	29%
S10	Mensen die voor mij belangrijk zijn vinden dat ik gebruik zou moeten maken van Power BI.	2,4	24%
S11	De directie van deze organisatie ondersteunt het gebruik van Power BI.	3,3	6%
S12	Over het algemeen steunt de organisatie het gebruik van Power BI.	3,2	6%
	<b>Facilitating conditions</b>	<b>2,4</b>	<b>0%</b>
S13	Ik beschik over de nodige middelen om gebruik te maken van Power BI.	2,9	18%
S14	Ik heb de nodige kennis om gebruik te maken van Power BI.	1,8	41%
S15	Power BI is compatibel met andere werkwijzen die ik gebruik.	2,4	12%
S16	Een specifiek persoon (of dienst) is beschikbaar voor bijstand bij problemen met Power BI.	2,4	18%
	<b>Self-Efficacy: Ik zou een taak in Power BI kunnen voltooien...</b>	<b>2,7</b>	<b>0%</b>
S17	... als er niemand beschikbaar was om me stap voor stap te vertellen wat ik moet doen.	2,8	12%
S18	... als ik een beroep zou kunnen doen op iemand voor hulp wanneer ik vastloop.	3,5	0%
S19	... als ik veel tijd had om de taak te voltooien waarvoor Power BI bedoeld is.	2,7	0%
S20	... als ik voor bijstand enkel een beroep kon doen op de helpfunctie die in Power BI is voorzien.	1,9	35%



## Appendix C Dashboard 'Financial insight in area'

*\*This part has been removed due to confidentiality agreements\**

## Appendix D Dashboard 'RFM model'

*\*This part has been removed due to confidentiality agreements\**

## Appendix E Dashboard 'Order analysis'

*\*This part has been removed due to confidentiality agreements\**

## Appendix F Dashboard 'self-analysis'

*\*This part has been removed due to confidentiality agreements\**

## Appendix G Results questionnaire current and expected user acceptance

Table H.1: Results questionnaire current and expected user acceptance

S#	Statement	Current average	Current % ratings <2	Expected average	Expected % ratings <2
	<b>Performance Expectancy</b>	<b>3,1</b>	<b>0%</b>	<b>3,2</b>	<b>10%</b>
S1	Ik zou Power BI nuttig vinden in mijn werk.	3,8	0%	3,5	0%
S2	Gebruikmaken van Power BI stelt me in staat om taken sneller te voltooien.	2,8	18%	3,3	0%
S3	Gebruikmaken van Power BI verhoogt mijn productiviteit.	3,0	6%	3,1	0%
S4	Gebruik maken van Power BI kan mijn loopbaan bevorderen.	2,7	0%	2,7	20%
	<b>Effort Expectancy</b>	<b>2,5</b>	<b>0%</b>	<b>2,9</b>	<b>10%</b>
S5	Het gebruik van Power BI is duidelijk en begrijpelijk voor mij.	1,9	41%	2,7	10%
S6	Vaardig worden in het omgaan met Power BI zou gemakkelijk zijn voor mij.	3,5	0%	3,2	10%
S7	Power BI is voor mij gemakkelijk te hanteren.	2,2	24%	2,7	20%
S8	Leren omgaan met Power BI is gemakkelijk voor mij.	2,2	29%	2,8	10%
	<b>Social Influence</b>	<b>2,7</b>	<b>0%</b>	<b>3,1</b>	<b>0%</b>
S9	Mensen die mijn gedrag beïnvloeden vinden dat ik gebruik zou moeten maken van Power BI.	2,0	29%	2,8	10%
S10	Mensen die voor mij belangrijk zijn vinden dat ik gebruik zou moeten maken van Power BI.	2,4	24%	2,8	10%
S11	De directie van deze organisatie ondersteunt het gebruik van Power BI.	3,3	6%	3,4	0%
S12	Over het algemeen steunt de organisatie het gebruik van Power BI.	3,2	6%	3,5	0%
	<b>Facilitating conditions</b>	<b>2,4</b>	<b>0%</b>	<b>3,0</b>	<b>10%</b>
S13	Ik beschik over de nodige middelen om gebruik te maken van Power BI.	2,9	18%	3,3	0%
S14	Ik heb de nodige kennis om gebruik te maken van Power BI.	1,8	41%	3,0	10%
S15	Power BI is compatibel met andere werkwijzen die ik gebruik.	2,4	12%	2,5	10%
S16	Een specifiek persoon (of dienst) is beschikbaar voor bijstand bij problemen met Power BI.	2,4	18%	3,0	10%
	<b>Self-Efficacy: Ik zou een taak in Power BI kunnen voltooien...</b>	<b>2,7</b>	<b>0%</b>	<b>2,7</b>	<b>20%</b>

<b>S17</b>	... als er niemand beschikbaar was om me stap voor stap te vertellen wat ik moet doen.	2,8	12%	2,5	20%
<b>S18</b>	... als ik een beroep zou kunnen doen op iemand voor hulp wanneer ik vastloop.	3,5	0%	2,7	20%
<b>S19</b>	... als ik veel tijd had om de taak te voltooien waarvoor Power BI bedoeld is.	2,7	0%	2,9	20%
<b>S20</b>	... als ik voor bijstand enkel een beroep kon doen op de helpfunctie die in Power BI is voorzien.	1,9	35%	2,6	20%