HOW CAN COMPANIES WITH LIMITED RESOURCES BEST OBTAIN A DATA-DRIVEN PRICING STRATEGY?

Industrial Engineering and Management

Dassen, T. (Thory, Student B-IEM)
t.dassen@student.utwente.nl

I. Preface

This report is the final result of my research conducted at Catch-22, which is written to fulfill the graduation requirements of the Industrial Engineering and Management Bachelor program at the University of Twente.

I want to thank all the people within Catch-22 for their help. The research was conducted during the COVID-19 pandemic, and all the research has been done online. It was hard in the beginning, but without actually seeing the employees of the company, I have felt very welcome. I have had a lot of support from my close friends and family, who have motivated me to work hard, even when sometimes it felt I was on my own.

From the University of Twente, I want to thank my supervisors Dr. A. Abhishta and I. Topan for helping me with this research.

I hope you enjoy reading my thesis.

Thory Dassen

Enschede, July 2021.

II. Management Summary

Catch-22 is an organization willing to invest in big data analytics. It wants to improve their business by making use of data science and data analytics and is willing to make investments that enable this. It is an ambitious and growing consultancy organization. The organization is founded in 2019 and is focusing on coaching, counselling, and training. Catch-22 focusses on improvement and change issues where people, process and technology are central.

Problem description and motivation

However, Catch-22 is facing a number of issues. They have a small team of staff (six employees) and they have invested a lot in their new product: The Catch-22 Academy. The Academy is an online platform that provides online training videos especially for maintenance engineers. The research problem that Catch-22 provided me with was based on looking at ways to come up with a pricing strategy and provide research to motivate that pricing strategy. Investments have been made in the development and implementation of this Academy, and the investments need to be earned back. In the first weeks of my assignment, I talked to all the members of the organization to narrow down the problems they face. As the days followed, I became more aware of the complexity of the problem. Just providing a pricing strategy was not enough. A pricing strategy requires data from the market, data from competitors and data from the market. Due to the insufficient availability of data, Catch-22 was unable to construct and implement a pricing strategy. Hence, the research goal was to increase the availability of data to construct and monitor a pricing strategy.

Approach

For this research I used the Design Science Research Methodology (Peffers et al., 2007). This approach allowed me to work alongside fixed steps, in order to create structure and work towards an artifact (a prototype of a solution) and resulted in a dashboard for the company that provided insights in performance, marketing efforts and logistics. For validation of this proposed solution, I conducted a semi-structured interview that allowed me to measure the effectivity and reliability of my dashboard. The outcome of the validation was that the dashboard fulfills all the constructed objectives, and almost all the requirements. The overall performance of the dashboard was graded with a 8 on functionality.

Conclusion & Recommendations

Based on this research, I have made some recommendations. For instance, integrating sales within the dashboard is very important in monitoring the overall performance of the organization. Furthermore, I want to address that implementing an online dashboard increases the functionality of the dashboard and allows for better integration along different data types. At last, we want to recommend implementing a dynamic pricing model in the future through enabling dual channeling across its customers.

Contents

1 Introduction

In the following chapter, I will introduce the different aspects of this research. The host-organization is introduced, and after that we come to the core problems of this research. The needed methodology and research design is also explained. This also includes the research questions and the required deliverables for this research.

1.1 General Introduction

Using experience or gut feeling for decision making is shifting towards data-driven decision making within all the industries. When we look at leadership and decision making within the 21st century, we identify a shift in decision making (Provost & Fawcett, 2013).Some examples of this are targeted-marketing and online marketing. Data science enables managers to increase their knowledge on all business problems that one can think of. That being said, we still see that not all companies are correctly implementing this science, or even implementing it at all. According to Forbes (2019), only 53% of companies are adopting big data analytics. This means that the other 47% of the companies do not use data science to increase their knowledge and tackle business problems.

There are multiple advantages of data science. However, according to Akter et al. (2016), we find that 47% of companies have reasons to not apply data science. A recent study by Accenture and General Electric (Columbus, 2014) reports that: “87% of enterprises believe Big Data analytics will redefine the competitive landscape of their industries within the next three years. 89% believe that companies that do not adopt a Big Data Analytics strategy (BDA) in the next year risk losing market share and momentum.”

BDA requires a link between three important factors: humans, technology, and management. Furthermore, the implementation of BDA requires an investment. This investment faces a lot of challenges due to the missing link between the capability of the organization to use the analytics and the performance of the organization. In other words, the required investment is only the beginning of the shift in management and performance. The difficulty of correct implementation of big data analytics and validation makes some companies stick to their known way of conducting business. However, other companies are willing to take the risk and invest in this shifting atmosphere of management and business performance.

1.1.1 Introduction to Catch-22

Catch-22 is an organization willing to invest in big data analytics. It wants to improve their business by making use of data science and data analytics and is willing to make investments that enable this. It is an ambitious and growing consultancy organization. The organization is founded in 2019 and is focusing on coaching, counselling, and training. Catch-22 focusses on improvement and change issues where people, process and technology are central. Every organization is unique and valuable. Their motto “Catch-22 takes small pebbles out of shoes to be able to make bigger strides”, is based on the continuous improvement. This means that they focus on the small obstacles that occur in organizations that jeopardize its effectivity. They assume that every organization and its people have everything to be successful, and by helping them to recognize and utilize those qualities, the organization can defy future

challenges themselves and can again rely on their own goals and strategy. Catch-22 believe this approach only leads us to sustainable change.

However, Catch-22 is facing a number of issues. They have a small team of staff (six employees) and they have invested a lot in their new product: The Catch-22 Academy. The Academy is an online platform that provides online training videos especially for maintenance engineers. The different topics (e.g., Data Asset Management, 5S, Risk Management) are split up into modules that are sold separately. These modules are sold to companies that offer these training videos to their employees.

1.1.2 Introduction to the C22-Academy

The Academy is the core scope of my assignment. The Academy has been live since September 2020 and new modules have been produced since then. The Academy currently has two staff members assigned full-time to this project. The academy is online only, and the modules are unique in this type of industry. All the modules make use of professional animations and voice-overs.

Catch-22 has been developing their services to the change in learning accordingly. One of the biggest changes in the past decennium has been the shift to virtual classrooms and the change in mindset in how to learn. However, Catch-22 has seen that this shift is not only positive. For instance, they experience that we all desire and require human contact while learning. Catch-22 adapts this market-demand and has implemented various ways to integrate the human-factor into the virtual classroom, by offering coaching and delivering knowledge via training videos.

Currently there are two different courses available. We distinguish between modules, and smaller courses. A training module consists of around two hours of video material that cover a bigger concept, while the smaller courses contain the different topics of a module and is around 30 minutes of video material. After an online training, after-service is provided through answering questions and working close together with the organization. Customers test their knowledge with assignments that are provided after each training video, and if there are any remaining questions, they can purchase additional counseling time with one of the employees of Catch-22. This means that the after-service, the counseling after a training video is extremely important for the success of the Academy. The average counseling fee in this market is around 150 euros per hour which can generate large revenue streams for Catch-22. Therefore, another important product of this Academy is the counseling hours sold as an addition to the main product, the training modules.

1.2 Problem identification

As mentioned before, the academy has been online since September 2020. Since then, the organization has grown a lot and certain aspect of a starting organization have been neglected due to the lack in time, staff, and priorities. The main goal of the Academy and Catch-22 is to ensure maximum revenue while satisfying the customers they serve. Furthermore, the continuous improvement also reflects on the modules they create. The way we look at business and core business processes changes over time, and this change should also be seen into the modules the Academy provides. This means that another goal is that the module should reflect the demand of the market at any given time from now on. Coming to the core problem of my assignment has been more difficult than anticipated. The problem that Catch-22

provided me with was based on looking at ways to come up with a pricing strategy and provide research to motivate that pricing strategy. In the first weeks of my assignment, I talked to all the members of the organization to narrow down the problems they face. As the days followed, I became more aware of the complexity of the problem. Just providing a pricing strategy was not enough. A pricing strategy requires data from the market, data from competitors and data from the market.

While the initial problem was all about the pricing strategy, in collaboration with my supervisor from the organization, Marieke Koningen, I went deeper into the problem and found out that constructing a pricing strategy is a result of improving the data collection and visualization of the collected data. In other words, the pricing strategy was the tip of the iceberg and not the core problem of my assignment.

When my assignment started, plans for data gathering were there but not implemented yet. This meant that effectiveness of all the marketing efforts, advertising and investing in the virtual classroom was not measured and therefore could not be monitored or even improved. For my research this meant two things: Firstly, the scope of my research was very important. What gives the most impact to the organization and guarantees reliability and validity? And secondly, how to combine that with a realistic problem statement for the timespan of ten weeks?

In the first weeks, I have performed a SWOT-Analysis with the staff of Catch-22 to get clear insight in any structural issues. As mentioned before, I needed to know if the lack of a pricing strategy was the cure for all the problems within the organization. Due to COVID-19, I am working from home and every meeting is online. While this makes certain things more difficult, I have tried my best to get the best information about the organization as possible.

The SWOT-Analysis consists of several stages. The first stage is done with all the staff members and was set-up like a brainstorm session. We distinguish four quadrants in a SWOT Analysis, namely the strengths, weaknesses, opportunities, and threats. Through a brainstorm session we filled the quadrants and discussed the points made by the staff members. After filling each quadrant, I gave the employees time to come up with their own personal top three per quadrant. I added a weighted score to each top three by simply ranking and multiplying. The number one receives three points, the number two receives two points and the number three received one point. For each quadrant, the average top three was then created. For my own benefit, I needed to know what the staff members thought they needed to improve. And, when mentioning their own strengths, I immediately could see how they looked at the situation and how to solve it.

The session started with discussing the organization's strengths. Right away, I could identify some important factors. Two of the staff members have years of experience in this line of work (consultancy and coaching) and have acquired an enormous network. According to the staff members, this network is not used yet to promote and increase the reach of the Academy yet. Another strong point is the professionalism of the videos that are online now. This is unique for the market as the direct competitors do not offer this quality. Catch-22 have hired an extra employee who purely focusses on the animations present in the training modules. Because of this employee, minor problems can be fixed in a matter of minutes instead of days because of the short lines of communication. Furthermore, the knowledge on

how to run a business is present. The experience of working in different layers of a big organization is within the organization and can be used as a strategic factor in the near future.

The employees see a shift in demand in the market. Catch-22 predicts an increase in demand by young professionals. They are inspired and stimulated to embrace the lifelong learning principle, which states that one can always increase its knowledge through education. Based on the brainstorm session, I find that the following assumptions are made by the staff of Catch-22:

- The current generation wants to keep learning;
- there is a gap visible. Employees are either very young or old (<30 years and >50 years). It seems like there is a generation missing on the job market;
- the current demand on training modules on topics such as Operational Management is very high;
- there is no similar supply on the market from competitors;
- due to COVID-19 the e-learning demand has increased more;
- there is a shortage of qualified personnel.

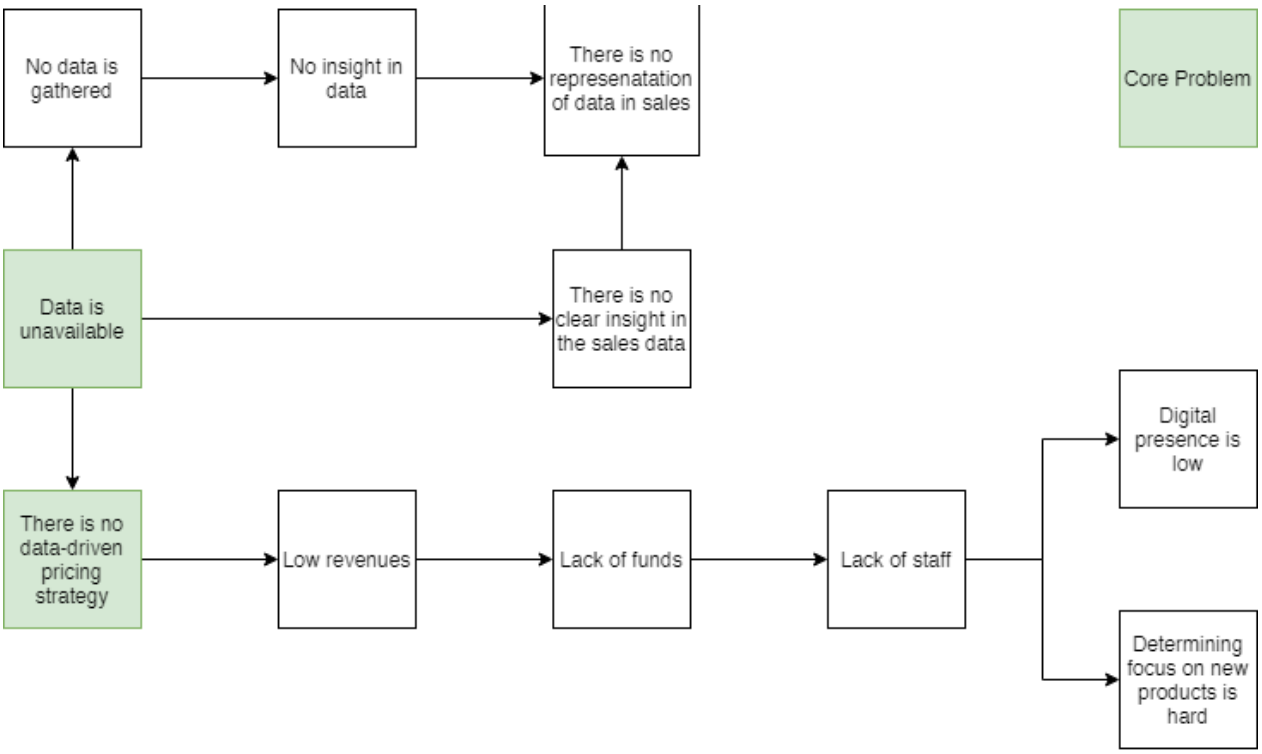
Due to the current COVID pandemic, the staff members also see an increase in demand. Work is shifting from physical to digital environments. The unique selling point of these training modules is that it connects the work floor with the big organization running it. Furthermore, there is a limited supply of well-educated, qualified employees fit for Catch-22. The current pool consists of around 100 potential freelancers fit for working for Catch-22 full-time, but previous experiences have resulted into a negative look on expansion of the workforce. Furthermore, the competitors are also struggling to find well-qualified employees. When Catch-22 fulfills its ambition to be a major player on the e-learning market, we can identify a potential problem. Due to the fact that three of the consultancy employees are working around 36 hours on interim assignments, they have no time to work full-time on the Academy as well. In other words, the ambition to grow with the demand growth may contradict with the amount of full-time employees Catch-22 has.

The abstract above can be constructed in a problem cluster seen in Figure 1. There are two core problems visible in this cluster. While the initial research was based on constructing a pricing strategy, the shift has been made towards improving the availability of data. When data of the customers, marketing, sales, and production is available, we can construct a pricing strategy that is backed up with evidence, research, and most importantly, reliable, and valid data. This led to the following action problem:

Employees are not able to create a pricing strategy for the Catch-22 Academy modules due to the unavailability of information.

1.2.1 Problem Cluster

Figure 1: Problem Cluster



1.2.2 Core problem

How can companies with limited resources best obtain a data-driven pricing strategy?

1.2.3 Motivation Core Problem

We have concluded that the core problem is that the current pricing strategy is not sufficient due to the fact that there is no data available that is necessary to construct such a strategy. Therefore, by improving the data collection and visualizing it, all the tools necessary are present to create a correct pricing strategy.

The current pricing strategy is based on a combination of gut-feeling and educational guessing and leaves room for extensive research. As seen in Figure 1, the lack of an optimized (and monitored) pricing strategy results in low revenues. This is because we cannot determine the maximum revenue if we do not have data that can support those assumptions. When we look at the lowest part of the cluster, we distinguish a problem that, when solved, can contribute to the action problem. When we know how to collect the data of sales and furthermore, give an insightful representation of this data, we know if the chosen strategy works and how it performs. The performance of the chosen strategy can then be controlled, altered, and monitored. Lastly, the other branches of the organization are also more accessible for research and in-depth analysis if a corresponding framework that visualizes the gathered data is built.

1.3 Research Questions

In order to obtain the answer for my core research question, the research is narrowed down up into sub-questions. Each sub-question will cover a different aspect of my research.

1. Current System Analysis
    a. What is the current pricing strategy?
    b. What stakeholders are involved?
2. Literature Study
    a. What pricing strategies are available according to literature?
    b. What is the best method to represent the optimal performance of a pricing strategy?
    c. What are relevant Key Performance Indicators to measure the feasibility of the pricing strategy?
3. Solutions
    a. What is the objective of the representation of data?
    b. What are the requirements for the representation?
4. Validation
    a. How is validation of the representation possible?
5. Recommendations
    a. What can be added to the artifact?

1.4 Deliverables

As seen in the problem analysis, I will look into the best and most feasible way to represent the optimal performance of the pricing strategy. This means that the deliverable will be a method to represent the data we have analyzed and gathered throughout the research process. In the following chapter I will look into the feasible options and combined with the correct approach to constructing KPIs I will recommend and deliver the best option to represent the performance of the pricing strategy. This will probably be a dashboard made through the platform Power BI due to the fact that it integrates all the main data of different software and the host-organization intends to use this platform.

2. Background

The first two phases of the Design Science Research Process (DSRP) have been stated in the first chapter. The second phase of this methodology is concerned with *defining the objectives of a solution*. Before I can move on to the third phase, the *design and development* phase, we first have to answer research questions that will help gather knowledge on the current system. The following chapter is divided into two parts. In the first part, we will answer the research questions that will give insight in the current system. To know what to improve and how to improve, we first need to know what is there. In the second part, we will perform a literature study with three different topics that will give us insight in three different aspects: pricing strategies, corresponding KPIs and the representation of the performance of a pricing strategy. Literature can be used to create knowledge on fields where Catch-22 is lacking that knowledge. By having answered the research questions based on literature, we can move on to the third phase of the Design Science Research Methodology.

2.1 The current pricing strategy

Before we can work towards an artifact that could improve the current system in the third phase of the DSRP, I first need to answer the question: what would a better artefact accomplish? Answering that questions requires us to look into the current system, and in the following section the first research question will be answered:

1a. What is the current pricing strategy?

The current system has no pricing strategy. This means: the final price of the products is not defined yet and the strategy that corresponds to choosing a price is not defined yet. The products (training videos) are under development and not ready to be sold. The focus of the organization is to develop and produce more training videos in the months to come before these are sold.

2.2 Stakeholders

While the current system has no pricing strategy, it does have stakeholders. In the following section, I will answer the following research question:

1b. What stakeholders are involved?

In Figure 2, the difference between the stakeholders is explained. This figure distinguishes between the internal and external stakeholders of the Catch-22 Academy.

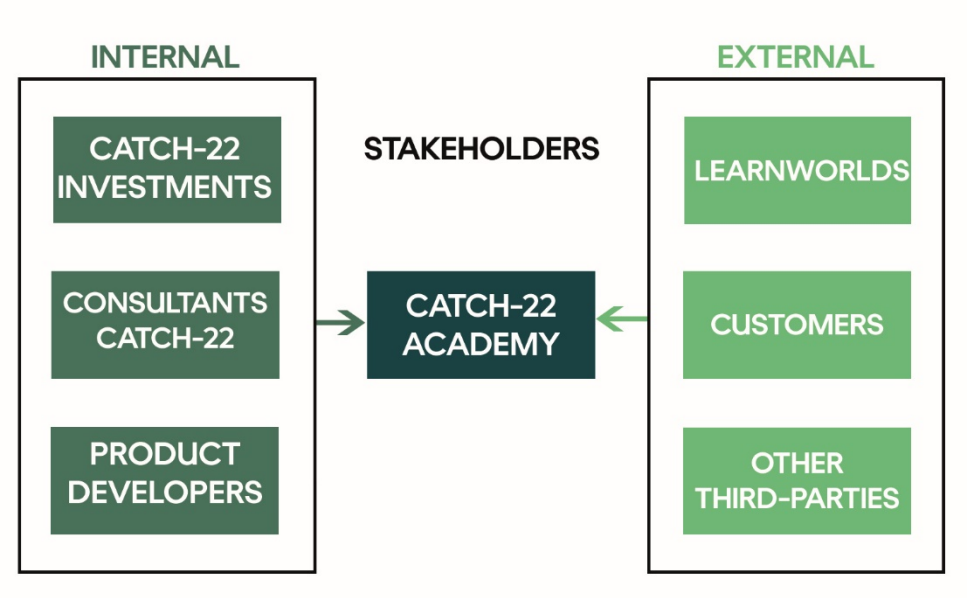


Figure 2: Stakeholders

In the current system we speak both of internal and external stakeholders. The internal stakeholders of the Catch-22 Academy are the entities within the business. They are directly impacted by the actions and performance of the organization.

The Catch-22 Academy closely works together with the Catch-22 Consultancy branch, and this makes it one of the core internal stakeholders of the system. Furthermore, the two employees of the Catch-22 Academy are very important stakeholders. They affect the performance of the Academy and they are the main developers of new products, which generate revenue for the organization. The consultants that are involved in the development process of new products are also internal stakeholders and should therefore be mentioned. They are responsible for the final checks of the products and ensure quality.

Now that we know what activities each stakeholder does in relation to the Catch-22 Academy, we will provide some more insight on how these stakeholders affect the pricing strategy. With the internal stakeholders, the product developer's stakeholder is most important. Longer production times inevitably lead to a higher cost price for the product, which then cost the organization money. The consultants have no major influence on the pricing strategy, they are only necessary for a final check of the created product regarding correctness and quality. The investments are needed for the product development and are indirectly linked to the pricing strategy due to the fact that these investments are used for product development, but not used as an input for the strategy itself. In the long run, these investments need to be repaid, so there is a connection with this stakeholder and the strategy.

The external stakeholders are all the people or groups of people that are affected by the products but are not directly affected by the performance or the outcomes of the business processes of the organization. These are the customers that buy the product, third party companies that are hired for their services, the professional voice-over actor that is hired for his service, and other software companies for licensing. Learnworlds in the online platform that is used for the videos. It costs Catch-22 money but Learnworlds takes care of the framework of the online platform. The external stakeholders

can be divided into two groups: stakeholders that costs money and stakeholders that generate money. The customer stakeholder generates money, the two others cost money. Customers buy the product and generate revenue, while Learnworlds and other third parties ask money for their services.

2.3 Pricing strategy selection

Now that we know what stakeholders are involved and what pricing strategy the current system has, we can look at the objectives of a solution. In the following section, we will answer the following knowledge question:

2a. What pricing strategies are available according to literature?

For this systematic literature review, we have selected seven studies. For this literature study, I have worked according to the Webster & Watson method. I have constructed several inclusion and exclusion criteria that reduced the number of entries that we got from selected database (Scopus). After that I read all the abstracts that were left and reduced more based on relevance of those entries. For the literature study in the next section, I have deliberately included bias in the selection of the entries. Because of the broad availability of sources regarding pricing strategies, I have used only the sources that were fully available. I then performed an extra filter by excluding all sources whereby certain keywords were not present. I am aware this allowed for several feasible entries to be excluded. However, the still existing availability of a broad variety of feasible sources has convinced me that the literature study is valid and reliable. All the choices made can be found in the Appendix A of this research.

2.3.1 Pricing strategy selection from literature

From my literature study, I have looked at the different types of pricing strategies available for companies that concern themselves with e-commerce. As seen in the stakeholder section, the revenue is created by selling the products to customers. This acquisition can be done online or in an offline manner. This means that we speak of a dual-channeling perspective; where an organization sells their products via online channels as well as via traditional channels. With the help of the literature, we have seen that there are several feasible options when looking at pricing strategies.

We have seen several studies mentioning the effects of the Stackelberg Leadership model, where we have seen that the economic leader moves first, and the followers' firms move sequentially. In order to achieve profit maximalization, the market leader will choose the price (Yang & Tan, 2014). Furthermore, the larger the product web-fit is, the more the traditional retailer will improve its retail service (Yan & Pei, 2019).

Another perspective found in literature is the positive effects of adapting dual-channeling pricing with a combination of dynamic pricing. Offering prices which customers think of as fair will have a positive impact on the business by sustaining customer loyalty rather than employing an extreme dynamic pricing approach. Hence, it is recommended that the fluctuations in prices must be in a range that does not hurt the fair price perceptions of the customers (Victor et al., 2018). However, there are downsides to dynamic pricing. If the hybrid firm charges a lower price in its online channel to compete with Internet-only retailers, a practice known as channel pricing, it may not generate enough profit and may even suffer from channel cannibalization. Moreover, inconsistent pricing strategies across channels may cause

confusion to customers (Kauffman et al, 2009). This could negatively impact the reputation of the organization.

Another study (Thoppan et al, 2019), shows that the price perception of customers is very sensitive to the magnitude and proximity of price fluctuations. A customer who gets to know about the pricing strategy will wait for price markdowns and make the purchase once the online price matches his price perceptions. It can be avoided by offering prices which are fair according to the customers rather than employing an extremely fluctuating prices approach which also helps maintain a loyal customer base (Thoppan et al, 2019).

Literature has provided several feasible options for the new pricing strategy. While the Stackelberg Leadership Model tells us that the market leader sets the price and the other market players adapts to that price, we will need to establish who the market leader is in this research. We have performed a thorough competitor's analysis in chapter one, which resulted in finding no real competitor when we look at the products Catch-22 is offering. Literature has given us insights in the advantages of dynamic pricing and this type of strategy also closely connects with the strengths of my host organization. For instance, when a dynamic pricing strategy is correctly implemented, it ensures customer loyalty and allows the maximalization of revenue for the organization. The advantages of dual-channeling can also be fully enabled when choosing a dynamic-pricing strategy. For example, the dual channeling allows us to reduce the costs of a traditional distribution channel. Charging the same price in both the online and the offline channel is the best pricing strategy for a hybrid firm from a long-term perspective (Victor et al., 2018).

2.4 Representation of the pricing strategy

Now that we have looked at the literature for available pricing strategies, we can look at literature again for answering the following knowledge question:

2b. What is the best method to represent the optimal performance of a pricing strategy?

For this systematic literature review, I have selected four studies. For this literature study, I have worked according to the Webster & Watson method again. I have constructed several inclusion and exclusion criteria that reduced the number of entries that we got from the database I used. After that I read all the abstracts that were left and reduced more based on relevancy of those entries. The full process of this literature study can be found in Appendix A.

2.4.1 Representation of the pricing strategy from literature

Literature has provided several clear insights. In the following section we will explain these insights and what conclusions can be based on those insights. The use of multiple perspectives in the visualization of performance is present in all the sources. The host organization also consists of several different stakeholders that all contribute to the overall performance of the organization. Including the customer's voice in the visualization of the performance has been mentioned in multiple sources and is important for Catch-22 as well, as the biggest revenue stream is business to customer sales.

Furthermore, the visualization should provide tools to slice and dice the enormous data streams that flow into the companies (Lamest & Brady, 2019). These tools include the correct interpretation of the data but also the correct people and staff assigned to translate the data into knowledge.
The implementation and increased use of interactive dashboards has contributed to a shift in decision making (Lamest & Brady, 2019). It also enables another important factor, namely a tailored view for every user of the dashboard (Santhoshkumar et al., 2019). Because of the correlation between the different KPIs, key performance indicators, the importance of an accessible platform is high (De Felice & Petrillo, 2013). The fact that an interactive dashboard is available every time, from any place contributes to the accessibility and transparency of an organization (Lamest & Brady, 2019).

The end-user, in this case my organization, is not only a user of the tool but also a participant. (Santhoshkumar et al, 2019). With the help of everybody involved the tool can contribute to continuous improvement throughout the entire organization. A study has shown that the marketing theory provides evidence for the relevance of dashboards (Lamest & Brady, 2019). The increase of data flows creates a need for correct interpretation of those data flows, and a well-constructed dashboard can contribute to that. What should not be forgotten is that every stakeholder has different KPIs (Felice & Petrillo, 2013). The visualization of the performance should therefore consider that the representation can become more complex when more stakeholders are involved.
The best way, according to the literature, is an interactive dashboard that maximizes user-friendliness through reducing visible complexity to the front-end, provides practical relevance while also serving the need to represent the core goals of the organization. In the following section we will elaborate on the input of the dashboard, that requires the construction of key performance indicators, variables that measure the performance of an organization.

2.5 Key Performance Indicators (KPIs)

As mentioned earlier, the current system does not have a pricing strategy yet. A key performance indicator, or KPI, is a measurable value that demonstrates how effectively an organization is achieving key business objectives. For creating a pricing strategy, having KPIs, is crucial. The current system is also lacking KPIs. Therefore, I performed a literature study that had the goal to answer me what KPIs this organization needed for its new pricing strategy variables are chosen by the user, based on the goals and needs of the organization. KPIs can be very effective and are very supportive towards monitoring policies and overall performance, as well as performance in more detailed aspects of an organization. However, without knowing what to measure and why you want to measure it, the construction and implementation of KPIs leads to data with no use. The construction step is very important. The current system has no KPIs, and no measurable variables based on performance. This is due to the fact that the organization is still starting up and no sales have been made yet. However, for the purpose of this research, I have looked into literature and performed research on how to come up with the proper and feasible KPIs, which will be discussed in the following section.

2.5.1 KPI Selection

Another research question formulated in chapter one has to be answered by performing a systematic literature review. We will use literature and the input from my organization to choose the feasible KPIs as input for the final deliverable, the dashboard. In the next section, we will answer the following knowledge question:

2c. What are relevant KPIs to measure the feasibility of the pricing strategy?

I have selected six studies from the literature review. Like with previous literature reviews, I have worked according to the Webster & Watson method. I have constructed several inclusion and exclusion criteria that reduced the number of entries that we got from the database I used. After that I read all the abstracts that were left and reduced more based on relevancy of those entries. The full process of this literature study can be found in the Appendix A.

2.5.2 Findings from literature

Literature has shown that KPIs measuring a pricing strategy can be split up into four different categories. These categories are Marketing & Sales, Logistics & Manufacturing, Finance & Accounting and Human Resources. By splitting up the KPIs in these categories, we can establish structural monitoring on each of the core aspects of the organization. The general idea is that the four production systems perform differently in terms of competitive priorities (Johnson & Rudberg, 2017).

2.5.3 KPI Selection from Literature

While literature provided a lot of KPIs, not all of them were feasible for this research. For example, some KPIs were based on inventory management which is not relevant for this research. However, all the chosen KPIs are relevant for measuring the performance of the pricing strategy, and the four aspects of the pricing strategy. The dashboard should give insight into the KPIs, because all the different production systems are involved in the dashboard.

The success of an organization depends upon its ability to turn its competencies into products and services that customers want (de Felice & Petrillo, 2013). This implicates that the corresponding KPIs should contribute to turning these competencies into customer satisfaction.

It is also crucial to notice that performance measurement systems should focus on what is important to measure and not simply what is easily measurable (Mourtzis, Fotia & Doukas, 2015). We have included KPIs from all the four different production systems in the concept matrix. This list can be expanded after the conducted interviews with the different stakeholders. Also, the priority of these chosen KPIs through literature may change over time or can be withheld from the list if they appear to be irrelevant.

Table 1: KPIs

Marketing & Sales	Logistics & Manufacturing	Finance & Accounting	Human Resources
new customers	Average cost of production	Profit per product	Efficiency of employees
The growth of the total number of customers	Production time/product	Earnings per project	Education level of employees
Perceived Quality	Total production time	Total production cost	Staff satisfaction
Customer satisfaction	Time to market	Development cost	
		Average Sales	

2.6 Objectives and requirements of a solution

In the previous section we have used a systematic literature review to look at the different KPIs, available pricing strategies and the best way to visualize a pricing strategy. In this section we will answer the research questions that provide insight into the objectives and the requirements of the representation of data.

In this section we will perform extra research on the design and development process of the dashboard. In the next several sections, all the relevant steps needed to construct the objectives and requirements of a solution will be taken accordingly. In the problem identification phase, we have constructed the problem cluster and defined the goal of this research. By answering the research questions concerned with the objectives and requirements of a solution, we can construct a possible solution.

2.6.1 Dashboard Objectives

In the following section, we will look at the objectives of the representation of data. In other words, what are the objectives of the represented data and how can we guarantee that these objectives are obtained? We will answer the following research question:

3a. What is the objective of the representation of data?

The objective of the representation of data in general is to create insight in some of the core business processes and ensuring that monitoring of the organizational strategy is possible. Another objective of the representation of data is that it solves a core problem stated in chapter one of this research, namely contributing to the increase of the availability of data in order to create a data-driven pricing strategy.

In the previous chapter we have conducted a literature study that provided us with several objectives for the representation of the data. These objectives can be found in the concept matrix in the Appendix A and are stated as follows:

- the dashboard has multiple perspectives present;
- the dashboard has practical relevance;
- the dashboard allows interactivity;
- the dashboard represents goals;
- the dashboard has minimal complexity.

For the design phase of the dashboard, we need to take certain issues into account that could arise from the objectives stated above. Furthermore, we have performed multiple interviews with employees. As seen in chapter one, we have conducted a SWOT-Analysis that not only demonstrated the weaknesses of the organization, but also spoke of possible opportunities for the organization to exploit its own market the best. The stakeholder that will use the solution to the problem is small (two full-time employees from Catch-22) and therefore their insights are very important because the presented solution later on should be valid and reliable to those two employees.

2.6.1.1 Multiple perspectives

In the second chapter we have seen four different categories for KPIs, that represent a different part of the pricing strategy and its effects on the organization. The corresponding success factors are different for every branch (Frieß, Baumgartner, & Bauer, 2008) and therefore each branch should have a different perspective on the dashboard. A dashboard can be useful for several different stakeholders. In this research, the dashboard is intended for the internal stakeholders that are concerned with the pricing strategy. The pricing strategy has several different aspects that have to be visible in the final dashboard. We should therefore think about the information that is presented to the personnel. What information should be presented for employees from different branches? The use of multiple perspectives integrates the different types of KPIs (Felice & Petrillo, 2013) and with the use of dynamic dashboards, every stakeholder gets a tailored view on the data flows (Santhoshkumar et al., 2019).

2.6.1.2 Practical relevance

Another objective of the dashboard is the practical relevance. We have seen that a study has shown that by creating a dashboard with practical relevance, we obtain a shift in gut-feeling based decision making towards data-driven decision making (Lamest & Brady, 2019). However, the demand for practical relevance should be considered continuously (Frieß, Baumgartner, & Bauer, 2008). We should consider when to update the data to keep the relevance as high as possible. However, the update time is different for different types of data. Not all data needs to be updated every day to be practical and relevant. We are designing a dashboard that is making use of external data as well, so we should continuously look at the practical relevance of those data types.

2.6.1.3 Interactivity

While every branch has its own KPIs, these KPIs are correlated (Felice & Petrillo, 2013). The interactivity between these four perspectives should be present. They contribute to transparency within the organization (Lamest & Brady, 2019), and allow the customers voice to be present. The customer's perspective is important, because this is one of the major aspects of a pricing strategy. Without sales there is no revenue, and with monitoring the customers behavior, we can monitor the performance of certain aspects of this pricing strategy.

2.6.1.4 Represent Goals

Another objective is the representation of the goals of the organization within the dashboard. A good way of constructing goals is by using KPIs for monitoring goals. This implicates that the dashboard represents goals. However, each perspective has different goals and objectives (Felice & Petrillo, 2013). Stakeholder satisfaction plays a major role in the formulation of goals (Frieß, Baumgartner, & Bauer, 2008) and therefore should be considered in the dashboard. Furthermore, the increase of data flows creates a need for correct interpretation (Lamest & Brady, 2019).

2.6.1.5 Complexity

Another objective is to minimize the data present on the dashboard that justify the stated goals. Despite dashboards' popularity, little is known about the extent of their effectiveness, i.e., what types of dashboards work best for different users or tasks (Yigitbasioglu, 2011). A dashboard can become too complex in two ways (Chartio, 2011): in the components, or into overall effect of the interaction of those components. Increase in data does not always result in an increase in effectivity. Therefore, in order to reduce complexity, we have to justify the need of the components present on the dashboard and look in what ways we can optimize the interaction of those components.

2.7 Dashboard Requirements

Now that we have stated the objectives of the dashboard, we need to consider the relevant requirements for the dashboard. This is done by conducting interviews with the organization as an addition to the literature studies performed in the previous chapter. In the following section, the following research question is answered:

> *3b. What are the requirements for the representation?*

When we look at the problem statement in the first chapter of this thesis, we can identify different requirements. We want to increase the availability of data within the entire organization. We also want to monitor this data and create a dashboard that represents the data that is collected accordingly. We have looked at the different objectives of the dashboard in the previous section and combined with the interviews conducted with the employees of the organization we can now come up with the requirements of the dashboard that support these objectives.

2.7.1 Insight in sales

The first requirement can be seen from the problem cluster in chapter one. We want to increase the insight on sales through data in order to monitor the impact of the pricing strategy and the overall

performance of the organization. This is done by the selection of the proper KPIs, which was done in chapter four. The chosen KPIs should be able to provide insight on the sales, but also provide insight into the organization's financial efficiency. Because the organization is currently not making sales, there is no data available. However, profit margins as well as the efficiency of the product development can be analyzed and used for determining the right price for the products. Furthermore, by monitoring the costs made with product development, we can monitor the potential profit in the near future and make decisions on future product development.

2.7.2 User friendly

The second requirement is the user friendliness of the dashboard. The organization is small, and therefore the focus should be on the end-user of the dashboard, the employees. The organization has limited resources and the dashboard should contribute towards increasing the organizational efficiency. This can only be done if the dashboard is user friendly and all the users concerned are benefiting from the dashboard.

2.7.3 Integration of Data

Understanding the firm's market and its position within the market requires information and data from diverse sources at different levels of aggregation and covering different time periods. The dashboard provides a common organizing framework (Pauwels et al., 2009). The input for the dashboard requires the integration of different data types. The data type is primarily Microsoft Excel, so the chosen dashboard should function with those corresponding data type. However, for the proper integration of all the aspects of the organization, preferably other data types (e.g., LinkedIn Navigator, Google Analytics) should be usable in the dashboard as well.

2.7.4 Future Additions

The organization is currently small and is focusing mainly on core business processes to be monitored in the dashboard. However, optional additions could arise in the near future. For instance, when the organization will be focusing on acquisition, requirements and objectives may alter over time. The chosen dashboard should adhere to these changes and should be able to change with the organization over time. We may want to extend the dashboard in the future for the different branches when the organization's size grows. The chosen dashboard should be able to adapt to such changes by being able to extend towards individual dashboards for different stakeholders.

Now that we have created and selected a feasible framework for the dashboard, with the corresponding objectives and requirements, we can continue to the next phase of this research: the design phase. In chapter four, we will present the final KPI list as well as the chosen pricing strategy and provide a dashboard that represents all the aspects of the pricing strategy accordingly.

2.8 Findings

In the past chapter, we have looked at the approach towards the final solution by answering the research questions that are concerned with the representation of data. We have looked at the objectives obtained through literature studies and obtained the necessary requirements for the implementation of

the design of the dashboard. The requirements were obtained by conducting interviews with relevant stakeholders and in the following chapter, we can design the dashboard.

There are some important objectives that needs to be considered. For companies with limited resources, the requirements and objectives of the dashboard are different than for larger companies. The purpose is to increase the efficiency of the organization along the four perspectives of the organization (HR, Finance & Accounting, Logistics & Manufacturing and Marketing & Sales) and should start with a basic framework that is not too complex and is end-user focused. With the help of the GAK-method, where Goals are translated into Actions and KPIs, we can obtain the most effective way of determining what to include and what to exclude (Rickards, 2009). Creating a dashboard that is increasing the insight in sales is the primary goal, and all the other aspects are secondary goals that can be added in the future.

3. Methodology

In chapter two, we have performed one literature study that serves three objectives: create insight in available pricing strategies, create insight in the representation of the pricing strategy and create insight in feasible KPIs. In this chapter, the chosen methodology is explained according to all the steps that can be seen in Figure 3. This research is done according to the Design Science Research Methodology (Peffers et al., 2007). I chose this methodology because of the feasibility of the design cycle that can be seen in Figure 3. It allows me to create an artifact which, in this case, is very useful. The proposed deliverable will be a dashboard which is an artifact. This artifact is a tool which is made for the problem at hand. In this chapter I will explain my problem-solving approach to the core problems that we have introduced in chapter one of this thesis. The chosen research design, research methodology and the final deliverables are introduced, as well as our approach to solving those. The steps of the DSRM are in Figure 3.

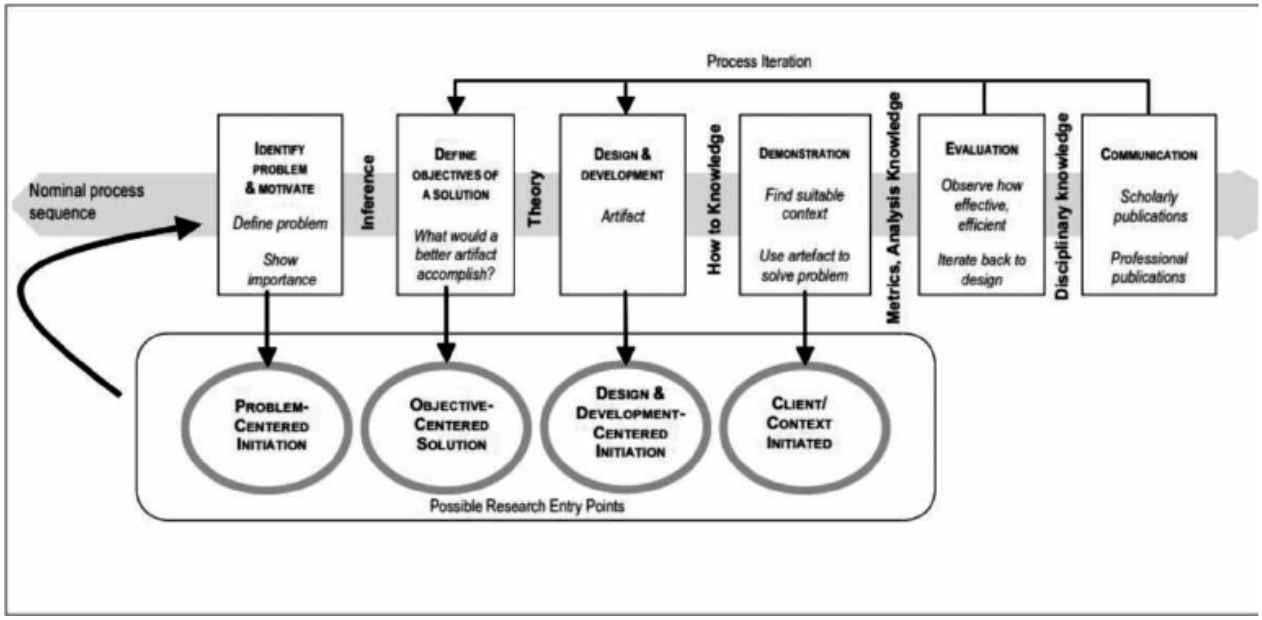


Figure 3: Design Science (Peffers et al., 2007)

Problem identification phase

In this phase, the problem is defined, and the importance is shown to the audience. When we take a glance at the most logical entry point for my research, we can clearly see that we start in the problem identification phase. Here, we are namely getting to know the organization, its employees and diving into the problems at hand. For instance, as mentioned before, the problem started with the host organization lacking to come up with a pricing strategy for their products, and they needed help to come up with that. In the weeks that followed, I discovered that the problems were deeper, and the missing pricing strategy was just a tip of the iceberg for Catch-22. I then discovered that the lack of data-gathering focused on their product and the marketing perspective of this product was the core problem

for this research. But the need to make big data small for companies that have limited resources is very important (Fan, 2019). Our task is to construct a framework that allows the big data to be sliced and diced in order to serve its purpose: create insight in the core business processes of the Catch-22 Academy. The next step is to come up with the objectives of a solution. In this phase, we determine the objectives that provide a solution to our problem from the previous step. These objectives could be quantitative as well as long as it provides a better solution than the current solution. These objectives should be constructed rationally when looking at the problem statement. For my stakeholder analysis, descriptive research is performed. Observation and communicating with the stakeholders, both internal and external. The needed data and knowledge on this matter can be (fairly) easily be obtained through a video-call with my supervisor from the organization.

Objectives of a solution phase

Then in the second phase, we define the objectives of a solution. Before a potential solution can be presented, we need to know what goals this solution must serve. In this phase I will perform research on what requirements and objectives a dashboard should have. I will conduct interviews with the employees, and I will look at available literature for other insights on potential objectives and requirements. When I have both the results from the interviews and from the literature, we will come up with the objectives and requirements of the proposed artifact.

Design and development phase

In this phase an artifactual solution is created. These include potential prototypes of a solution to the problem from the first phase. For this research, this means that I provide an information management tool that visualizes KPIs constructed in the previous phase. This also closely connects with the wishes of the host-organization because they would like the final model to be presented in an online environment (data visualization tool).

The design and development phase consists of several steps. At first, I choose the final KPIs that will be used on the dashboard. This is done by combining the insights created from literature with the insights from the host organization. After that, we will come up with the data needed to express these KPIs on the dashboard. We also provide clear explanation for the type of data needed for each of the KPIs and explain how to prepare this data for the artifact. This also includes the type (graph/table/list) for each of the selected KPIs. The constructed objectives and requirements are used to visualize the KPIs in the proper way. All the types of chosen visualization tools are explained, and the chosen software is explained as well. In the end of this phase, the required framework is created for an artifact that can be demonstrated to the host organization.

Demonstration phase

In this phase, the provided artifactual solution is provided and demonstrated. In my research, this means that I show the first version of the artifact to my Catch-22. This is a very important step because this requires me to explain all the details of my information management tool to my supervisor from the organization. The demonstration phase is not only about me showing what we have done. It also

includes an online training session that ensures that every aspect of the artifact is clear, and that the organization can use my artifact without my help in their business. For that I am giving a presentation to the organization with a training in order to guarantee the continuity of this artifact.

The presentation is done through an online call with the supervisor from the organization, and consists of the following steps:

1. Introduction to the problem
2. Insights from literature
3. Present the KPI list
4. Show for each KPI the necessary data that has to be gathered
5. Show for each KPI the selected visualization and provide argumentation
6. Show the information management tool
7. Q&A session

Evaluation phase

In this phase, as the name states, we evaluate the proposed objective of a solution from the previous phases. Measure and validate the effectivity of the demonstrated model, closely look into the effectivity of a proposed objective of the solution. Due to the fact that the solution only affects two staff members directly, only a questionnaire is not feasible for a reliable validation of the solution. We therefore validate through a semi-structured interview, which will be conducted with the staff member where their performance is directly connected to the performance of the dashboard. The results of this semi-structured interview can be seen in Appendix B.

Communication

In this phase of this research design, we communicate the importance of the problem to all audiences necessary. In my research this means we communicate the importance of this problem to all stakeholders that are concerned with my research. So, this means we have to communicate the problem and the importance of this problem to my supervisor of the organization, the possible audiences that are concerned with this problem as well, and my academic supervisor. Other companies can benefit from the proposed solution if their situation is comparable to the one of the Catch-22 Academy, as well as other students. The main line of communication is by writing and publishing this thesis. This means that by reading this thesis, and following the same steps, everyone that follows the same steps as constructed in this chapter should end up with a similar artifact and solution to the stated research problem.

In this phase, we also communicate all the aspects of this research. The communication phase is very important because at this phase, we can explain the choices I have made, the assumptions we have done and what other results this research has given me. For example, we can communicate the argumentation for the initial price of the product by showing the cost structure. This also includes several recommendations that we will propose to the organization with the corresponding argumentation.

Another important aspect of the communication is the communication towards the organization. In addition to the presentation and training performed in the demonstration phase, we will also construct a user manual for working with the artifact. In this way, the continuity is guaranteed for the years to come and the solution can be validated accordingly. This manual includes all the steps needed to work with the artifact. How to gather the data, how to prepare the data and how so work with the visualization. This manual can be found in Appendix C.

4. Design and Development

In this chapter, we will construct the artifact. This artifact is subject to the objectives and requirements constructed in chapter two. The objectives and the requirements of the solution are as follows:

Objectives

- The dashboard should have multiple perspectives (stakeholders) present;
- the dashboard should have practical relevance;
- the dashboard should allow for Interactivity;
- the dashboard should represent goals;
- the dashboard should have minimum complexity.

Requirements

- The dashboard should create insight in sales;
- the dashboard is user friendly;
- the dashboard allows the integration of different data types;
- the dashboard allows for future additions.

4.1 KPIs

Now that we have stated the objectives and the requirements of both the dashboard as well as the visualization, we can make a final decision on the KPIs that we want represented in the dashboard. In the second chapter we have constructed a list of KPIs that was based on literature. In this section, we will combine and match those KPIs with the list of KPIs that we received from interviewing staff from the organization and provide clear argumentation for the choices we have made. Literature distinguishes between four different categories of KPIs, namely Marketing & Sales, Logistics & Manufacturing, Finance & Accounting and Human Resources. In the following sections, we will explain the choice for KPIs for each of these categories.

4.1.1 Marketing & Sales

We have constructed several KPIs based on literature. The interview gave me another list of KPIs, which we have combined in the Table 2. We can see that the last KPI of this list requires further explanation. Literature provided us with the KPI “Perceived Quality”, while the organization wants further analysis on certain aspects of the marketing side of the organization. For the KPIs “New customers & the growth of total number of customers” the data is acquired through exportation of the LinkedIn data that is being gathered with the traffic on the LinkedIn page.

The marketing budget being spent is a different KPI, because it tells us how effective certain campaigns have been based on the traffic it has created in that given period. We can, in the future, perform additional research that tells us how to effectively advertise, but that lays out of the scope of this research. We can identify that on the final KPI list the “Perceived Quality and Customer Satisfaction” are not included. This is because the organization is purely focusing on developing new products and sales

are not being made. It is therefore at this moment in time not a priority to include these KPIs on the final dashboard.

Table 2: Marketing & Sales KPIs

Based on literature	Based on interviews	Final List
New customers	New customers	New customers
The growth of the total number of customers	Marketing budgets spent	The growth of the total number of customers
Perceived Quality	Interaction rate LinkedIn	Marketing budgets spend
Customer satisfaction		Interaction rate LinkedIn

4.1.2 Logistics & Manufacturing

For the logistics and manufacturing side of the organization, the KPI list is limited. This is due to the fact that the costs of the development of new products is not the main priority of the organization. They want to know how much it costs, but the financials are not a leading priority for measuring performance. The products created need time and attention and therefore should never be rushed. However, for the main aspect of this thesis, we want to include two financial KPIs that allow me to measure the overall performance and the effectivity of investments. For example, when we see that a certain product costs three times the development costs of another similar product, the organization is performing below their own standard. We want to be able to measure the effectivity of a pricing strategy as a whole and measuring the average cost of production is necessary to obtain the right price for the product.

Table 3: Logistics & Manufacturing KPIs

Based on Literature	Based on Interviews	Final List
Average cost of production	Average cost of production	Average cost of production
Production time/product		Production time/product
Total production time		
Time to market		

4.1.3 Finance & Accounting

This part of the organization is important for measuring the overall performance of the pricing strategy because it tells the organization immediately how healthy their business is at a given point in time. When the organization decides to actively sell their product, we can monitor in what way the production costs represent revenue due to sales. In more detail, how to calculate the best break-even point for the product and calculate an expected revenue for those products. Some of these KPIs will only be effective once the organization starts to sell their products. However, in the final dashboard we need to include these KPIs because they can tell the organization how their pricing strategy is performing.

Table 4: Finance & Accounting

Based on Literature	Based on Interviews	Final List
Profit per product	Sales	Sales
Earnings per project		Earnings per product
Total production cost		Total production cost
Development cost		Development cost
Average Sales		Average Sales

4.1.4 Human Resources

As we can see in the table below, we have chosen zero KPIs that are concerned with Human Resources. This is due to the fact that the organization has six employees and the KPIs that have been presented by literature are not in any way relevant for my situation, namely giving insight in the performance of the strategy. There are two employees full-time working on the products that do not have to be tracked in order to measure any kind of performance.

Table 5: Human Resources

Based on Literature	Based on Interviews	Final List
Efficiency of employees	-	-
Education level of employees	-	-
Staff satisfaction	-	-

4.1.5 Final KPI List

We have distinguished between the KPIs from literature and from interviews with the organization and have decided what KPIs are included in the dashboard and what KPIs are not included. The final list can be seen in table 6.

Table 6: Final KPI list

Marketing & Sales	Logistics & Manufacturing	Finance & Accounting
Marketing budgets spent	Average cost of production	Sales
New customers	Production time/product	Earnings per product
The growth of the total number of customers	Total production cost	
Interaction rate LinkedIn		

4.2 Needed Data

Now that we have the final KPI list, we need to know what data is needed to express these KPIs before we can think about the visualization. For the marketing & sales part, we need to know how much marketing budget is spent. This is done automatically by LinkedIn and can be obtained by simply exporting the data. This process will be explained later on in this chapter. For the last KPI of this category, the "Customer Satisfaction", we implement a feedback questionnaire which will be used to measure the satisfaction. This is not in our scope of research and will be done by the organization.

For all the logistics KPIs, we gather the data that is tracked by the organization. This will be continuously tracked through Excel, where the cost structure is monitored, and overhead costs are also noted. The third category, the Finance & Accounting KPIs, we get that data from the third-party organization that provides the digital platform for the organization. This third-party performs all the sales data as well as the earnings per product.

4.3 Software Selection

The main goal of the dashboard is to increase efficiency and monitor the different types of data that is generated by the different types of platforms that are used across the organization. These platforms are LinkedIn Analytics, Google Analytics, and the Learnworlds Analytics. We have looked at the different options available and decided to create a dashboard via Excel. The current resources needed to fully integrate through third-party systems are too high for the organization and therefore another approach should be used. The tradeoff between an offline and online dashboard can be seen in Table 7.

Table 7: Software Selection

	Type of Dashboard	
	Online	Offline
Cost/year	€ 700	€ 0
Pro's	• Live insight • User-friendly • Integration across all data types	• Free • Accessible
Con's	• High cost • Complex	• No live insight • Requires manual actions

This has changed the way we look at the possible options enormously. The organization has no financial asset assigned to such an investment and that leaves room for offline options only. This makes it harder to deliver a dashboard that confirms to all the requirements, because at the end it requires manual actions to obtain the final, desired result. However, the framework for an online dashboard can be made for free and is done accordingly in the following sections. For the purposes of the wishes of the organization we have also created an offline dashboard, which can be seen in the next sections.

LinkedIn and Google Analytics all use the same datafile as output for its data, namely spreadsheets (.xlsx files). In the following section, we will explain more about how to create the best possible dashboard through Excel (offline dashboard) and PowerBI (online dashboard) and aim for the best tool possible for representing and monitoring the chosen pricing strategy for both types. In the final recommendations part, we will leave my thoughts on future methods that become feasible when financial investments are available for a monitoring dashboard.

4.4 Preparing the data

In the following section we will explain the steps we took for creating the data for the dashboard. The offline dashboard has a different approach, due to the fact that it extracts data from Excel only. For the online dashboard, a framework is included and is used to visualize and represent all the KPIs that have been selected in Section 4.1.5.

4.4.1 The offline dashboard

The offline dashboard is constructed via the programming language Visual Basic. We have included a user manual for this type of dashboard in Appendix C. In this user manual, we explain all the steps needed to come up with the dashboard that can be seen in Section 4.5.2. In this section, we will briefly explain the most important steps of this dashboard. The costs of the integration of an online dashboard are too high for the organization at this point as stated in Section 4.3. Therefore, we provide the organization an offline alternative using Visual Basic. For the offline dashboard, we have created a

macro, that loads in all the needed sheets, takes out the information needed in those sheets and deleting those sheets right after that. The user sees nothing happening but is presented with a functioning dashboard that presents the results of the past period. The most important part of the code is about extracting the data from the sheets that are loaded into the dashboard.
We used the following piece of code for this solution:

```
directory = "OWN DIRECTORY"
fileName = Dir(directory & "*.xl??")
Do While fileName <> ""
Workbooks.Open (directory & fileName)
For Each sheet In Workbooks(fileName).Worksheets
   total = Workbooks("FIlename.xlsm").Worksheets.Count
   Workbooks(fileName).Worksheets(sheet.Name).Copy _
   after:=Workbooks("Filename.xlsm").Worksheets(total)
Next sheet
Workbooks(fileName).Close
fileName = Dir()
Loop
```

What this code does is the following: it reads all the available Excel files present in a given directory, where all the sheets will be copied in the opened Excel file. Because LinkedIn uses the same format for its data output, the whole process is harmonized and can be used for every type of file. The next step is looking for the data we do need and discarding the rest of the data present in the loaded sheets.

For the next part, we look into the sheets that we loaded in, and extracting the data we need for the final dashboard. For this part of the dashboard, we do not need all the KPIs yet constructed in the previous part. This is because that data is not available yet and therefore not measurable. The data is then extracted from that given sheet and right after that, the sheet is deleted from the Excel file. In this way, the process takes a fraction of extra time, but in the end, it presents a clean worksheet with no other sheets present in the file. Hence, optimizing the user friendliness of the tool. The extraction of data from the sheets is then repeated in various ways for the needed data that supports the KPIs mentioned in the previous sections. The macro then automatically the tables that provide insight while still being user-friendly.

4.4.2 Online dashboard

The online dashboard is designed via PowerBI. This is software focused on the visualization of data across different platforms (Google Analytics, LinkedIn, Excel, etc.)

The online dashboard requires less data preparation than the offline dashboard. While the online dashboard cannot be implemented in the coming period, we can design and build the entire framework for the online dashboard. In this way, when there will be budget allocated and an online dashboard will be feasible, the organization is presented with a foundation to build further upon. For building the framework for the online dashboard, the steps are the same as the offline dashboard. We need the same data, and we can extract that data from the same places as the offline dashboard. The main difference is

that we do not need to write a macro that does these actions, we can just simply clean the needed columns and rows. In the next section, we will explain all the steps for acquiring the needed data to visualize the KPIs.

4.4.3 Data Cleaning

PowerBI tracks all the data cleaning steps the user has performed. In this way, any other person who opens the dataset can easily see what changes has been made to the dataset. For the example: We want to obtain the number of new followers (as stated in Section 4.1.5). The most important step is to know what data we need, and what data we do not need. In Table 8, we can see what data we need to extract from the exported Excel files. In Table 8 we can see that some data is labeled with "fictional number". This is because that data is not available yet, but the framework has been built if the data becomes available.

Table 8: Needed data

KPI	Needed data	Letter in Figure 6
Total number of followers	Summation of all the new followers per day + the number of followers from the previous period.	A
New followers	Summation of all the new followers per day.	B
New followers/day	Number of new followers per day	C
Interaction rates	For each post: -Interaction rate -Clickthrough rate For the total of post of the past period: -Average of interaction rate -Average of clickthrough rate	D
Number of sales	Not available.	E
Average cost of production	Total of the all the production costs made/number of produced products (Fictional number)	F
Earnings per product	For each product: -Total cost development/number of sales * Sales price (fictional number)	G
Total production cost	Summation of the all the production costs made (Fictional number)	H
Total costs in relation to sales	Summation of total costs / Summation of sales (fictional number)	I
Marketing budget spent	Summation of the marketing budget spent	J

4.5 Visualizing KPIs

Now that we have gathered all the data needed for the KPI and prepared the data for visualization, we can start visualizing these KPIs accordingly. In the following section, we will explain the decisions made for the visualization of the KPIs for both the online as the offline dashboard.

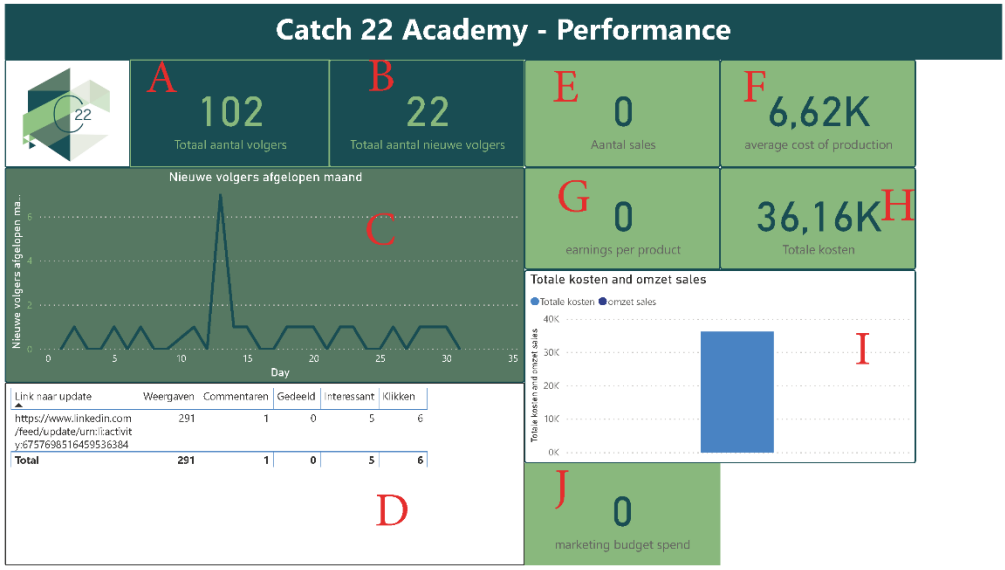
4.5.1 Online Dashboard

In the Figure 6, we can see a snapshot of the framework for the online dashboard. In Section 4.4.3 we have explained what data corresponds to each KPI, and how to obtain it. In the legenda in Table 9 we see what KPI corresponds to which visualization in the figure.

Table 9: Legenda

Letter	KPI
A	Total number of followers
B	New followers
C	New followers/day
D	Interaction rates
E	Number of sales
F	Average cost of production
G	Earnings per product
H	Total production cost
I	Total costs in relation to sales
J	Marketing budget spent

Figure 4: Snapshot Dashboard



For the KPIs number of new followers and total followers we have initially chosen for a figure with the corresponding number only placed in the top of the dashboard. Due to the fact that the performance is measured through this number, we need to make it clearly visible for the user to ensure user-friendliness and reduce complexity.

We can see a graph below those two KPIs where we can see for each day of the given month how the new followers have developed over time. We want to visualize this through a graph in order to see what impact the marketing strategy has done on the reach to new customers. With this graph we can track the effectivity of marketing campaigns. Below that graph we can see a table with extra data regarding the content that has been published. This is done through a table because in that way we can measure the interaction rates accordingly and over time tell more accurately in what way the interaction rates have developed.

On the right side of the dashboard, we have all the visualization of the numbers that account for the financial health of the performance. All the KPIs corresponding to the Finance & Accounting and the

Logistics & Manufacturing can be found in that side of the dashboard. While in the scope of this research we do not have the data available yet for the sales, we can give clear insight in the manufacturing costs that have been made. In the next section, I provide further analysis on the manufacturing side of the organization and provide a break-even analysis for the developed products.

4.5.2 Offline Dashboard

For the offline dashboard, there are some differences towards proper visualization. Firstly, Excel is not a designated tool for visualizing data. This means that while we can visualize KPIs this way, we want to keep the framework as simple as possible. Secondly, we do not include the KPIs that are concerned with the Finance & Accounting side of the organization in the offline dashboard. This is because that data is not available and can therefore not be visualized. The decision to build a framework for those KPIs in the online dashboard is due to the fact that it provides the organization a template for future purposes, without increasing the complexity of the dashboard. Furthermore, my organization will not make use of the template for the online dashboard until they will allocate budget for connecting all the data sources of that template. We therefore do not include those KPIs on the offline dashboard, but we do include them on the template for the online dashboard.

The steps taken in Section 4.4.2 result in a dataset that only has the data needed to express the KPIs that are concerned with Marketing & Sales because that is the only data available. We have chosen to express those KPIs in a table, as seen in Table 9. This format is chosen purely based on the wishes of the organization. They need such a format for the monthly meetings and the numbers are stored locally. While this may seem like a straightforward solution, it does achieve one important aspect of this research: it increases the availability of data regarding the performance of the organization and can therefore contribute to a better monitoring of key aspects of the organization. Furthermore, the steps taken towards acquiring this data are the same as for an online dashboard; the main difference is the options for visualizing the KPIs.

Table 10: Offline dashboard

Results	C22 Academy
Number of new followers (new)	166(+45)
Placed in feed	3
Views in timeline	1149
Video Views	538
Clicks	39
Clickthroughrate	3,36%
Unique visitors	45
Likes	15
Comments	4
Shared items	3
Interactionrate	5,24%

4.6 Initial product price

The use of many performance-improvement tools such as identifying and removing constraints, optimizing logistics all lead down to two pathways, value improvement and cost reduction (Cafferky & Wentworth, 2010. For my research, I came to some limitations regarding this topic. Normally we would speak of fixed costs, variable costs, and other costs.

However, in this research, we combine those costs into Research and Development costs. This is due to the fact that the production of one product, a training video, is a process that takes up to several weeks, but cannot be combined with the development of another product. The true variable costs are too difficult to find and are included in the research and development costs. Variable costs in software development would include aspects such as outsourcing development, costs for using a third party for a platform or infrastructure providers (hosters, data centers etc.). However, in this case we use a third party for the videos, but the costs of using that platform are not (directly) linked to the total number of customers using the platform. Each customer pays a fee for accessing the product through the platform and that is included in the product price. We can therefore conclude that variable costs cannot be included in this thesis.

After a product has been developed, a new product is developed. The products are put on a third-party platform where customers can buy access to this product. The revenue made from one product is therefore only dependent on the number of customers that buy access to this product. A thorough break-even analysis is therefore not feasible, due to the fact that development costs are linear and independent on the number of sales. The breakeven point is the volume at which the total revenue equals the total cost and profit is zero. For this research this means where the total costs of development for the product equals the number of sales times initial price X. In collaboration with the organization, we have set the initial price on €149. They believe that the number of sales needed is feasible and the price is well in between the range of competitors.

5.Validation

The fifth phase of the Design Science Research Methodology evaluates the artifact. This means that it observes how effective and efficient the dashboard is. This means that it in this chapter, we will compare the constructed objectives and requirements of the dashboard with the perceived results through the demonstration of the dashboard. We have made questions based on a combination of using questions from a study (Venkatesh et al., 2013) and constructing own questions based on the constructed objectives and requirements.

5.1 Validation Objectives

Due to the fact that one employee is directly affected by the proposed solution, we have chosen for an interview to validate my solution. The aim of this interview is to know if the core problem is solved by my solution. This is done through a combination of structured questions with a combination of a questionnaire that was filled in afterwards. The entire result of the interview can be seen in Appendix B. The objectives of the dashboard were stated as follows:

- The dashboard has multiple perspectives present;
- the dashboard has practical relevance;
- the dashboard allows interactivity;
- the dashboard represents goals;
- the dashboard has minimal complexity.

In Table 11 I briefly compare the norm with the reality of my solution. After that we go in depth on the validation process, where more explanation is given for each objective.

Table 11: Objectives: Summary Norm & Reality

Objective (Norm)	Reality
1. The dashboard has multiple perspectives present	*We can see several stakeholders on the dashboard*
2. The dashboard has practical relevance	*The dashboard measures the results of their efforts and the performance of the marketing side of the organization.*
3. The dashboard allows interactivity	*The goals and targets that have been set are visible and are measured constantly. This is a great example of interactivity that is present on the dashboard.*
4. The dashboard represents goals	*The selected KPIs are visible and are clear to the end-user. We can identify the targets and the goals that have been set on the dashboard.*
5. The dashboard has minimal complexity	*The dashboard is easy to work with and not complex.*

The first objective states that several perspectives (stakeholders) should be present on the dashboard. The relevant KPIs were selected from literature and stakeholder interviews and these KPIs were used to represent the performance of different aspects of the organization. The core stakeholder present on the dashboard is the management itself, according to the interviewee. However, the customer stakeholder is also visible due to lead-generation of the dashboard. It tracks the number of new followers that are potentially new customers. In that way it is clearly visible what the impact of certain marketing efforts are.

The second objectives states that the dashboard should have practical relevance. The organization was very happy with the practical relevance of the dashboard. It measures the results of their efforts and the performance of the marketing side of the organization. This is very practical for the organization. The dashboard tells what types of efforts lead to positive results and further analysis can be performed based on those results. Marketing investments can be tracked on performance and efficiency in this way fairly easily and give a good insight in the performance of the strategy.

The third objective states that the dashboard should allow interactivity. The goals and targets that have been set are visible and are measured constantly. This is a great example of interactivity that is present on the dashboard, according to the organization.

The fourth objective states that the dashboard should represent goals. This is also the case. The selected KPIs are visible and are clear to the end-user. We can identify the targets and the goals that have been set on the dashboard.

The fifth objective states that the dashboard should have minimal complexity. The organization finds the dashboard easy to work with and not complex. This can also be seen in the questionnaire that can be found in Appendix C.

5.2 Validation Requirements

For the last part of the validation, we want to ensure that all the requirements are being met by the dashboard. The requirements that have been constructed are stated as follows:

- The dashboard should create insight in sales;
- the dashboard is user friendly;
- the dashboard allows the integration of different data types;
- the dashboard allows for future additions.

In Table 12 I briefly compare the norm with the reality of the requirements. After that we go in depth on the validation process, where more explanation is given for each requirement.

Table 12: Requirements Norm & Reality

Requirement (Norm)	Reality
1. The dashboard should create insight in sales.	*Not being met. This is because the sales part of the organization has no priority yet*
2. The dashboard is user friendly.	*The dashboard works and does what it should do, and we have included the proper labels to the visuals in order to increase the user-friendliness of the dashboard.*
3. The dashboard allows the integration of different data types.	*While the only data type for now is Excel, this requirement is out of the scope of my research and is therefore not being met.*
4. The dashboard allows for future additions	*The framework is ready for the future additions on sales and marketing.*

The first requirement, the created insight in sales, is not being met. This is because the sales part of the organization has no priority yet. However, as can be seen in Figure 4, the framework for the sales is ready.

The second requirement states that the dashboard should be user-friendly. According to the organization, this is the case. The dashboard works and does what it should do, and the organization is happy with the result. We have also included several types of visualization tools that have increased the user friendliness. We have included the organization's colors in the dashboard and created an attractive dashboard that is pleasant to look at by the end-user, the employee of Catch-22. The most important KPIs are centered and can be obtained easily when opening the dashboard. We have included the proper labels to the visuals in order to increase the user-friendliness of the dashboard.

The third requirement states that the dashboard should allow the integration of different data types. While the only data type for now is Excel, this requirement is out of the scope of my research and is therefore not being met.

The fourth requirement states that the dashboard should allow future additions. As we can see in Figure 5, this is the case. We have the framework ready for the future additions on sales and marketing, which have become irrelevant for the organization but relevant for the research. The chosen KPIs regarding Sales are necessary according to literature to measure the performance of an organization. Therefore, we have included those KPIs in the dashboard.

5.3 Findings

In conclusion, we have to distinguish between two aspects of the validation: the objectives and the requirements of the solution. All the objectives have been validated by the organization and therefore these objectives have been met. The requirements are not all being met, due to the fact that priorities have shifted alongside my research. However, the framework has been made and is ready in the near future to measure the performance of those goals. All in all, we may conclude that the dashboard meets the formulated objectives.

6. Conclusion & Recommendations

The goal of this thesis was to solve the core problem: no data had been collected regarding sales and marketing and no pricing strategy had been used. The organization wanted a dashboard that provided insight in the performance of a new pricing strategy. Management wants to see the results of their efforts and the performance of the marketing side of the organization. At the beginning of this research, we formulated the following research goal:

Determine how companies with limited resources can best obtain a data-driven pricing strategy.

We have decided to use the Design Science research methodology (DSRM) for this research. It focuses on two main aspects: Design and develop an artifact that improves the situation for the core stakeholders, while measuring the performance of this artifact in the context of the problem at hand. In this research, I have designed a dashboard for my host organization, which has several stakeholders.

We have performed a literature study that contained three different subjects: What are the available pricing strategies, what are the KPIs that are used in measuring performance of a pricing strategy and how to best visualize and measure these KPIs.

The list of KPIs was constructed with a combination of the abovementioned literature study and interviews with the organization. The final selection was made with a combination of those two inputs and used as input for our dashboard. We have designed and developed two different dashboards: An online dashboard and an offline dashboard. We have looked at the shifting priorities within the organization and the feasibility of an online dashboard was not in this scope due to financial reasons. However, we have constructed a framework for an online dashboard that supports all the objectives and requirements literature provided us. In the following sections, we evaluate in what way we have answered the stated research questions formulated in chapter one and look at if we have solved the core problem. Furthermore, we provide recommendations for the organization.

6.1 Research Questions

In Section 1.3 we have formulated research questions that are necessary to solve our core problem. In this section, we evaluate all the stated research questions briefly.

1a. What is the current pricing strategy?

The purpose of this question was to obtain the current situation. We want full understanding of what can be improved and for that we have to know what the current pricing strategy is. The answer was obtained by an interview with employees of the organization, who all agreed with the fact that there was no pricing strategy used. We dug deeper into this problem with a SWOT-Analysis I performed with the employees to really know what other problems were occurring and in what way those problems were related to my core problem. We found out that the collection of data is necessary to even think about obtaining a pricing strategy and that the organization had no resources allocated to improve their data gathering.

1b. What stakeholders are involved?

The purpose of this question is to increase the knowledge in the current system of the organization. Who is affected by my possible solutions and who can benefit from it? A stakeholder analysis was done by conducting interviews with the employees. We could tell after answering this research question what stakeholder potentially costs money, and what stakeholders generate money for the organization.

2a. What pricing strategies are available according to literature?

Due to the fact that in the starting phase of this research there was no pricing strategy, we wanted to create insight in all the available pricing strategies and look for the optimal pricing strategy. We have performed a literature study with corresponding concept matrices that resulted in several feasible pricing strategies. Due to the fact that the organization generates revenue both through online acquisition and offline acquisition, we speak of dual channeling. Furthermore, dynamic pricing, where the price of the product is altered based on several factors, is feasible in combination with dual channeling. The advantages of dual channeling can also be fully enabled when choosing a dynamic-pricing strategy. For example, the dual channeling allows us to reduce the costs of a traditional distribution channel.

2b. What is the best method to represent the optimal performance of a pricing strategy?

The purpose of this research question was to obtain a method that allowed us to visualize the performance of the pricing strategy. We wanted to create insight in marketing, sales, and increase the overall data collection. Measuring performance alone has no purpose. The measurement and monitoring should be accessible for the stakeholders to adapt to changes and improve the performance of the organization. This is done by visualizing the performance and this research question left us with several options to visualize the performance. We came up with objectives and requirements for optimal representation. The most important conclusion based on literature is that the end user is not only a user of the tool, but also a participant. With the help of everybody involved the tool can contribute to continuous improvement throughout the entire organization. The best way, according to the literature, is an interactive dashboard that maximizes user-friendliness through reducing visible complexity to the front-end which provides practical relevance while also serving the need to represent the core goals of the organization.

2c. What are relevant KPIs to measure the feasibility of the pricing strategy?

In chronological order, we now have looked at the possible pricing strategies and constructed a framework for representation with corresponding objectives and requirements. For the last step of the literature study, we need to know what KPIs are relevant to measure the performance of a pricing strategy. We have looked at literature as well as conduction interviews with the organization to come up with a final KPI list that in divided into three different categories; each category representing a different aspect of the organization. We distinguish between Marketing &; Sales, Logistics & Manufacturing and Finance and Accounting. Literature provided us another category, namely Human Resources. We have chosen to exclude that category from the KPI list due to the fact that the organization has six employees

and the KPIs that have been presented by literature are not relevant because they do not contribute to creating insight in performance.

With the final KPI list we have chosen what types of visualization every KPI needs to conform to the objectives and requirements. Furthermore, we have looked at what data is needed for each KPI and how to extract that data from the data sets available.

3a. What is the objective of the representation of data?

The purpose of this research question is the use the knowledge gained from the literature study in combination with the wishes from the organization to come up with a final list of objectives for my solution. We have used the objectives for the construction of the dashboard. The objectives are stated as follows:

- The dashboard has multiple perspectives present;
- the dashboard has practical relevance;
- the dashboard allows interactivity;
- the dashboard represents goals;
- the dashboard has minimal complexity.

The representation of the data is based on the abovementioned objectives and the validation of those objectives can be seen in Chapter 5.

3b. What are the requirements for the representation?

The approach and arguments for the purpose of this research question is the same as for the objectives. The requirements were also created by combining the insights from literature with the findings of the organization. The requirements were part of the framework for the dashboard. It is extremely important to have a clear and structured framework for solving the core problem. The priorities can shift over time, but the resources allocated have to be used as efficient as possible for (relatively) small companies such as my host organization. Therefore, by creating clear objectives and requirements, we were able to narrow the scope and focus on improving key aspects of the organization. The constructed requirements are stated as follows:

- The dashboard should create insight in sales;
- the dashboard is user friendly;
- the dashboard allows the integration of different data types;
- the dashboard allows for future additions.

The representation of the data is based on the abovementioned requirements and the validation of those requirements can be seen in Chapter 5.

The other two research questions are concerned with the validation and the future additions of the dashboard. The validation can be found in Chapter 5 while in the next section we elaborate on future additions to the dashboard, as well as recommendations regarding other topics.

6.2 Limitations

For this thesis, I want to reflect on certain limitations of this research. When working with a start-up company, we have seen that retrieving information can sometimes be very hard. Furthermore, I have seen that over the weeks of this research priorities were shifting in a split second. While this research started with researching a pricing strategy with a corresponding price and approach, it shifted when Catch-22 decided not to sell the products but focusing on product development. When confronted with a startup company with limited resources, figuring out the priorities for research is extremely important. For my research the limitations are as follows:

- The variable costs are not included;
- sales data necessary for measuring performance of the pricing strategy is not available;
- the offline dashboard does not include all the KPIs needed for measuring the performance;
- the pricing strategy is not decided yet.

Not including the variable costs and mapping them with the research and development cost is a normal approach. However, finding out the true variable costs was not achieved due to the difficulty of finding out what those costs are. The data for sales is not available, due to the fact that during this research Catch-22 decided not to focus on sales. For a reliable measurement of the performance, this data needs to be available. I have built a framework for integrating this data when it becomes available. The offline dashboard does not include all the KPIs I have constructed. This is due to the fact that this data is not available yet and can therefore not be used.

The final limitation, namely the decision for the pricing strategy is also not included in this thesis. Research have given me a number of feasible options and I have communicated those options with Catch-22. It is up to them to decide what pricing strategy will be chosen. I will give my recommendation on the pricing strategy is Section 6.3.

6.3 Recommendations

All of the objectives, and most of the requirements of the dashboard are met. However, there are some improvements to be made in the future. Furthermore, I believe certain aspects of this research are a good lesson for future researchers who are confronted with a start-up organization. Start-up companies bring different dynamics to a research problem than “normal” companies. The main difference is sudden shifts in priorities, that can sometimes be of a major impact to a thesis such as this one.

1. **Catch-22 should consider using an online dashboard**

While we have implemented an offline dashboard for the organization, it lacks certain key features that online dashboards do have. An offline dashboard is more difficult to design and develop. Changes to an offline dashboard sometimes result in doing the entire design phase again. Online dashboards, such as PowerBI, have built in tools that help the designer in all the construction steps, and integrates different data types easily. With an offline dashboard, all the data integration is done through manual integration and cleaning, which is time consuming and gives an increased risk for human errors.

Furthermore, an offline dashboard allows interactivity between different stakeholders. End users can slice and dice their own needed information, while an offline dashboard cannot be altered and shows the same result for each stakeholder. We have also seen that the sales integration within the offline dashboard is not feasible, while this can create a major insight in the performance of a pricing strategy.

Another major important difference between offline and online dashboard is the flexibility. We have seen that offline dashboards are not flexible. With a start-up, in a matter of days priorities within the organization can shift enormously. This means that certain KPIs can become obsolete, and the part of the dashboard where these KPIs are visualized are then also obsolete. With an online dashboard, this can be changed within a matter of minutes. With an offline dashboard, this sometimes means that the entire dashboard is obsolete due to the integration and data cleaning steps that have been performed in order to construct the dashboard. We would recommend using PowerBI in the future, where all the major data sets (Excel, Access, LinkedIn, Google Analytics etc.) can be integrated easily within the dashboard.

2. **Integration of sales should be a high priority**

While the priority of the organization is to develop more products before actively focusing on acquisition, the integration of sales within the dashboard should be one of the first additions. We have three categories of KPIs present on the dashboard, but for each category the sales KPIs can create insight in all those categories. The goal of this thesis is to create insight in the performance of the pricing strategy, and this can only be done if we measure all the aspects of a pricing strategy. Furthermore, the usage of future marketing budgets for promotion can only be measured correctly if we know what the results are of those marketing efforts. We therefore recommend focusing on the integration of sales within the (offline) dashboard.

3. **Dynamic pricing with dual channeling**

When looking at what type of pricing strategy the organization should use in the future, I would recommend dynamic pricing with dual channeling. With the performed competitor analysis, we found that within this market, the competition is scarce for the kind of products that Catch-22 develops. This implicate that Catch-22 is the market leader and can use this to their advantage by correctly following the Stackelberg Leadership model, where we have seen that the economic leader moves first, and the followers' firms move sequentially pricing. Offering prices which customers think as fair will have a positive impact on the business by sustaining customer loyalty rather than employing an extreme dynamic pricing approach. The current price of the product lays within this range, so this strategy should be recommended.

6.4 Contribution to practice and theory

In this section I briefly discuss the contribution I have made to practice and theory. This section is meant for both research purposes as well as other companies that have similar problems within their organization as Catch-22.

6.4.1 Contribution to practice

The dashboard has been constructed as a goal to increase the overall availability of data within the organization as well as creating insight in marketing, sales, and logistics. The dashboard is created in such

a way that that it helps to monitor the performance of the organization in a user-friendly manner. The investments made in the organization can be monitored and, in the future, the integration of sales efforts will lead to the increased insight in measuring performance throughout the entire organization. Furthermore, by a performed SWOT-Analysis in the early stages of this research, additional problems have been made clear within the organization that were not clear before. This has contributed to increased knowledge of the health of the organization and future goals for improvement. Due to the increased knowledge on the overall performance, strategic decision-making is now possible more effectively.

I have also created a framework for an online dashboard that is ready to use once the financial resources are available. Tis online dashboard allows the integration of all the different data types along the organization and increases the insights in the core business processes of Catch-22.

6.4.2 Contribution to theory

Other than practical use of this research, I have also ensured theoretical contribution with this research. Organizations with limited access to data or with similar limitations concerning employees, financial instruments or other resources can look at how this research has increased the availability of data in a practical and accessible way. To implement data science and analytics within an organization, a proper framework with objectives and requirements should be constructed first before actually collecting data. In this way, the right data is used, and it can increase the insights in core business processes. Without constructing a framework with corresponding goals, KPIs and visualization specifics, the effectivity of the dashboard cannot be ensured, and the used resources are not used effectively. By following the steps, I have taken, the design process can be used for other companies that have similar problems.

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Appendix A: Literature Reviews

In the following chapter the literature review of this thesis is performed. As seen in chapter 1, I have constructed several research questions that will be answered through literature. The importance of literature within my thesis is high. “A substantive, thorough, sophisticated literature review is a precondition for doing substantive, thorough, sophisticated research” (Boote and Baile, 2005). The aim of this study is to summarize the knowledge on those research questions for the audience of my thesis, as well as contribute to an academic standard when I come to the results of my study. For my host organization it provides thorough argumentation if the presented solution is indeed feasible and reliable and will contribute to an improved business process.

All the research questions that will be answered through literature studies are performed according to the method made by Webster & Watson and published in 2002. In this paper, all the necessary steps to conduct a good and reliable literature study, which will be briefly explained in the following section.

- Inclusion and exclusion criteria: These criteria have to be established in order to create the correct scope for answering the research question. These can include the age of the article, certain key terms or a subject are of the article.
- Search String: Search strings are also included for every literature study. These search strings return a number of entries accordingly.
- Database; the used database for each of these literature studies is Scopus. Based on my previous experience and the availability of articles I have chosen to only use Scopus for these three literature studies.

Literature Study: Relevant KPIs to measure the feasibility of the pricing strategy.

This research question is very important for my study. My organization has certain wishes when it comes to the relevant KPIs to be included in my solution, but the academic approach should also be considered before I can finalize my advice to the organization. Therefore, I have constructed a research question that will be answered by literature to obtain a thorough research on what is important when it comes to the construction of KPIs regarding pricing strategies. I will conduct the same steps as the other two research questions for this research question.

Tabl: Inclusion and exclusion criteria

Nr	Inclusion Criteria	Reason
1.	Keywords: KPI(s), or Key Performance Indicator(s)	This keyword must be included. Otherwise, the source is irrelevant for the research question.
2.	Subject Area: “Business, Management and Accounting” or “Computer Science”	Other subject areas are not relevant for my research.

3.	Accessibility: Open Access	Article should be fully accessible in order to be included in my research.
Nr	Exclusion Criteria	Reason
1	Age of article	Everything before 2004 is not included (founding data Google Analytics) because it is assumed to be too old for my research.
2	Non-Dutch or non-English articles	Other languages cannot be fully understood by me and therefore are irrelevant for this research.

After coming up with the right inclusion and exclusion criteria, we are using the chosen database to search for the right sources that will contribute to answering the research question. The search strings that are used can be found in the table below.

Table 13: Search Strings

Search String	Database	No. of entries
("Key performance Indicator" OR KPI) AND "Pricing Strategy"	Scopus	29
("Key performance Indicator" OR KPI) AND "Pricing")	Scopus	46
KPI AND (pricing OR cost) AND Strategy	Scopus	158
Total		206
Selection based on inclusion/ exclusion criteria		-191
Removed after abstract reading		-7
Removed after full reading		-3
Total selected for research		5

After removal of the articles that did not fit the search criteria and removal of the duplicates the following articles are scanned and read. In the following list the chosen articles are presented in the table below.

Table 14: Chosen literature

Nr	Article	Author(s) (year)	Subject
1	Performance Management Methods: A Case Study from International Industrial Companies	Bogdan Kuzmanovic, Zdravko Tesic, Ivana Tomic, Sonja Buncic, Milos Tomic, Mirjana Sujic Stamenic (2019).	The main objective of the research paper is creation and presentation of new methods for monitoring and analyzing KPIs suitable for displaying a combination of input, process, and output measures, which implies the evaluation values of Key Performance Indicators (KPIs) according to their impact on international industrial companies' goals.
2	KPIs for measuring performance of production systems	Department of Science and Technology,	This paper aims to define key performance indicators (KPIs) for measuring performance of production systems

	for residential building	Linköping University (2017).	for residential building from a production strategy perspective.
3	BSC and benchmark development for an e-commerce SME	Robert C. Rickards (2007).	This source shows how an SME developed strategic and operational balanced scorecards (BSCs) as well as benchmarks for use in e-commerce.
4	Key Success Factors for Organizational Innovation in the Fashion Industry	Fabio De Felice, Antonella Petrillo (2013).	This paper proposes a multi-criteria methodological approach for evaluating the performance of the fashion industry based on the Balanced Scorecard (BSC) and the Analytic Network Process (ANP), called 'MAB' – Multi-criteria Assessment Balanced Scorecard.
5	Performance Indicators for the Evaluation of Product-Service Systems Design: A Review	Dimitris Mourtzis, Sophia Fotia, and Michael Doukas (2015).	This paper proposes a conceptual framework for the effective evaluation of PSS design using important KPIs.
6	Designing a stochastic multi-objective simulation-based optimization model	Rouzbeh Aiassia, Seyed Mojtaba Sajadib, Seyyed Mohammad Hadji-Molanac and Ali Zamani-Babgohari (2020).	This research has applied a simulation-based optimization approach to balance the trade-off between logistics cost and customers' experience level as the main objectives.

Now that the articles are selected, we can apply more structure to the different perspectives present in the sources. In the following table, a concept-matrix is added. In this manner, the different perspectives regarding the paper towards the different KPIs can be analyzed more efficient.

Table 15: Concept-Matrix

Source	Marketing & Sales	Logistics and Manufacturing	Finance and Accounting	Human Resources
1	X	X	X	X
2	X	X	X	
3	X	X	X	X
4	X	X		X

5	X		X	
6		X	X	

Table 16: Concept Matrix

Source	Marketing & Sales	Logistics and Manufacturing	Finance and Accounting	Human Resources
1	Customer satisfaction	Average Cost of production items	Profit per product	Efficiency of employees
	new customers	Production time	Earning per project	Education of employees
	The growth of the total number of customers			
2	Perceived Quality	Total production time	Total production cost	
3	Customer Satisfaction	Efficiency	Growth of Sales Revenue	Motivation
4	Revenue	Time to market		Staff satisfaction
	New customers	Product quality		
	Customer loyalty			
	Customer satisfaction			
5	Satisfaction		Development cost	

6		Average logistics cost	Average Sales	

Literature Study: Available pricing strategies.

The current system has no pricing strategy, and the main goal of my research is to choose the best pricing strategy for my organization. This means that I have to perform research on the available pricing strategies according to literature. In the following sections, I will perform a systematic literature review based on the Webster & Watson method to answer the following research question: "What pricing strategies are available according to literature?" I will start by applying inclusion/exclusion criteria and after that my search strings can be found, which will then lead to the selection of the entries. After that, my search strings are presented.

For this literature study, I choose to reduce my scope by using the presented search strings. The number of sources concerned with pricing strategies are enormous, and therefore I could do two things: Exclude all the types of sources that are not relevant for my research or including only sources that concern themselves with my type of research. I choose to do the second option. I searched for only the sources that contain information on pricing strategies with respect to e-commerce industries. In this way, I could work more efficient towards answering the research question.

Nr	Inclusion criteria	Reason
1	Table of contents should have at least one chapter on the topic "Pricing Strategy" or a synonym of those terms.	For the Webster & Watson method the table of contents should be briefly scanned on relevance. For this certain research question, it is necessary that at least one chapter is about the question. If that is not the case, I assume that I cannot obtain relevant information from this source.
2	Subject Area; "Business, Management, Accounting", "Computer Science" and "Economics, Econometrics and Finance".	For other subject areas than these listed, I assume that it is either too abstract from my scope, or not relevant at all. This allows me to reduce my scope towards topics of journals that speak of a pricing strategy with a similar goal.
3	Keywords: "Pricing Strategy" or "Pricing Policy" and "E-commerce" or "E-business"	These keywords allow me to reduce the sources that I really need. These terms are leading in my research and should therefore be present. E-commerce is very important in the distinction between all the possible types of industries that have pricing strategies.
Nr	**Exclusion Criteria**	**Reason**

1	Language: non-Dutch or non-English	Other languages are not fit for my research because I cannot understand other languages well enough to identify relevance of the source.
2	Age: Before 2005	Articles before 2005 are excluded because the launch of google analytics was in 2005. Everything before that is too old, technology wise, to consider.
3	Availability: Full access only	Articles that are not fully available to read are excluded. Just the abstract does not contribute to the research.

Search String	Database	No. of Entries
("Pricing Strategy" OR "Pricing Policy") AND ("E-Commerce" OR E-business")	Scopus	192
"Pricing Strategy" AND ("e-learning" OR "online training")	Scopus	16
Total entries		208
Selection based on inclusion/ exclusion criteria		-193
Removed after abstract reading		-5
Removed after full reading		-4
Added after looking at reference lists		+2
Removing duplicates		-3
Total selected for research		**8**

After removal of the articles that did not fit the search criteria and removal of the duplicates the following articles are scanned and read. In the following list the chosen articles are presented in the table below.

Table 17: Selected Literature

Nr	Article	Author(s) (year)	Subject
1	*Retail services and firm profit in a dual-channel market*	Ruiliang Yan & Zhi Pei (2009)	This research is about the new mix of retailing due to the rapid development of the internet. The strategic role played

			by the retail services in a dual-channel competitive market is discussed.
2	*Study on Pricing Strategy of Hybrid Distribution Channels of Cruise Companies.*	Yang Yang & Huashan Tan (2014)	This paper researches the product pricing problems of cruise companies based on hybrid distribution channels, discusses a manufacture-leader Stackberg game model and a Bertrand game model, and gives equilibrium results of pricing game between cruise companies and distributors.
3	*Price tracking behavior in electronic commerce and the moderating role of fair price perception.*	Victor V., Nathan R.J., Grabara J., Fekete-Farkas M. (2018)	This study aims at analyzing and measuring crucial factors that influence price tracking among online customers. These include shopping experience, fair price perceptions and awareness about dynamic pricing.
4	*A Hybrid Firm's Pricing Strategy in Electronic Commerce Under Channel Migration*	Robert J. Kauffman , Dongwon Lee , Jung Lee & Byungjoon Yoo (2009)	In this study, two pricing models are proposed to examine how customer channel migration (one-way channel interaction from the traditional sales channel to the Internet) affects pricing strategy.
5	*Pricing strategies in the era of digitalization and the perceived shift in customer behavior of youth in Poland*	Victor Thoppan, J. J., Fekete-Farkas, M., & Grabara, J. (2019).)	This study examines various traits exhibited by online customers in a dynamic pricing environment and figure out the reasons for the display of strategic purchase behaviour by the customers in response to the dynamic pricing strategy adopted by the sellers
6	*Pricing Strategies in Dual-online Channels Based on Customers' Shopping Choice*	Jieyu Lei, Junxiu Jia, Tao Wu (2015)	In this paper, we analyze the channel choice of either retail/online shopping, and give demand functions of the two channels based on the customers' segmentation and preference
7	*E-Commerce Pricing Opportunities: And How to Exploit Them*	S. Balamurugan, M. Selvalakshmi	This study discusses about the different price strategies and its impact on e-marketing. By understanding these pricing strategies, more efficient

			marketing strategies will be available, that will drive internet and e-commerce.

Now that the articles are selected, we can apply more structure to the different perspectives present in the sources. In the following table, a concept-matrix is added. In this manner, the different perspectives regarding the paper towards pricing strategies can be analyzed more efficient.

Table 18: Concept Matrix

Source	Dual-Channel Pricing	Dynamic pricing	Stackenberg Game theory	Bertrand Game theory	Cost-based
1	X		X		
2	X		X	X	
3		X			
4	X	X			
5		X			
6	X		X		
7	X	X			X

Table 19: Concept Matrix

Source	Dual-Channel Pricing	Dynamic pricing	Stackelberg Game theory	Bertrand Game theory	Cost-based
1	Channel competition can effectively motivate the traditional retailer to improve its services. The larger the product web-fit is, the more the whole supply chain will profit.		The strategic use of direct channel effectively motivates the traditional retailer to increase its retail services; the larger the product web-fit is, the more the traditional retailer		

			will improve its retail services.		
2	With the development of E-commerce and network technology, many companies built up their own electronic distribution channel. The electronic distribution channel has many advantages such as distance-destroying, reducing intermediate links, low transaction costs etc.		In order to achieve profit maximalization, the market leader will choose the price.	The equilibrium price is influenced by the wholesale price. And then it can influence the profit function and the pricing decision of both sides.	
3		Offering prices which customers think as fair will have a positive impact on the business by sustaining customer loyalty rather than employing an extreme dynamic pricing approach. Hence, it is recommended that the fluctuations in prices must be in a range that does not hurt the fair price perceptions of the customers. This also ensures that customers are not so much concerned about the price fluctuations as the			

		range of fluctuation is within the limits of their fair price perceptions and the awareness about dynamic pricing does not necessarily lead to the tendency to track prices.			
4	If the channels overlap and customers are free to move from the traditional channel to the on-line channel, then the firm should treat the two channels as one large channel with two types of customers. Charging the same price in both the on-line and the off-line channel is the best pricing strategy for a hybrid firm from a long-term perspective.	If the hybrid firm charges a lower price in its on-line channel to compete with Internet-only retailers, a practice known as channel pricing, it may not generate enough profit and may even suffer from channel cannibalization. Moreover, inconsistent pricing strategies across channels may cause confusion to customers.			
5		The price perception of customers is very sensitive to the magnitude and proximity of price fluctuations. A customer who gets to know about the pricing strategy will wait for price markdowns and make the purchase once the online price matches his			

		price perceptions. Again, this can be avoided by offering prices which are fair according to the customers rather than employing an extremely fluctuating prices approach which also helps maintain a loyal customer base.			
6	Selling a product by two online channels, the manufacturer has to make a sufficient analysis of channels' difference and customers' behaviors.		There is a tradeoff between setting a different price for every feasible region and the customers' behavior. The selected region for the final decision for the pricing strategy is important		
7	The costs of the web store ought not be higher than those of physical stores.	The value differential with dynamic pricing is known as the distinction between the cost cited and the net cost charged. This cost is decreased is made as impetuses to purchasers to meet focused weight. Furthermore, in dynamic pricing, competitor pricing is frequently updated, and this information can be used as a triggering factor to update the prices. This will help to get maximum profits from each customer.			It is basic and first step, to find out the cost of the product. It is to make the product and calculate exactly is a little tricky. It does not only contain the unit purchasing price of the goods from a supplier and includes all the overhead

					expenses. The overhead expenses are associated with the internal e-commerce operation of the organization.

What is the best method to represent the optimal performance of a pricing strategy?

This research question allows me to find a literature-based solution to the problem of my host organization. By combining the literature research with the wishes of my organization, I can provide the best solution that confirms both to academic standards as well as the standards of my organization.

Nr	Inclusion criteria	Reason
1	Keywords: “Pricing Strategy”, “Pricing Strategies”, “cost strategy”, “pricing Policy”, “Cost Policy”.	These keywords allow me to reduce the sources that I really need. These terms are leading in my research and should therefore be present.
2	Keywords: KPI, Key Performance Indicator, Web Analytics, Dashboard, Data Representation.	The same as mentioned above. However, these keywords are from another category when compared to the first inclusion. Therefore, they should be mentioned separately.
3	Subject Area: Business, management, and Accounting.	Without this Inclusion criteria, many sources that have nothing to do with my research are included as well. Think of subject areas as medicine, energy, or physics.

Table 20: Inclusion Criteria

Nr	Exclusion Criteria	Reason
1	Language: Dutch or English	Other languages are not fit for my research.
2	Age: Before 2005	Articles before 2005 are excluded because the launch of google

		analytics was in 2005. Everything before that is too old, technology wise, to consider.
3	Availability	Articles that are not available to read are excluded. Just the abstract does not contribute to the research.
4	Keywords: Keywords: “Carbon Emissions”, "Carbon Taxes, "Construction Industry", "Gasoline, "Greenhouse Gases”, "Renewable Energy Resources,"Renewable “Energy Source” "Autoregressive Model with Exogenous Variable”, "Bandwidth, "Car Insurance” ,"Carbon" "Carbo Pricing”, "Carbon Tax Policy, "Carbon Tax Policy Scheme","Carbon Trading", "Cellular Telephone Systems" “Cellular Telephones” "Charging batteries” "Charging Station" “Climate Change”	These keywords all are regarding different aspects that I do not need in my research.

Table 21:Exclusion Criteria

Search String	Database	Number of entries
Dashboard AND web AND analytics	Scopus	180
"Pricing Performance"	Scopus	198
Dashboard AND “cost Strategy” OR “cost Strategies"	Scopus	98
Dashboard AND “Pricing Strategy” OR “Pricing Strategies"	Scopus	2
Monitoring AND “Pricing Strategy” OR “Cost Strategy”	Scopus	242
("Key Performance Indicator" OR KPI) AND pricing AND strategy)	Scopus	15

Table 22: Search String

Total entries	735
Selection based on inclusion/exclusion criteria	
Removing duplicates	

Removed after abstract reading	
Removed after complete reading	
Total selected for research	4

Table 23: Entries

After removal of the articles that did not fit the search criteria and removal of the duplicates the following articles are scanned and read. In the following list the chosen articles

Nr	Article	Author(s) (year)	Subject
1	*Success factors of petroleum exploration and production companies*	B. Frieß, R. J. Baumgartner & G. Bauer (2008)	Research on success factors is presented and divided into 4 different groups. Each success factor group requires a different approach.
2	*Key success factors for organizational innovation in the fashion industry*	F. De Felice & A. Petrillo (2013)	The abstract presents research and argumentation on the way organization's productivity can lead to higher levels of performance.
3	*Data-focused managerial challenges within the hotel sector*	M. Lamest & M. Brady (2019)	Decision making through dashboard and KPI analysis is discussed as well as the need to choose correct KPIs.
4	*Cloud based user analytics and dynamic page refreshment application for web portal*	S. Santhoshkumar, C. Balakrishnan, P. Subhasri, V. Lankeswaran & M. Sangeetha (2019)	The use of Dynamic dashboards is discussed.

Table 24: Selected Literature

Conceptual Matrix:

Source	Multiple perspectives present	Practical Relevance	Interactivity	Represent Goals	Complexity
1	X	X	X	X	X
2	X		X	X	X
3	X	X	X	X	X
4	X	X	X		X

Table 25: Conceptual Matrix

Source	Multiple perspectives present	Practical Relevance	Interactivity	Represent Goals	Complexity
1	Success factors are different for every branch.	The demand for practical relevance should be considered continuously.	Excellent firms learn from their customers.	Stakeholder satisfaction plays a major role.	Only fewer complex structures promise good results.
	The assumption is made that Competition, strategy and market conditions determine success.			Most companies explain their success mainly through the satisfaction of stakeholders.	
				Diversity creates better results even concerning profitability.	
2	A balance scorecard allows stakeholders to see the feasibility of short-, medium- and long-term objectives at a glance.		The KPIs from all the four different perspectives are correlated.	Each perspective has different goals and objectives.	Addressing the complex issues of performance is not simple.
	The use of multiple perspectives integrates the				KPIs are different for every stakeholder.

	different types of KPIs.				
	The four perspectives are the financial, customer's, internal process, and the innovative perspective.				A strategy map contributes to user-friendliness and less complexity.
3	The customer perspective has a leading role in the industry. Empirical data on other perspectives are not used.	The fact that information is visible, and reliable has practical use. The acceptance of marketing proposals is higher now senior managers can see evidence.	Interactive dashboards contribute to transparency within the organization.	With clear KPIs the data flows can be sliced and diced more easily.	The ability of translating data into knowledge has become leading for success.
	The volume and variation of customer reviews moderates the relationship between the two stakeholders.	Contributions to marketing theories are made due to the introduction of dashboards.	The increased visibility of the customer voice through Interactive dashboard has improved transparency and success.	Transparent and clear goals contribute to good Decision-making.	The amount of data present in current industry is unique in the history of business, volume-wise.
		The marketing theory provides evidence for the relevance of dashboards.		The increase of data flows creates a need for correct interpretation.	
		Dashboards show how the customer voice can be used			

		into decision making.			
4	With the use of dynamic dashboards, every stakeholder gets a tailored view on the data flows.	The user of a dynamic dashboard needs relevant information on the product they seek.	Interactive dashboards contribute to user customization and is available every time.		The end-user is not only a user of the application but also a participant.
					The user cannot see all the processes that are running. Simplicity is sometimes better for a clear overview.

Appendix B: Questionnaire + Interview Validation

		strongly agree	agree	uncertain/ not applicable	disagree	strongly disagree
1.	I would find the dashboard useful in my job.	X				
2.	Using the dashboard enables me to accomplish tasks more quickly.	X				
3.	Using the dashboard increases my productivity.		X			
4.	My interaction with the dashboard would be clear and understandable.			X		
6.	It would be easy for me to become skilful at using the dashboard.		X			
7.	I would find the dashboard easy to use.		X			
8.	Learning to operate the dashboard is easy for me.		X			
9.	Using the dashboard is a good idea.	X				
10.	The dashboard makes work more interesting.		X			
11	Working with the dashboard is fun.			X		
12.	I like working with the dashboard.			X		
13.	I have the resources necessary to use the dashboard.		X			
14.	I have the knowledge necessary to use the dashboard.			X		
15.	The dashboard is not compatible with other dashboards I use			X		
I could complete a job or task using the dashboard….						
16.	If there was no one around to tell me what to do as I go.		X			

17.	If I could call someone for help if I got stuck.		X			
18.	If I had a lot of time to complete the job for which the dashboard was provided.		X			
19.	I intend to use the dashboard in the next 6 months.		X			
20.	I predict I would use the dashboard in the next 6 months.		X			
21.	I plan to use the dashboard the next 6 months.		X			

Thory: *Does the dashboard have practical relevance?*

Marieke: "Yes, it does! It measures the results of our efforts and the performance of the marketing side of the organization. This is very practical for me. The dashboard tells me what types of efforts lead to positive results, and what type of efforts lead to negative results. Our future investments are now ready to be measured on efficiency and it gives me a good picture on the performance of those investments."

Thory: *What different types of stakeholders can you identify on the dashboard?*

Marieke: Well, the main stakeholder I identify is our management as a whole. As mentioned before, our efforts on social media and the corresponding impact can be seen right away! Furthermore, I think the dashboard clearly tells us how our customer stakeholder reacts to the efforts we do. So, I would say the main two stakeholders I can identify is our management, and our customers. Oh, by the way, I think we can also see the stakeholder of our consultants. While some of them are part of the management, I think they are an individual stakeholder on this dashboard. So that would make it three stakeholders.

Thory: *Does the dashboard allow interactivity?*

Marieke: Do you mean interactivity as in I change something, and another stakeholder can see that change? In that case no because it is an offline dashboard. However, I think that one aspect of interactivity on this dashboard is that I can see the goals and target I have set and see if they are being met. I think that is one form of interactivity. So yes, I believe it allows interactivity.

Thory: *Does the dashboard represent goals?*

Marieke: 100% yes. I can see my own goals very clearly and I can see if these goals are being met straight away. The different goals I have set (new followers, total number of followers etc.) are all there.

Thory: *Do you think that the dashboard has minimal complexity?*

Marieke: Well, it is always hard to say what is minimal complexity. However, I find the dashboard easy to work with and I know where to find the results I need.

Thory: I have also constructed some requirements for the dashboard. The first one is the created insight in sales. Do you think the dashboard has created insight in sales?

Marieke: No, not at this point but that has not been one of our goals yet. It has no priority as of now. When we are really focusing on making sales this becomes important but not at this point.

Thory: Do you think the dashboard is user-friendly?

Marieke: Yes, very much so. It does what it needs to do, and I can fairly easily find the data I need.

Overall experience

How would you score the dashboard on functionality(1-10)? **8**

How would you score the dashboard on practical relevance(1-10)? **8**

How would you score the dashboard on interactivity(1-10)? **6**

Do you believe the dashboard increases the insight on the performance of the pricing strategy? Not yet, but the framework you have made is ready to do that. However, as mentioned before, this has not been a priority yet but when it becomes a priority, the foundation is ready.

Appendix C: User Manual

This user manual is written for the offline dashboard only. This is due to the fact that this is the solution I have presented and demonstrated to my host organization, and it is the solution they are using right now.

Step 1: Download the needed datasets from LinkedIn. Click on Exporteren (export in English), and select the period that you want the data from. Repeat this process for all the necessary datasets LinkedIn provides. For this manual, this means that we want to export the data from the *Statistics from Visitors, Statistics from Updates and Statistics from Followers*.

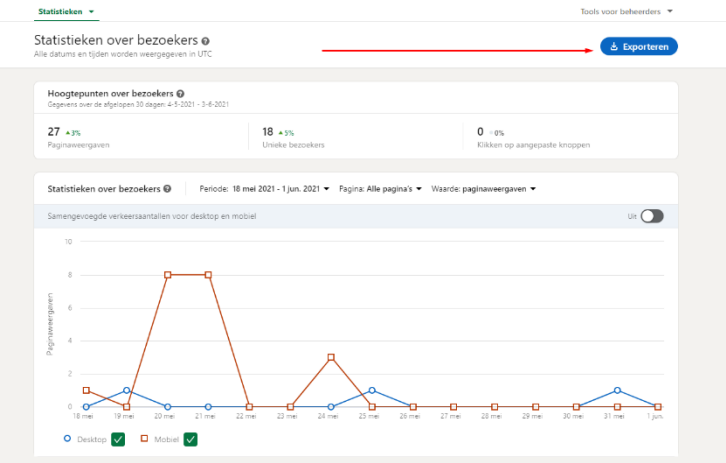

Figure 8: Step 1

Step 2: Place the three datasets in a new folder, preferably on the desktop.

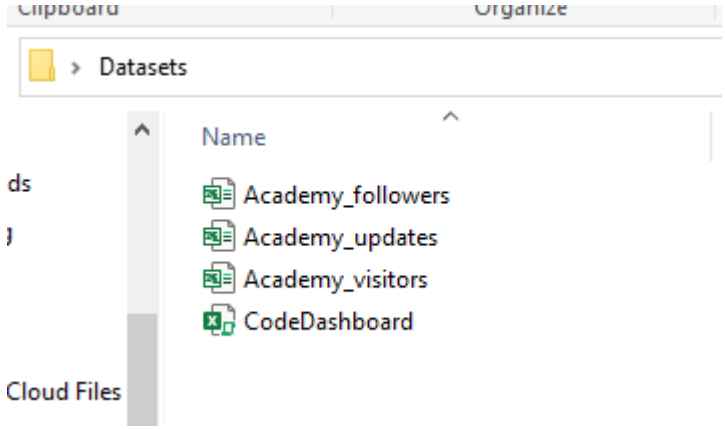

Figure 9: Step 2

Step 3: Open the dashboard file, named CodeDashboard.xlsm

Step 4: Enable Editing & Enable Macro's when the pop-up shows.

Step 5: Press the two buttons (Named *First* and *Second*).

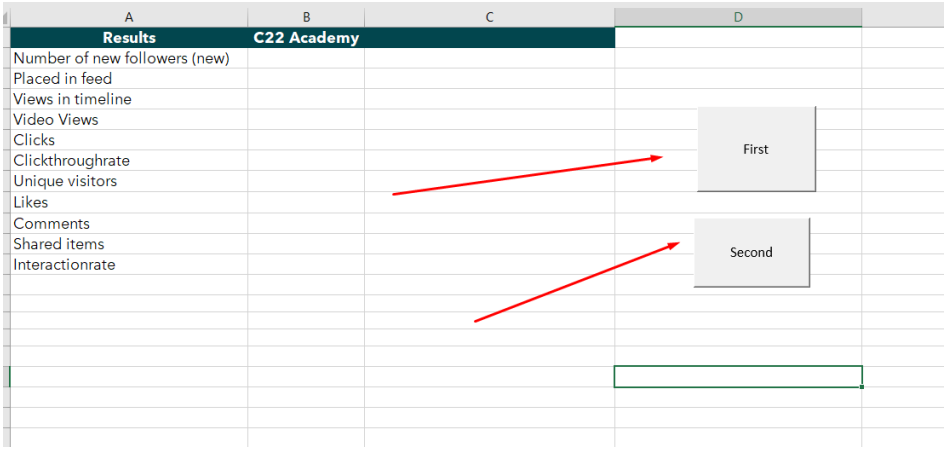

Figure 10: Step 5

Step 6: The datasets are cleaned, the right data is extracted and placed in the right cells.

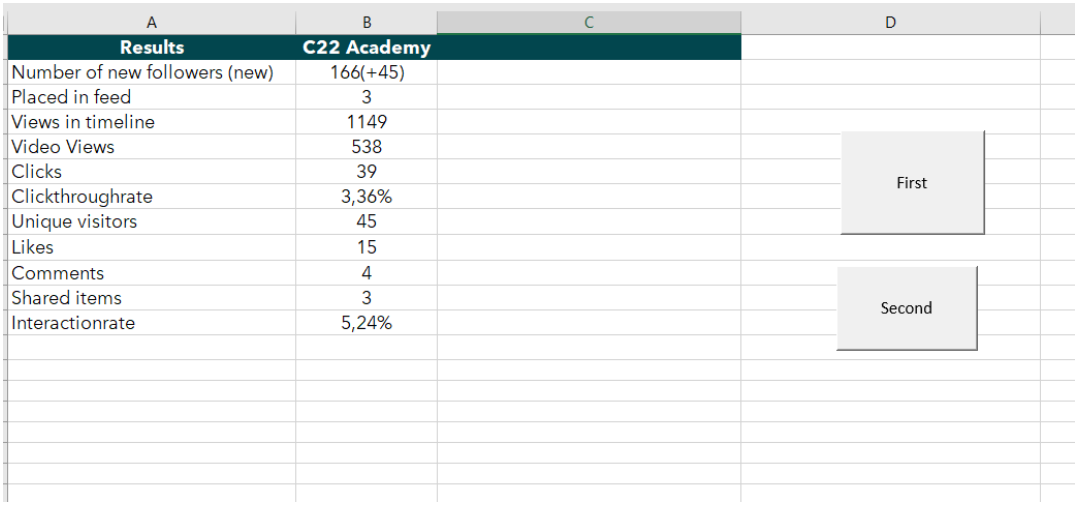

Figure 11: Step 6