EVALUATING THE RETURN PROCESS OF INTERNATIONAL BOOKS AT COMPANY X

Industrial Engineering and Management

Bachelor Thesis report

University of Twente

Eleanor Thelen
e.a.h.thelen@student.utwente.nl
Faculty of Behavioural, Management and Social Sciences (BMS)
21-01-2021

University of Twente
Industrial Engineering and Management
Postbus 217
7500 AE Enschede
Tel. (053) 489 9111

Evaluating the return process of international books at company X

Author: E.A.H. Thelen
Industrial Engineering and Management
University of Twente

Supervisors:
University of Twente
dr. Ir. W.J.A. van Heeswijk Faculty of Behavioural, Management and Social Sciences (BMS)
J.P.S. Piest Faculty of Behavioural, Management and Social Sciences (BMS)

Company X
T. Doeswijk, Retail Excellence specialist
J. Thijssen, Supply Chain Excellence specialist

Publication date: 2 February 2021
Number of pages excluding appendices: 63
Number of pages including appendices: 81
Number of appendices: 10

This report was written as part of the bachelor thesis of the Industrial Engineering and Management educational program at the University of Twente.

Preface

Dear reader,

In front of you lies my bachelor thesis report which documents the result of the research I conducted at Company X for the books cluster. I have analyzed the current return process of international books and have improved the process by implementing a dashboard.

I want to thank my assignment supervisor, Tom Doeswijk from Company X who helped me create the dashboard and gave a lot of useful feedback which kept me motivated to continue. I really enjoyed our collaboration and our weekly meetings. Additionally, I want to thank Joyce Thijssen, my operational supervisor, who helped me with all the operational tasks. She made me feel very comfortable in the company, even though we had to work from home. Furthermore, I want to thank my team of FMCG and Books from the Supply Chain Excellence department by making me feel at home and connected to the company. I had a great experience and I am really thankful for the opportunity that I could have a look behind the scenes during the peak period in such a large company.

Additionally, I want to thank my supervisors from the University of Twente, Wouter van Heeswijk and Sebastian Piest who provided useful feedback for this report and supported me when I struggled with working from home.

Lastly, I want to thank my friends and family for their love and support.

With kind regards,

Eleanor Thelen

Glossary

- SE: Sourcing Excellence, the old department who used to do the return process. This department currently consists of Supply Chain Excellence and Retail Excellence department.
- SCE: Supply Chain Excellence department
- RE: Retail Excellence department
- NCO: Non Commercial Order: orders that are not sent to customers
- GSE: the internal Company X return system, where all returned shipments receive an unique code
- RVR: 'Recht Van Retour': Right of return
- Cross dock: method of holding stock, where the stock is placed in the warehouse of the supplier and is kept there until the item is ordered.
- Google Data studio: program from Google, which can be used to build dashboards
- Google Bigquery: program from Google, which can be used to write queries using the SQL programming language
- MPSM: Managerial Problem Solving Method, a methodology to solve problems in a company in a structured way.
- Return dashboard I: the dashboard that was already developed by Company X itself before the start of this research
- Return dashboard II: the dashboard that is created for this research

Management Summary

In this research we have designed a dashboard to solve the following problem:

'There is no clear overview of all the costs that are involved in the returning process from Company X to the suppliers for international books.'

The dashboard provides a clear overview of all the costs that are involved in the return process of international books. This way, all the required data is presented in one place. Additionally, the dashboard provides an advice based on these costs which helps the Retail Excellence or Supply Chain Excellence specialist to decide which items have to be returned to the supplier, in the form of a green or red sign which provides a quick indicator for the suggested decision.

Currently, return decisions are solely made based on the sales forecast. This means that all items that are not likely to be sold within 8 weeks are returned and Company X receives a full refund. Remaining books can be sent to a bulk buyer for a small percentage of the original purchase price. Although this approach can prevent holding unsellable items and associated loss of sales value, it fails to include other cost parameters such as the holding costs, return costs and labor costs involved in inventory management. The objective for the design of the dashboard was to build a decision support tool that includes all the known drivers of the total return costs. The dashboard supports decision-making by displaying data which can be used to evaluate certain tradeoffs. Using the dashboard, the return costs can be compared with the holding costs to determine which option is most profitable. The effect of the dashboard and the advice in the dashboard on the decisions needs to be determined in further research.

Using the dashboard is expected to reduce the time for planning the return process takes with 15%. The data is in a clear overview, so the specialist can find all the required information in one place. Next, the dashboard shows the tradeoff between the total return and holding costs, which results in an advice to the specialist. Furthermore, the output of the dashboard is adapted to the requirements of the internal return system, the GSE.

We used a questionnaire to validate whether the new dashboard solves the core problem. From this questionnaire we can conclude that the dashboard does help with solving the core problem and improves the return process of international books. The employees graded the dashboard with an 8.4 (out of 10) as a solution for the core problem.

Based on our research, we provide some recommendations for further research. First of all, the number of return moments can be increased. Additional return moments provide more opportunities to return a book within the return deadline to the supplier. This would result in fewer books that are sent to a bulk buyer, which reduces the unnecessary costs. Next, further research could be executed to determine a better buying strategy, using the costs determined in this research. When the return restriction is almost met, it could be better to purchase the same book from another supplier at a higher price, to keep the right of return. Furthermore, there is still a lot to discover on why the current stock is obsolete and what the composition of the obsolete stock is. Next, the option to destroy or recycle books that stay in the warehouse could be further researched.

In conclusion the delivered dashboard provides a solution for the return process of books at Company X that is appreciated by its users and could form the basis for similar decision evaluation for other product groups at Company X or similar decision processes in other companies.

Contents

1. Introduction to the research

This research is conducted for Company X. In this research, we will analyze and improve the current return process of international books. In this chapter, we will introduce the company and describe the problem context and the research design. Furthermore, we will provide a description of the deliverables of this research.

1.1. Background information

Company X is a web shop which sells items ranging in more than 20 categories, ranging from books to kitchen equipment. They call themselves 'the shop for everyone', which also reflects in the broad range of articles they provide. (Geschiedenis van Company X, sd)

It all started in 1998, where the first 8 employees worked for an online bookstore called Bertelsmann On-line B.V. On March 30th, 1999 Company X officially starts in the Netherlands with 140.000 books to choose from. One year later movies, tv series and cd's joined the product range. From 2004 more electronic devices were added since they became more popular and were necessary to play all the movies and cd's. One year later, mobile phones were added to the range. In 2007, the option to buy and sell secondhand books via Company X became available (Geschiedenis van Company X, sd). This is also one of the unique selling points of Company X, because most of the web shops (in the Netherlands) do not offer the possibility for other people to sell their goods.

During the current events around the COVID-19 outbreak, web shops are very popular because people order a lot of goods online. For most of the (non-food related) web shops the annual growth rate increased from 16-18% to 60-70% (Schutijser, 2020). For Company X specifically, the growth rates were most for home office supplies, work out gear and medical tools like thermometers (Verbesselt, 2020). Overall Company X experienced a growth rate in website visitors of 6% since the COVID-19 outbreak (Paesschen, 2020).

Since Company X offers the option for other people to sell goods via their website, there are two retailers: Company X itself (retailer 1) and the private sellers (retailer 2). From September 1st there has been a separation within the organization, where employees either work for retailer 1 or retailer 2. This split is also applied to the department where this research is conducted. However, since the project is executed for retailer 1, we will only focus on that.

Another reorganization took place within the department where this research was conducted. The responsibilities of the former Sourcing Excellence and Commercial Excellence departments are now divided over the Supply Chain Excellence (SCE) department and the Retail Excellence department. This research was mainly conducted for the SCE department since we evaluated the process for returning books. In figure 1 is the structure of the departments of Company X before the reorganization displayed. The dark blue bordered boxes are relevant for this research.

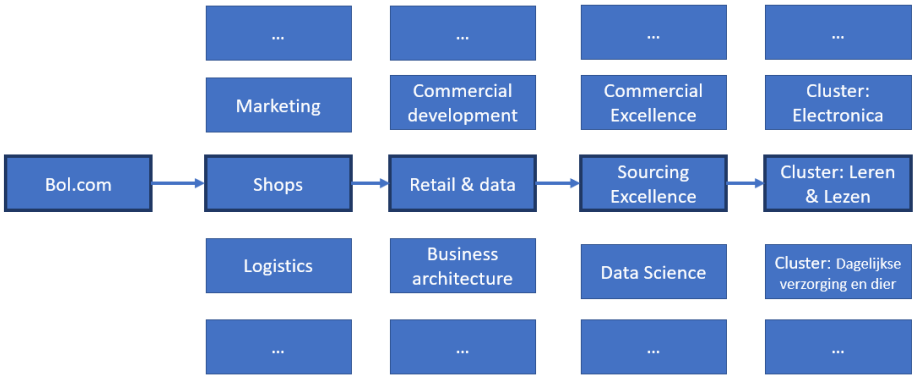


Figure 1: Structure of Company X before reorganization (Company X, 2020)

In figure 2, the split of the Sourcing Excellence department is displayed. As can be seen, the department is split into two new departments. For each cluster, there is a Supply Chain Excellence team and a Retail Excellence team.

Figure 2: Split of SE and connection to cluster

During the COVID-19 outbreak, the departments were planning on returning books from the warehouse of Company X to their suppliers as they always do in February. However, due to the outbreak this process took very long and a lot of problems occurred. Some of these were not a result of the crisis and needed to be tackled before the next return moment. In section 1.4. we will describe this problem context.

1.2. Involved departments

As mentioned before, the research was conducted mainly for the Supply Chain Excellence department. However, in the process there are four departments involved: the Buying department, the Supply Chain Excellence department, the Retail Excellence department and the Reverse department. The employees of all these department are called specialists.

The Supply Chain Excellence department is responsible for managing the supply chain, provides new insights into the data and looks at process improvements. The Retail Excellence department makes the decisions about the pricing component by deciding when items should be on sale or should be returned. This department also provides new insights in data and looks at process improvements. The reverse department, which is responsible the operational activities and for the financial side of these processes, checks if the money is received. The buying department is responsible for the contact and the negotiations with the suppliers and has to interpret the data and insights provided by the other two departments.

The cooperation between these departments is represented using a triangle, which can be found in figure 3. The meaning of the triangle is that all three departments have their own responsibilities and tasks, which is described by the three points, but all the departments have to work together as well, which is described by the circle in the middle of the figure.

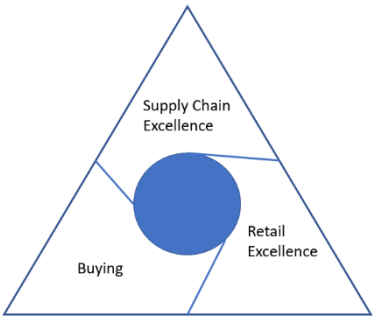


Figure 3: Triangle for cooperation between 3 departments (Company X, 2020)

Since the reorganization, the responsibilities for the Supply Chain Excellence department and the Retail Excellence department are sometimes still a bit unclear. An example is the returning process, because previously the Sourcing Excellence department used to do this, but now activities and responsibilities need to be divided over both new departments.

1.3. Process description

About 2 or 3 times per year, around February and October, the Book team makes an overview of all the books in the warehouse and makes a plan for all the return shipments to the suppliers. The book team consists of people from all the involved departments. They decide which books need to be returned and determine if that is even possible. All the stock is divided into categories, based on the forecasting when it is predicted to be sold. The categories are displayed in a graph which is called the stock ceiling, which can be found in figure 4. In this research one category in particular is most interesting, namely the books that are forecasted not be sold within eight weeks. Those are the books that Company X wants to get rid of to make space for other books. In the stock ceiling graph, these items are located in the red, dark red and black bins.

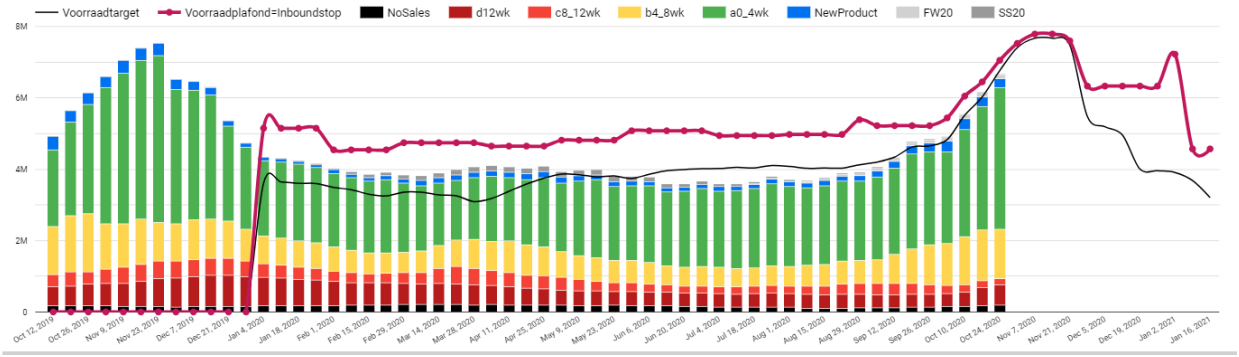


Figure 4: Stock Ceiling: stock per week including the distribution of the stock in forecasted bins (Company X, 2020)

For Company X there are a few options when it comes to removing items from the warehouse if they cannot be sold to a customer. First, the book can be returned to the supplier. This is the preferred option, because then Company X will receive the original purchase price. If the book cannot be returned to the

supplier, there is another option. Books can also be sold to a bulk buyer. This means Company X can get rid of the books, but they receive a small fraction of 8% on average of the purchase price, which means that Company X loses money. If both types of buyers do not want the book, it stays in the warehouse.

After determining which books need to go to which supplier or bulk buyer, a list is made for each supplier or buyer containing all the items. This list is filed in the internal system called the GSE, or the Returns Management System. This list is sent to the supplier, who has to accept it or provides comments on items that cannot be returned. Then the (adjusted) list has to be approved by the Buying department as well since they made all the agreements with the suppliers. After all the lists are accepted, the items are picked in the warehouse and transported to the right buyer or supplier. This complete process can be found in the flowchart in appendix B. We also stated the time each activity takes in order get a complete picture of the process.

1.4. Problem description

Company X encounters several problems in the process described in the previous section. We will describe all the problems in this section.

For international books Company X has several suppliers, based all over the world and the agreements for the return percentages and rules are different for each supplier. This makes it hard to identify whether a book can be returned or not. A list of the 14 biggest suppliers with their location and current shipping method can be found in appendix A.

Another issue regarding the international books is that several suppliers can offer the same book. The book is ordered at the supplier which offers the lowest price at that moment. However, when returning the books, it is hard to identify to which supplier the book has to be returned. Another difficulty that arises is that it is hard to identify the number of books that need to be returned to each supplier. As mentioned before, a book can be bought several times from different suppliers in one year. Therefore, the number of books that is returned to each supplier needs to be in line with the number of books purchased from that supplier. This means a fair division has to be made when the books are returned to the suppliers.

Another difficulty for international books is that Company X offers a lot of different titles. Not all these titles are stored in the warehouse of Company X, because there is not enough room. They only store popular items locally since they are sold more frequently. For less popular items Company X uses the cross-dock method. This means that books are stored in the warehouse of the supplier until a book is ordered by a customer. After a book is ordered it is transported to the Company X warehouse and is sent to the customer. The problem occurs when the customer returns this item to Company X, because it will stay in the Company X warehouse. This results in small batches of different titles which come from a different supplier. Each batch of books that arrives at the Company X warehouse, comes with a digital label, containing information about the book and the shipment. For some books, the label states that they cannot be returned at all. This is the case for the so called ‘printing on demand’ (POD) titles. This means that books are not printed until they are sold. Currently, it is unclear which books in the warehouse are POD titles, which makes the situation more complicated. Company X is working on making this information available so that it can be used in return process, but also in the ordering process. Fortunately, there is already some progress in this process. The book department is working on creating real-time insights in the available data. Now there is a dashboard already which provides insight on monitoring the current process. It shows the value of obsolete items per supplier and it shows the value of the items that have their return deadline within a month. This is presented in a dashboard which can be extended to solve the

problems mentioned above. However, the dashboard is not live yet and has therefore not been used in the process.

Next, in the current decisions transport costs are not considered. Company X simply pays the bill instead of adding it to the decision-making method. This means that there is not really a plan when the transport for all the items is fixed. It could save costs when shipments are combined or send separately and those tradeoffs are currently not made.

Lastly, Company X has a lot of data of the books in the warehouse. However, this data is stored in different locations, like Excel files and Bigquery tables. This makes finding the right data very hard and will therefore also result in a long process time.

To end this section, we will summarize all the problems we mentioned. Firstly, suppliers have different agreements and return percentages which makes it hard to identify if an item can be returned or not. Next, several suppliers offer the same book, which complicates the process of determining how many items need to go to which supplier. Also, the different stock methods cause a large variety of books in the warehouse. Some of these items cannot be returned at all and for the rest of the items it is hard to determine to which supplier the books have to be returned. Additionally, Company X does not always use the information provided by supplier which states whether a book can be returned or not. Next, the costs are not taken into account in the current process. Lastly, all the data that is used in the process is stored in different files and tables. Several problems are caused by not storing the right data or storing the right data in several locations. In order to set the right boundaries for this research, we decided to focus on the costs as the data that is unknown or not stored right.

1.5. Theoretical framework

In this research we used the guidelines of the Managerial Problem Solving Method (MPSM) (Heerkens & Winden, 2012), since it is a very structured method, which covers solving action problems. Additionally, the MPSM allows for exits to the research cycle to solve the knowledge problems. We will first explain both types of problems. An action problem is a difference between norm and reality. A knowledge problem occurs when something about the reality is unknown. It is important to define this difference because both problems need a different approach. The MPSM consists of 7 phases (Heerkens & Winden, 2012):

- Problem identification
- Problem approach
- Problem analysis
- Formulating solutions
- Decision making
- Implementation
- Evaluation

1.6. Core problem and research questions

In section 1.4, we described the problem context. In this section we will describe the problem we are going to solve with this research by examining the problem cluster. The problem cluster is an overview of all the problems in the problem context and shows the relations between all the problems. This way, we can find the core problem, which is the underlying problem for all the other problems in the problem context.

Solving the core problem will contribute to solving the other problems. In figure 5, the problem cluster can be found.

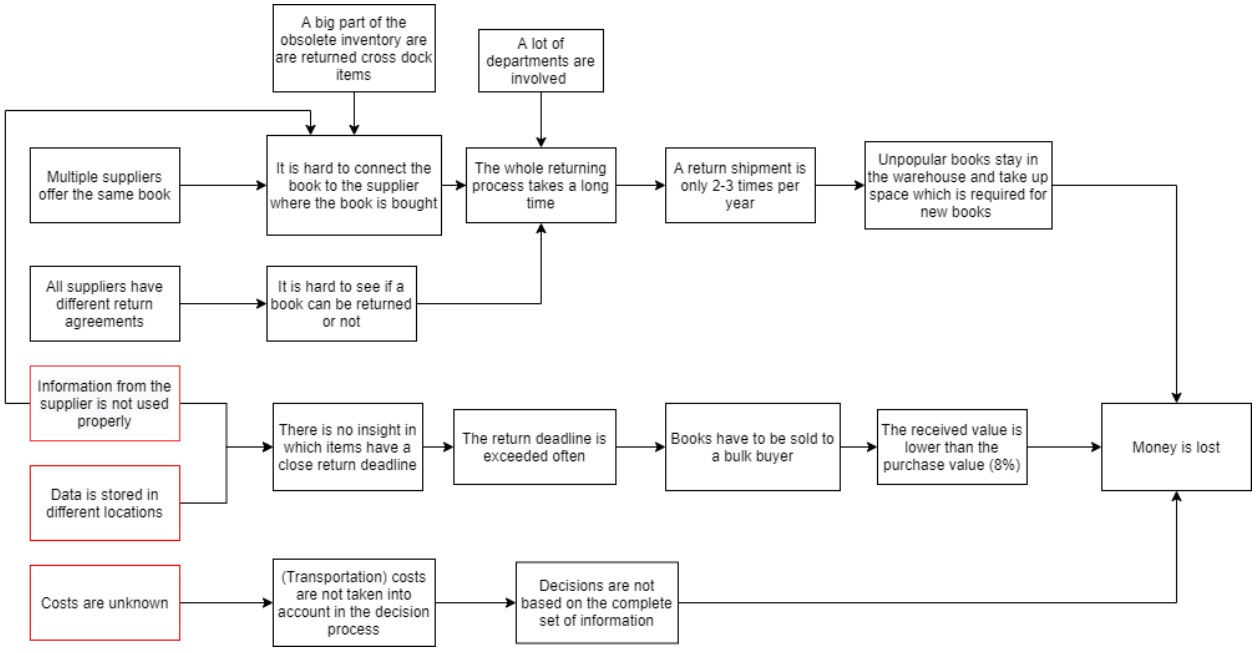


Figure 5: Problem cluster with core problems in the red boxes

We will briefly explain the problem cluster to demonstrate how the core problem is found. A core problem is a problem which does not have a cause that can be influenced (Heerkens & Winden, 2012). The problem cluster should be read from the right to the left to find the causes for each problem. The core problems are in this case as much on the left side as possible and are the problems in the red boxes. However, not all the problems on the left are core problems since some of them are not solvable by doing research. For example, the fact that multiple suppliers offer the same book is something that cannot be solved by research, because Company X simply selects the most beneficial supplier at that moment. This means that the supplier offers the lowest price or has stock of the item while others do not. Buying a certain book from one supplier would therefore involve the risk of paying too much or waiting too long, which would cost a lot of money and would not outweigh the time it takes to check at which supplier a book is bought.

One of the main issues is that the process takes a long time. This causes other issues like money loss and unnecessary books in the warehouse. These are the problems more to the right side of the cluster. The main reason that the process is taking so long, is that the decision making takes long, since the data where the decisions are based on are unknown or stored in different places. This data consists of costs, information provided by the supplier about the return agreements and product information. These problems can be found more on the left side of the cluster.

Heerkens & Winden (2012) mention that if there are multiple core problems, the problem with the most effect should be solved. The core problems from the problem cluster that are solvable are the issues regarding the unknown costs and the unavailable data. In this case, we could solve multiple core problems because they could all help to improve the current return process. Since money loss is the problem that relates to all the core problems and therefore has the most effect, we decided to focus on the unknown

costs as a core problem. If the costs are known and presented in a central place it can be taken into account in the decision-making process. The core problem for this research is therefore stated as follows:

'There is no clear overview of all the costs that are involved in the returning process from Company X to the suppliers for international books.'

This is a problem because we notice a difference between the reality and the norm. In this case, the reality is that not all the costs are known and we want all costs to be known to be able to base the decisions on those costs. To be able to solve the core problem, we stated research questions to help approach the problem in a structural way.

The first question considers the scale of the problem by researching which costs are involved and if the costs are known or unknown.

Q1: Which costs are involved in the return process? (Chapter 2)

- *What does the current return process look like?*
- *How long does the current process take?*
- *When are the return moments and why?*
- *Where in the process are costs involved?*
- *Which costs are known?*
- *Which costs are unknown?*
- *Why are the costs unknown or unavailable for the return process?*

Next, we considered the geological scale of the problem by looking at the suppliers. In order to evaluate the costs, we need to have more information about the suppliers and the current method of returning books to each supplier.

Q2: Which suppliers are involved in the current return process? (Chapter 1 and 2)

- *Where are the suppliers located?*
- *What is the current method for returning to this supplier?*
- *What are the costs per item of the current method?*

To improve the current process using the costs, we need to know what considerations are currently made when making a decision about which books need to be returned. We know that books that are forecasted to stay in the warehouse for more than 8 weeks are considered obsolete, because the chance of selling the items is very small. However, we want to know if that is the only criteria to return an item.

Q3: How is decided if a book needs to be returned? (Chapter 2)

- *Which data is involved in the current decision-making process?*
- *Who is involved in the decision-making process?*
- *How are the stakeholders involved?*

Lastly, we look at the solution for the problem. We want to make a dashboard to present all the required data in one central place. This will provide an easy tool to take all the involved costs into account. Next, it will save time, because the dashboard shows which books need to be returned and to which supplier they need to go. Additionally, it provides insight in the return deadlines, which will prevent books from exceeding the deadline.

Q4: What is the best way to present costs in a dashboard to support the decision-making process? (Chapter 3, 4, 5 and 6)

- According to the literature, what is the best way to make a dashboard?
- What data is missing in the current dashboard (Return dashboard I)?
- Which department uses which data?
- Do all the departments need the same dashboard?
- How can we validate if the dashboard is a solution for the problem?
- How should the new dashboard be implemented in the current process?

The aim for these research questions is to see how the current dashboards look and how our dashboard should look as well. Additionally, we want to find out what the end users exactly want in a dashboard. Furthermore, we want to study what the best way is to make a dashboard and what issues are involved when making a dashboard. Also, we want to see if the new dashboard solves the core problem and improves the return process. Lastly, we want to determine how the dashboard should be implemented in the current process and what the responsibilities of the different departments will be when the dashboard is implemented.

1.7. Research design

In order to solve the research questions, we needed to gather data. We gathered data using literature research, interviews with employees and internal data of Company X from existing dashboards and other data sources.

For the interviews, we asked questions to employees of the different involved departments. The questions of the interview can be found in appendix E. We recorded the conversations to be able to write down the important findings in a summary. The interviews were mostly used for acquiring requirements for the dashboard and to find out what problems employees experience to make a complete problem context. We also shared the anonymous outcomes with the problem owners of the company, to check if the requirements were correct. For the literature research, we stated the research question, which we answered by doing a systematic literature research. We stated search terms, inclusion and exclusion criteria for the sources. As a result, we made a summary of the acquired knowledge, which can be found in appendix F.

For the internal data, we stated research questions that needed to be answered and we studied internal sources for the answers. Often, employees were asked to answer the question to find the source or file we were looking for. After gathering all the data, we analyzed it. From the literature research we found out what the best way is to make a dashboard. We took a critical look at all the available sources and used the method which fitted best with the requirements of the dashboard.

Lastly, we needed data to put in the actual dashboard. This data is first used to test the functionality and performance of the dashboard, and later for the actual implementation of the dashboard. From the interviews deduced useful data and we used that information and our calculations to build the dashboard.

When conducting any research, validity and reliability are very important to keep in mind from the beginning of the research. In the microlecture “validity” of Heerkens (2015) these two concepts are explained. “Reliability asks whether the results will be the same if measurements are repeated” and “validity asks whether a researcher is actually measuring what he thinks he is measuring”. In other words, we need to examine if the research is representative for the reality.

The three types of validity mentioned are internal, construct and external validity. We will briefly explain how they relate to this research. Internal validity is about the soundness of the research design or checking if we are measuring what we aim to measure. There are many ways to compromise this type of validity. In the case of our research, the main threat would be that the sample of employees which are interviewed is unrepresentative for the actual end users of the dashboard and can therefore lead to a tool which does not comply with the actual needs of the company. Additionally, the requirements of the employees do not have to align with requirements of the company. We prevented this by interviewing the actual end users to gain insights in their requirements. Additionally, we sent a questionnaire to all the employees that were interviewed to see to which extend the requirements are met and if the dashboard is a solution to the problem. To make sure the dashboard would also comply with the needs of the company, the chief of the shop ‘Educatief en Internationale boeken’ was included in the interviews and the validation of the dashboard.

Construct validity concerns the question whether all variables are operationalized properly. For this type of validity, the main threat for this research would be to use too many irrelevant variables. It is important to only use KPIs in the dashboard which are relevant for the end users. We achieved this by continuously asking feedback from the end users to keep the dashboard as relevant as possible.

External validity is about applying conclusions of a research outside the context of the study. In this research we made a dashboard, which fits the needs of the company and can therefore not be applied directly in other cases. This also applies to all the other deliverables of this research. However, the research and recommendations can be used as guidelines for similar research; however, the outcome can be different. In section 7.3, more information about the academic contribution can be found.

1.8. Deliverables and requirements

In this section we will explain what we will deliver with this research and what the requirement of the deliverables are.

First, we will make a flowchart of the current return process. One of the problems is that there is no clear overview of the current process. Therefore, implementing improvements is difficult. In the flowchart, we will add the time each activity takes to measure the performance of the implementation of the dashboard, by looking at the time that is saved. The requirements for the flowchart are:

- The flowchart should include the full process, for all the departments included
- The flowchart should be included in the analysis of the current process
- The flowchart should provide a time indication for all the important activities

Next, we will deliver a dashboard. The purpose of the dashboard is to provide insight in which books are obsolete and to help with the decision-making process of which books need to go to which supplier and when the return shipment should be done, based on the calculated costs. We chose to make a dashboard to present the outcomes of these calculations for a few reasons. First, the company already uses a lot of

dashboards. Next, departments are working on getting rid of separate Excel sheets and instead presenting data in dashboards. Making an Excel sheet would therefore not solve the problem. Also, there are multiple departments involved and a central dashboard could be useful for all those departments. Lastly, we want the company to use the solutions after the research is done and therefore the dashboard should be mad in Google Data Studio. This way it will blend in with all the other dashboards and employees do not need a different program. The requirements for the dashboard are as follows:

- The dashboard should be user-friendly
- The dashboard should fit in with the theme and lay out of the current dashboards. Since Company X already uses a lot of dashboards, the new dashboard should fit in to be used by the employees.
- The dashboard should be able to be extended for other shops. If the dashboard proves useful for books, it should be possible to adapt it to fit other products.
- The dashboard should be made in Google Data studio, because all the existing dashboards are made in that program. Additionally, all the data is Microsoft Excel or in Bigquery, which interacts with Google Data Studio very easily.
- The dashboard is mainly meant for the Supply Chain department and should be able to be extended for the Buying and Retail Excellence department. Since all these departments are involved, the dashboard should be extendable to the needs of the other departments.
- The dashboard should be presenting different levels of data. In other words, the KPIs on the dashboards have different functions. The previous return shipments are shown (descriptive) and an advice is given based on the costs and the selected items to return (prescriptive).

There are also more technical requirements for the dashboard that need more explanation. An EAN is an unique code for an item, in this case a book. As mentioned before, a book can be bought from several suppliers which makes it hard to identify the supplier where the book has to be returned to.

- The dashboard should link the EAN to the supplier where the EAN is bought
- The list of EANs and the linked suppliers can be exported from the dashboard to an Excel sheet
- The dashboard should show the costs of a shipment when all the EANs are selected or a list of EANs is uploaded

Lastly, we will provide a recommendation for additional implementations, by adding an implementation plan to the report. The requirements for the report and recommendations are:

- The report should comply with the standard of an IEM bachelor thesis report
- The recommendations should be understandable for every employee within the department
- The recommendations should be covering additions to the dashboard
- The implementation plan should be adapted to the current way of working and department structure, which is defined by the triangle in figure 3.

1.9. Conclusion

In this research we will analyze the current return process of international books for Company X and will solve the following problem:

'There is no clear overview of all the costs that are involved in the returning process from Company X to the suppliers for international books.'

To solve this problem, we will design a dashboard along with an implementation plan, which will provide insights in the unknown costs for the process. The requirements for the dashboard will be acquired from interviews with employees, who will be using the dashboard.

2. Problem context

In section 1.4, we briefly addressed all the problems that occur in the return process of international books at Company X. We chose the unknown costs as the core problem as money loss relates to all the other core problems in a way. In this chapter, we will discuss the current situation for all the aspects that are involved in the core problem and how the core problem relates to the money loss.

2.1. Involved costs in the current process

As can be seen in the problem cluster in figure 5, part of the problem is that some costs are unknown or stored in different locations. Therefore, it is important to first make a list of all the costs that are involved in the process. We did this by following the process from start to finish and listing all the expenses and yield that we came across and we used internal documents to find the values of the costs. An overview of all the costs can be found in table 1. All the values are listed in table 1 as the NCO values. NCO means that the package is a Non Customer Order. In this case, that means the order is meant for a supplier or bulk buyer.

Table 1: overview of all costs

Costs:	Category		
Warehouse	Picking	€ 0,29	NCO
	Packing	€ 0,18	NCO
Shipping	Pallet	€ 27,85	
	Colli	€ 3,88	
	Item	€ 0,04	
Transport	UK	€ 0,30	
	US	€ 1,48	
	NL	€ 0,00	
Inventory	25 days	€ 0,07	
	1 days	€ 0,00	
	30 days	€ 0,08	
Man hours	1 hour	€ 0,00	(not taken into account)

There are five different costs involved in the process. First are the costs for paying one employee for one hour of work. When activities take a long time, this cost will lead to a higher overall cost. Next, there are warehouse outbound costs, which consist of the picking, packing and shipping costs. If it is decided to return a certain item, it needs to be picked in the warehouse and packed onto a pallet and the pallet needs to be prepared to be transported. Next, we have transportation costs. These are the marginal costs for transporting one item back to the supplier or to the bulk buyer. Also, we have the obsolete provision, which builds up as the item stays in the warehouse. Lastly, we have the inventory costs, which describe the costs for holding one item for one period of time.

2.1.1. Cost per employee

With any process where people are involved, the costs for letting one person work for one hour are important to take into account. In this process however, it is not essential for the dashboard. We are going to compare the time the process takes with and without the dashboard. The difference between those

processes is the same as the amount of money saved, looking only at the employee costs. Since it is a cost that is involved in the process, we mention it here. However, it is not considered when making the dashboard.

2.1.2. Warehouse outbound costs

When a load of books can be returned to the supplier or to a bulk buyer, it has to be collected from the warehouse. The costs for all these processes are called the warehouse outbound costs. In general, the outbound process consists of three steps: picking, packing and shipping.

First the list of all the items is filed by the Supply Chain Excellence specialist. This list is sent to the warehouse and is used to pick all the items from the warehouse. The costs for this are, on average, 0.29 cents per item. Because most return shipments consist of many items, the picking costs for a return shipment to a supplier are on average 0.20 cents lower than the picking costs for sending a package to a normal customer.

Next, the items need to be packed, or in other words need to be put in a box. This process is similar for normal customers and suppliers, since it takes the same amount of time per item. The packing costs are on average 0.18 cents per item.

Lastly, the shipping costs need to be taken into account. These are the costs to make a colli or a pallet of items ready for shipment. In this case the costs for a colli are 3.88 euro and the costs per pallet are 27.85 euros.

2.1.3. Transportation costs

When a package is ready for shipment it has to be transported to the supplier or the bulk buyer. Depending on the destination of the package, a separate transport company may be included. As mentioned earlier, the suppliers for international books are located all over the world. The four most occurring locations are the United Kingdom (UK), the United States (US), the Netherlands (NL) and Germany (GER).

For shipments to the United States a transportation party A is contacted. For the United Kingdom, this party is called B. For both countries, the process is similar. After all the lists are approved, the Retailer Excellence specialist calls the transportation company and asks for a quotation for the shipments. The packages are picked up and shipped to the correct destination. Company X then pays the bill.

For Supplier F, a supplier in Germany, there is a special case, which is worth mentioning. This is namely the only supplier which takes books back to Germany in the same truck in which books are delivered at Company X. Since the supplier does not charge any costs for transporting the returned items, because the truck already has to drive back, the transportation costs to this supplier are neglectable.

Lastly, there are some suppliers in the Netherlands. However, the focus of this research is on suppliers that are located abroad. Therefore, the transportation costs to these suppliers are not filled in. However, this can be adapted and changed in the dashboard very easily in the future.

2.1.4. Obsolete provision

In general, when a company wants to anticipate on any large investments or expenses for the future, a provision can be made. The amount for the provision is based on estimated future losses (Liberto, 2020). A provision can be made for several types of future losses. In this case we focus on items with a limited shelf life, to compensate for the risk that the items will not be sold and therefore money is lost. Books are

such items since they are more popular when they have just released and they can lose the potential to be sold. Therefore, the value decreases as the book stays in the warehouse. On the balance sheet, the provision is written as an expense, because the items are not going to be sold and therefore their value is lost. If the item is sold however, the total value of the provision decreases because the selling price of the item is removed from the provision.

The company needs to decide the estimated amount of money to reserve for the unsold items. In this case this needs to be done for each book, since the value of each book decreases independently. Company X has calculated decreasing factors, based on the age and the forecast of each book. The decreasing factors can be found in figure 6. These factors are an internal devaluation and do not have an effect on the consumer price. It is only used to calculate the value of all the items in de warehouse, keeping the forecast for selling the item in mind.

	Young	Mature_28	Mature_56	Mature_84	Old	Dust
<28D	0%	0%	0%	0%	0%	0%
28d-56d	0%	0%	6%	12%	35%	50%
56d-84d	0%	2%	10%	27%	50%	75%
>84d	0%	4%	18%	32%	65%	90%

Figure 6: decreasing values for obsolete items

Horizontally, the age of the item is displayed and vertically the forecast can be seen. For example, an item that has been in the warehouse for 70 days and is forecasted to be sold in 60 days loses 27% of its value.

To calculate the exact value of the obsolete value of one item, the decreasing factor is combined with the number of items in stock, which can be found in the stock ceiling in figure 7.

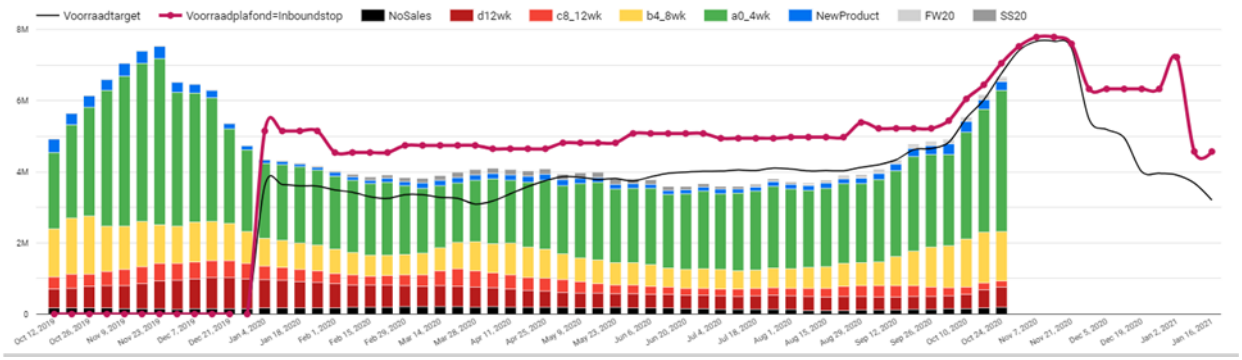


Figure 7: Stock ceiling (Company X (2020))

The number of items in each category is multiplied with the corresponding decreasing factor from the obsolete provision. Adding the values of each category results in the total value of the obsolete provision. The aim of this value is to compare it with the yields from a bulk buyer to see which option is more viable.

2.1.5. Inventory costs

In order to find out what the costs are to place one item for one month in the warehouse, we have interviewed some warehouse specialists. They mention it is not viable to clear the warehouse, since there is enough space. Due to the busy activities in the current peak period, they were not able to provide any numbers to further explain this statement. We have therefore decided to not take this into account in the

calculations. However, it is taken into account when making the dashboard and can therefore be included very easily.

2.1.6. Yields

In the whole return process, there are not only costs that are playing a role. The yields of the process are also important since they can play a role in the decision-making process. When an agreement is made between the supplier and Company X, the return percentage is also discussed. For most suppliers this is 100%, given the restrictions are met. However, there are some exceptions, like for example for Libri, where the return percentage is based on the number of items that are returned.

The yields coming from a bulk buyer are very low, around 8% of the purchasing price on average. Therefore, returning to the supplier is always the preferred option. However, if a book cannot be returned, it is better to earn some money than to destroy it and earn nothing. Therefore, the bulk buyer option can be useful sometimes.

2.1.7. Causes for unknown costs

Another interesting issue regarding the costs is the questions why some of the costs were unknown or unavailable. There are multiple reasons why the costs are unknown or unavailable. First of all, the combination of working with Bigquery and Excel results in having data in different places and making it harder to keep track of the locations of data. Next, there is no ownership of this problem. There is no specific department or person who is only responsible for the return shipments and the costs. Furthermore, the departments that are involved in the process do not see the urgency to investigate the costs, because it takes a lot of time and may not be viable. Lastly, every time the process is started all aspects have be figured out again, because there is no overview of the process. This also results in the fact that there is no time to improve the process by investigating the costs by the employees.

2.2. Decision making method

Due to the fact that the costs are unknown or located in different files, the decision-making method does not take the costs into account. In this section we will explain how decisions are currently made and who makes those decisions. Lastly, we will discuss what the different options are for the decisions.

2.2.1. Data for decision making

To determine which items need to be returned, some data is required. An item is considered obsolete when the forecast says it is not going to be sold in the next eight weeks. This data is displayed in the stock ceiling dashboard. All the items are divided in bins which are defined by the forecasted number of weeks in the warehouse. In figure 8, the stock ceiling and the bins can be found. As said before, the obsolete items are forecasted to stay in the warehouse for more than eight weeks. These are the red and dark red items.

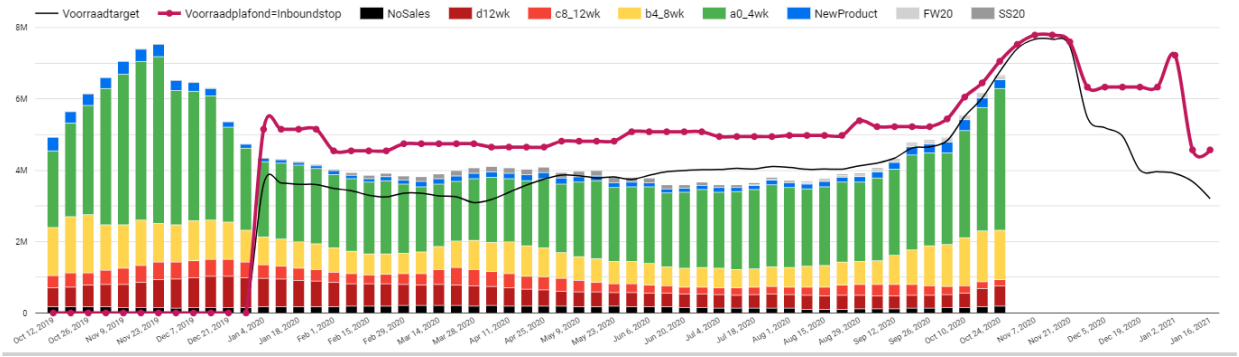


Figure 8: Stock ceiling (Company X, 2020)

Currently, books are returned in February and October. This is because the whole annual planning is based on the peak time, which is the most important time of the year for Company X. The peak time is starts on Black Friday in November and ends with the closing sale at the end of the year. For educational books, there are two more peak moments in September and February at the start of the two semesters of a college year.

Company X wants to start the peak time with relatively empty warehouses to fit as many products as possible which will be sold during the peak time. Therefore, unnecessary items are returned to the suppliers in October. The left-over books from the study peak in September are included here as well. At the end of the peak time and the beginning of the new year, all remaining the items are on sale. Everything that is in the warehouse after the sale period has to be returned as well in February. This time, the books from the study peak in February as included. As mentioned before, the whole returning process takes a long time and is therefore only done twice a year.

2.2.2. Stakeholders

In section 1.2, we briefly address all the people that are involved in the whole returning process. In order to take their requirements into account, we need to know what all the requirements are and what the level of involvement for each person should be, by placing every stakeholder in a power-interest grid. The grid is divided in four segments: keep satisfied, manage closely, monitor and keep informed. The grid can be found in figure 9.

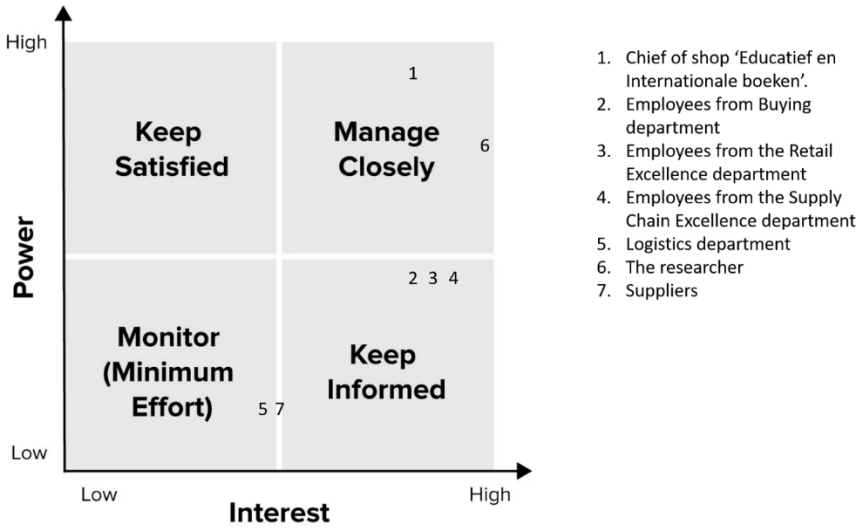


Figure 9: Power interest grid for stakeholders (Team M. T., sd)

The chief of the shop 'Educatief en Internationale boeken': the chief has high interest, since she is responsible for all costs that are made by that shop and since they have to face the consequences of the problems in the current system. Also, she has a lot of power, because she runs the shop.

The employees of the Supply Chain Excellence department and the Retail Excellence department: because all the employees are placed at the same position in the grid, is the explanation the same. The employees have a lot of interest in this system, because they are the users of the system and they have to deal with the problems immediately. Employees have less power than the chief, however they are important for the system to work. Therefore, they are placed in the middle of the power-axis.

The employees of logistics department: the logistics department is involved in the process but will not be using the system.

Researcher: the researcher is only providing the system. Generally, when assignment is done for a company, the researcher does not have much power in the decision-making process. However, since the system is developed by the researcher and the researcher is involved the most, the power is still high.

Suppliers: suppliers play a role in the current system and have therefore interest in the system. Also, they have some power, because Company X depends on the performance of the supplier. However, because there are so many suppliers, a supplier is easily replaced. Therefore, their power is very little.

2.2.3. Options for decisions

For Company X there are a few options when it comes to removing items from the warehouse if they cannot be sold to a customer. First, the book can be returned to the supplier. This is the preferred option, because then Company X will receive the original purchase price. If the book cannot be returned to the supplier, there is another option. Books can also be sold to a bulk buyer. This means Company X can get rid of the books, but they receive a small fraction, which is on average 8% of the purchase price, which means that Company X loses money. If both types of buyers do not want the book, it stays in the warehouse.

After determining which books need to go to which supplier or bulk buyer, a list is made for each supplier or buyer containing all the items. This has to be approved by the Buying department of Company X since they made all the agreements with the suppliers. When this is approved the items are picked in the warehouse and transported. The reverse department checks if the money is received. This process can take several weeks and therefore the company is interested if this can be improved.

2.3. Conclusion

There are five costs involved in the return process of international books. An overview of all the costs along with the values of these costs can be found in table 1. Currently, these costs are not taken into account when it is decided which books need to be returned. That decision is only based on the forecast of the item. If it is not going to be sold within 8 weeks, it is considered obsolete and it has to be returned. There are two option for returning an item. The books can be returned to the supplier where the book is bought, or the book can be sold to a bulk buyer. If both options are not possible, the books stay in the warehouse. The return process is currently executed twice a year, in February and in October. Because the process involved a lot of items and people of different department with different responsibilities, the process is very time consuming.

3. Solution method

In this chapter, we will describe the planning of the design process of the dashboard. We will evaluate different methods for dashboard design from the literature and select the method that fits the best with this research.

3.1. Considerations for dashboard design from the literature

Firstly, what is a dashboard? According to Orts (2004), a dashboard is a vital tool for monitoring the daily health of your organization. Few described it as "a visual display of the most important information needed to achieve one or more objectives; consolidated and arranged on a single screen so the information can be monitored at a glance" (Schwendimann, et al, 2017). Similar to the dashboard on a car, business dashboards can offer realtime information about the organization and aid in better managerial decision-making and agility. (Pankaj et al., 2006) Often, when speaking of dashboards the terms score card and report card are mentioned. However, they are not the same. A score card is used in activities like games where scores are given and the manager with the lowest score loses. However, this mentality brings anxiety to most managers. A report card is used in educational system and is simply based on judgement, which does not help if a company strives to collaborative projects (Allio, 2012). When creating a dashboard, there are some issues to consider in order to make a proper dashboard. Pakaj et al. (2006) mention 3 aspects, which will be discussed in the following sections.

3.1.1. Target and purpose

A dashboard can be useful for anyone within a company. However, it does make a difference for the design of the dashboard, for which department or user the dashboard is intented. Additionally, the function of the dashboard has an impact on the final design of the dashboard (Pankaj, Hyde, & Rodger, 2006). When thinking about this issue there are two fundamental questions one should answer. First, what information should be displayed for personnel at different levels and in different roles? Secondly, is there a set of personnel in an organization who are most likely to benefit from the dashboards? (Pankaj, Hyde, & Rodger, 2006) For creating an effective dashboard, you need to have a clear idea about the objectives to be achieved, target users, technology you will be working upon and many such objectives need to be identified. (Saini, Marriboyina, & Sood, 2019)

For the dashboard we are designing for this research, we need to think about these issues as well. In this case the dashboard is intended for the employees of the Supply Chain Excellence and Retail Excellence department. The purpose of the dashboard is to provide insight in all the costs that are involved in the return process of international books. Both departments have similar functions in the return process, so a separation in the data is not necessary. However, it is important that only the required data is displayed to maintain the overview.

3.1.2. Data and information availablity

In order for data to be available on the dashboard, the company should have the right data infrastructure. Dashboards are updated constantly and therefore need a constant data flow and the company should be able to handle that or should ask the question how up-to-date the dashboard should be. The frequency of updates depends on the data. Some data should be updated every hour, but other data every week. The important aspect is about a dynamic dashboard is that when data is updated, the dashboard should be updated as well. Another issue that makes the complexity even higher is that a lot of the time external data is required for a dashboard. Additionally, all these issues are likely to change over time due to the

change of requirements. Therefore the dashboard should be able to adapt to those changes (Pankaj, Hyde, & Rodger, 2006).

In this case, we are designing a dashboard, which is maintained by using queries which retrieve updated data from the database daily which keeps the data in the dashboard updated as well. The dashboard works with data from the Company X database using the queries, but it is also possible to attach data from a spreadsheet to the dashboard. Therefore, it is definitely possible to link to external data.

3.1.3. Usability

When considering the usability of the dashboard, we need to think about whether information is ready to be used in a dashboard. The information should be interpreted and acted upon in the context of the organization's overall objectives and goals. It should be defined as useful indicators which can be used for decision making while keeping those objectives and goals in mind. (Pankaj, Hyde, & Rodger, 2006)

Since our goal is to provide insight in the costs, any data about costs and the value of the involved costs is ready to be displayed in the dashboard. The interpretation is mostly happening when the data is already displayed in the dashboard. Therefore, this issue does not cause any difficulties.

3.2. Types of dashboards

Given these aspects, we can state that there are different types of dashboard for the different purposes. Saini et al. (2019) mention three main types of dashboards. Firstly, we have the policy making dashboard, or operational dashboards, which help with operational decision making. Next, we have strategic dashboards for cognizance, which are less interactive and more focussed on public knowledge. These dashboard show the 'health' of an organization (Pappas & Whitman, 2011). Lastly, we use analytical dashboards for the drive to learn, which are drafted for the purposes of communication to and education of the end user. These are often made over a longer time span, which helps to find trends in data (Pappas & Whitman, 2011).

3.3. Data types

In addition to the previous mentioned issues, it is important to decide which type of data the dashboard is going to display. The different types of data can need a different presentation methods. There are three levels of data: descriptive, predictive and prescriptive. (Gensinger, 2014) Descriptive data will describe what occurred in a sample or experiment. (Thompson, 2009). Predictive data is used to find correlations between events or data. (Gensinger, 2014). Lastly, prescriptive data helps to determine the best course of action (Gensinger, 2014). So, the type of data and the purpose of the dashboard are closely tied together.

3.4. Available methods for dashboard design

After considering the issues mentioned in sections 3.1.1. to 3.1.3, we make the design for the dashboard. For that, there are different options as well. The first issue that comes to mind when creating a dashboard is the program which is used. There are a lot of tools available for creating dashboards, but it is important to choose the tool wisely and to consider all the (dis)advantages. In this research we are focussing on the steps that should be taken when designing a dashboard. Here we discuss five options that were mentioned in the literature.

The first one is mentioned by Orts (2004) and consists of a six step plan. These steps can be found in figure 10. The six step plan starts with making a plan for the dashboard. In this phase we need to consider the three concepts of Pakaj et al. (2006) that were mentioned ealier. Next, we need to think about the

requirements for the dashboard and foremost who is responsible for the requirements and who are the stakeholders. Then it is time for the design, so we need think about what the dashboard is going to look like in the front, but also in the back. All the data sources need to work in order for the dashboard to work. Next, we will start building and potentially add external sources. After that, the dashboard can go live. Lastly it is important to maintain the dashboard and to check whether all KPIs are still relevant.

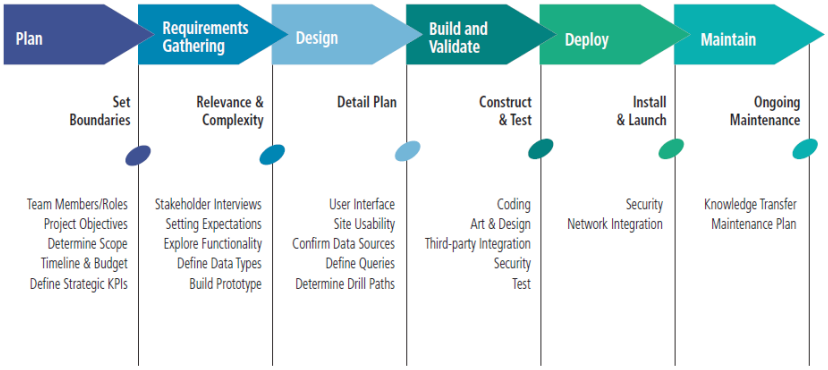


Figure 10: Six step guide (Orts, 2004)

Another framework for dashboard design is a top down approach, decribed by (Woodworth, Neville, & Frédéric, 2009). This approach is based on the suggestion that dashboards are more likely to be sucessful if they are created by the top of an organization. The model can be found in figure 13. The advantage of using this approach is that the managements has an overview of the entire company and is able to make a dashboard with a complete overview. However, in this case this advantage does not work, since we are dealing with a very extensive data source and unknown data. This data is also unknown for the management of the company and therefore there is no advantage in letting the management of the company make the dashboard.

Next, there is the process monitoring method by (Kintz, 2012) which is a full business process model driven monitoring methodology. The method is summarized in figure 11. It starts by matching the goals to the data types. Next, the data types are matched to visualizations. Next, the visualisations are matched to the data sources. Lastly the commands are defined, which are part of the code behind the dashboard and define the abilities of the dashboard. If the dashboard has more commands, it will become more advanced. The advantage of this method is that is useful when a company uses multiple IT systems in one process. In our research, this is not the case and therefore, this method is not suitable.

Another option for making a dashboard is to use the strategic roadmap. It is a dynamic concept where all modules and related tools are connected through the data flows and their feedbacks. (Kojal & Cyrus, 2013). It becomes a time line where all the KPIs are measured over time and the development can be monitored. The advantage of the model is that it is dynamic and it is updated as the processes change and it can be used by a company of any size. However, the model is aimed at companies that do not have any experience with designing dashboards. Therefore it is too extensive for our research.

The last method uses six questions to guide the development of a dashboard (Saini, Marriboyina, & Sood, 2019). The questions can be found in figure 12. The questions appear to be similar to the first method, but is not quite as structured and could be better applicable for, for example smaller companies who do not need a extensive dashboard. The advantage of the model is that the focus is on the end users and makes

the dashboard very user friendly. However the model is not extensive enough for our research as it does not cover the different data types and how each type should be displayed.

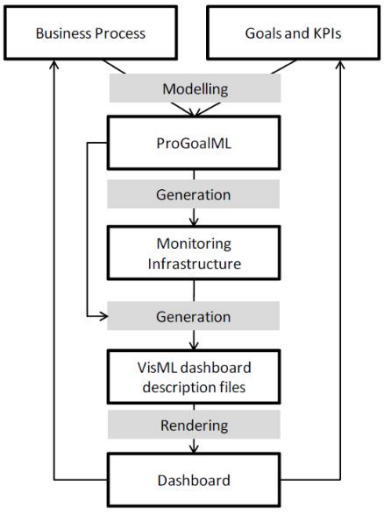


Figure 12: Monitoring Methodology (Kintz, 2012)

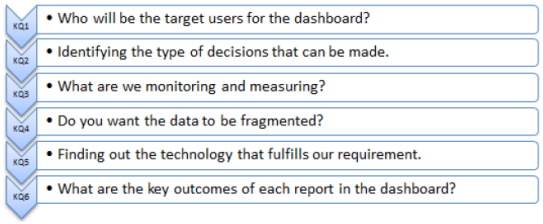


Figure 11: Six question guide (Saini, Marriboyina, & Sood, 2019)

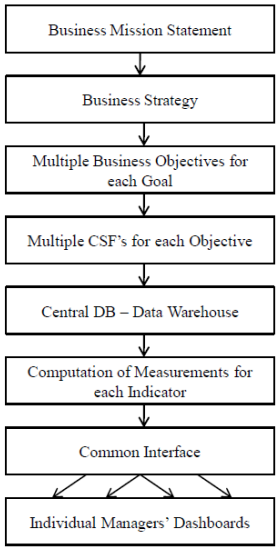


Figure 13: Top-Down approach (Woodworth, Neville, & Frédéric, 2009)

3.5. Chosen method for dashboard design

In order to choose a suitable model for our dashboard design, we need to subject the models to the rquirements of our dashboard. This way the method corresponds with the required outcome of the dashboard. In table 2, the requirements are shown and we displayed if the requirement is met per model.

Table 2: requirement dashboard design model

	Model				
Requirement	Six step guide (Orts, 2004)	Top down (Woordworth, 2009)	Process monitoring method (Kintz, 2012)	Strategic roadmap (Kojal, 2013)	Six questions (Saini, 2019)
User friendly	Yes, because user interface and team roles are considered extensively	Yes, because a standard interface is implemented so everyone in the company is familiar with the dashboard	No, because the end user is only considered at the end of the process in this method.	Yes, the end users are included from the beginning	Yes, the users are play a central role
Theme and layout	Yes, there is room for own design decisions	Yes, because a standard interface is implemented	yes, there is room for own design decisions	yes, there is room for own design decisions	yes, there is room for own design decisions

Extendibility	Yes, the stakeholder analysis makes sure other stakeholders are considered from the beginning. Furthermore, the scope and objectives are taken into account from the start. If extendibility is included in the objectives, it will be taken into account.	Yes, the standard interface can be extended for individual dashboards	Yes, the standard interface can be extended for individual dashboards	yes, but the whole process has to be done again for the extensions to see if other data is required.	No, because the model does not cover which data (type) is required for certain decisions.
Google Data Studio	Yes, the plan is query based, which is also used in Google Data studio	Not specified, but a central database is used, just like in Google data studio	No, this method is based on another program, which is based on Excel files.	Not specified, but a central database is used, just like in Google data studio	Not specified, but a central database is used, just like in Google data studio
Different levels of data	The data types are considered early in the process	Yes, but not as detailed due to the standard interface	Yes, but not as detailed due to the standard interface	The data types are considered early in the process	No, this is not covered in the model

Legend for table 1:

	The model fits the requirement
	The model fits the requirement partially
	The model does not fit the requirement

To answer the research question and to summarize this literature research, we follow the Six Step guide mentioned by Orts (2004). This is a extensive guide, which focuses on team members with different roles, which is also the case in our research, since we are dealing with employees of different departments which have different roles within the company. Our dashboard is targeted towards the employees of the Supply Chain Excellence and Retail Excellence employees. Additionally, it is made for a query based dashboard, which also applies in our case since Google Data Studio works with SQL and queries. Also, there is a structured approach for the knowledge transfer and maintenance plan. This is important because the dashboard will be used after the research is done, so a clear document on how the dashboard works is necessary. Furthermore, this dashboard is created by the researcher, so a top-down approach is not suitable. Also, the process monitoring methodology is not as optimal, because it is more focussed on general goals and we need something for a specific part of a department and a specific process.

The purpose of our dashboard is to gain insight in what items are obsolete, what the costs for these items are and what the best way is to get rid of these items. We are dealing with different types of data since we are not only providing insights with descriptive data by showing the information of the obsolete items,

but we are also using prescriptive data by combining the costs and the right of return information to support the decision making process on which items need to be returned. Since we are focussing most on the SCE and RE department, we want to provide data that is relevant for these departments. In chapter 4, we will discuss what data is presented and how it is presented in the dashboard.

Now we have selected a proper framework to start developing the dashboard, we want to briefly adress the design part of the problem. There are some aspects we need to think about when designing the interface. Yigitbasioglu and Velcu (2012) reviewed the research that is done on dashboard visualisation, appearance and user characteristics. They found that functionality was an important feature that needs to be taken into consideration when implementing a dashboard. Furthermore, designers need to be mindful of the effect of information overload. It is important not to make poor design decisions by putting anything on the dashboard which distracts the users' focus on the key information in the dashboard (Cahyadi & Prananto, 2015).

3.6. Conclusion

In the literature, several dashboard design methods are mentioned. All of these methods have advantages and disadvantages. To decide which method was most suitable for this research, we subjected each method to the requirements of the dashboard, mentioned in section 1.7. This way we could ensure that the outcome of the method we used would be able to meet all requirements. The method that suits this research the best is the six-step guide mentioned by Orts (2004). This method consists of the following six steps: plan, requirement gathering, design, build and validate, display and maintain. The steps will be discussed further in chapter 4. This method is the best suitable method for this research, because the model is a extensive guide, which focuses on systems with different roles. Additionally, it is made for a query based dashboard, which also applies in our case since Google Data Studio works with SQL and queries. Also, there is a structured approach for the knowledge transfer and maintenance plan. This is important because the dashboard will be used after the research is done, so a clear document on how the dashboard works is necessary.

In addition to the frameworks, three important aspects are mentioned in the literature. First, we need to think about the target and purpose of the dashboard. The purpose of the dashboard is to provide insight in all the costs that are involved in the return process of international books. The dashboard is targeted towards the specialists from the Supply Chain Excellence and Retail Excellence departments. Next, we need to examine the data and information availablity. In this case, we are designing a dynamic dashboard, which is kept up to date by using queries which refresh all the data daily. Lastly, we need to consider the usability of the dashboard. Since our goal is to provide insight in the costs, any data about costs and the value of the involved costs is ready to be displayed in the dashboard. The human interpretation is mostly happening when the data is already displayed in the dashboard. Therefore, the usabilitity does not cause any difficulties in this case.

4. Dashboard

In chapter 3 we mentioned the dashboard design method we selected for this research. Here we will describe how we executed all the steps of the process and how we designed the new dashboard (Return dashboard II).

The process starts with the planning phase. This is described in section 1.7. Next, we have requirement gathering which is done by interviewing the employees. This process is described in section 4.2.2. Next, we procees to the design of the dashboard. In section we 4.2.5, we explain the draft version of the dashboard and in section 4.4. the final version of the dashboard is presented. We will describe how the outcome of the interviews has affected the outcome of the dashboard and why specific KPIs were selected. The following phase is to build and validate, which is described in chapter 5. Next, we have the display and maintain phases which are included in chapter 6.

(Disclaimer: all values in figures 14-36 have been mutiplied with factor X)

4.1. Return dashboard I

Since Company X was already working on a return dashboard, we decided to expand that to have all relevant information in one place. The current dashboard consisted of three layers of information.

The first layer consists of information about all obsolete items per shop. The next layer is used to further go into detail and shows the information of all obsolete items per supplier. In the third layer, the data is shown per item to provide a very detailed overview of all the obsolete items.

As mentioned in section 1.4, one of the problems is that it is hard to know which items need to go to which supplier and how many items need to go to each supplier. These issues were tackled in Return dashboard I, because it shows the supplier for each item and the number of items that need to go to that supplier.

The components of Return dashboard I can be found in figures 14-16. This shows to which extend Return dashboard II is an extension of Return dashboard I.

Number and value of items with right of return per supplier

Overview of number of items and value that have right of return for each supplier

suppliername	RVR ▾	RvRWaarde	RvRVervaltBinnen1mnd	RvRWaardeVervaltBinnen1mnd
	16,100	269,901.56	null	null
	11,091	196,496.45	null	null
	9,180	56,280.97	null	null
	7,770	140,851.04	null	null
	4,807	98,579.08	null	null
	2,493	75,084.55	null	null
	2,292	20,444	null	null
	2,243	31,427.47	null	null
	1,521	13,592.98	null	null
	1,483	37,374.56	null	null

Figure 14: Component Return dashboard I: Number and value of items with right of return per supplier

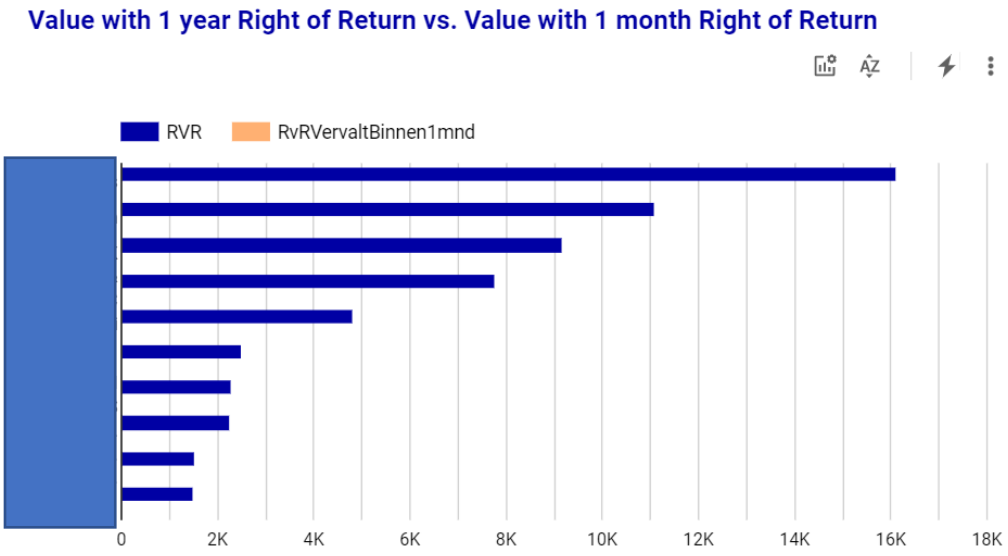


Figure 15: Component Return dashboard I: Value with 1 year right of return vs. value with 1 month right of return

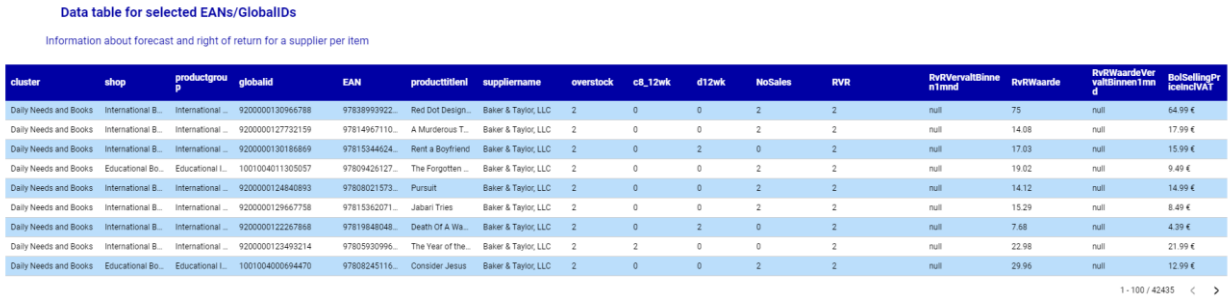


Figure 16: Component Return dashboard I: Data table for selected EANs/GlobalIDs

4.2. Design process

In this section we will describe the design process of Return dashboard II. Furthermore, we will describe how we used the interviews to determine the data and KPIs that is going to be displayed.

4.2.1. Google Data Studio

All the existing dashboards are made in Google Data studio. Therefore, one of the requirements is that the dashboard has to be made in Data Studio as well.

Google Data studio is a program of Google which helps to visualize data in charts and tables. Data can be connected using different methods like spreadsheets or queries. In this case, we connected our data to the dashboard using queries in which we filtered the required data from the large data sources. The queries are written using SQL programming language. The codes of the queries can be found in appendix G.

4.2.2. Interviews

As mentioned in section 1.7, we used interviews to gain information from the end users about what data should be presented in the new dashboard. We divided the question in several themes to make a complete picture. We divided the questions in the following themes: current process, problems, agreements, costs,

solutions and data. The questions can be found in appendix E and the summary of the findings can be found in appendix F.

We used the information about the current process for making the flowchart and to present the time the process currently takes. This way, we can compare the current situation with the new situation where the Return dashboard II is used.

We asked the employees about the problems they encounter during the return process to complete the problem context. These problems were also used as a check to make sure the dashboard would actually solve those problems.

Next, we asked the employees of the Buying department what the current agreements are, so that we could make an overview of that, since that information was spread over several files and spreadsheets.

Also, we asked the employees about the costs, so we could gain insight in what costs are involved and which costs are known and unknown. This way, the search process to the actual values of the costs was more effective.

Next, we added the input for possible solutions from employees to the requirements list or to possible recommendations for future use of the dashboard when the solution was out of the scope of this research. The list of requirements can be found in section 1.8. When making the dashboard we made sure that it was possible to implement these solutions later in the dashboard.

Lastly, we asked about what data was missing in the dashboards which could improve the return process. We used that to derive KPIs which will be presented in the dashboard. We also asked about the level of involvement of the specialists when using the dashboard and what the role of the dashboard should be according to the end users.

Using the outcomes of the interviews, we can define what data is missing in Return dashboard I. Firstly, there is no insight in what the costs of the total shipment will be. This is the problem statement of this research, but employees also want this data to help with making the decision about which items will be returned. Next, employees miss insight in where the mistakes are made. In other words, what does the current obsolete stock consist of? For example, is it mainly from one supplier, or are the items divided over all suppliers? Lastly, because every time a return process is done, it has to be figured out again, there is no performance measurement over all previous processes. Therefore, it would be useful to add that to the dashboard as well.

Summarizing all of this, we derived the following KPIs from the interviews

- Transport costs per supplier
- Total value of returned items versus the total value of purchased items in a year per supplier
- The deadline of the right of return per item to see if action is required
- The type of items that become obsolete: top/tail items, bulk order/manual orders, date product is purchased, to see where the biggest mistakes are made
- An overview and values of all the costs that are involved
- A performance indicator, to measure the performance of the process over the years. In this case we decided to display the percentage of books that are sent to the bulk buyer. This has to be done

with books that lose their right of return. If less books are sent to the supplier, less unnecessary costs are made, because books will get a full refund instead of only a small percentage.

4.2.3. Data per department

The dashboard will be used by employees of different departments. We determined which data is used by each department to decide which data will be presented in the dashboard. The dashboard is mainly focused on the Supply Chain Excellence department and therefore their requirements will be more important than the requirements of the other departments.

The buying department needs to know the forecasting and the selling numbers of each item to be able to make the best agreements with all the suppliers. For this department, the useful information about the return process are the current agreements and how well they still fit and if adaptations are necessary.

The Supply Chain Excellence department and the Retail Excellence department both use similar data for a similar purpose. They both want to know what the current stock of all the items is and if that is correct, looking at the current demand. So, they use the stock ceiling and the bins provided in that data to see what the good and the bad items are. Next, they want to see the trends in the selling numbers, so that they can adapt the purchases on the trends they see. Lastly, they want to know the prices of the items in order to see how much value is gained by selling the items, but also how much money is lost when items do not sell.

In conclusion, we the focus of the dashboard will me more on item and process related information like costs and selling prices instead of data about suppliers and agreements.

4.2.4. Lessons GSE experience

During our research, the return process in October was executed which gave us the opportunity to experience the problems of the process, but also provided specific subjects useful to include in the dashboard. The subjects from the return process were as follows:

- It is useful to have both the EAN code and the globalID code of the items in the dashboard, since different processes and people need the different codes. The EAN codes are used in the communication with other parties like the supplier and the bulk buyers, because they are universal codes. The globalID code is a code made by Company X itself and is therefore used in the communication with internal parties like other departments within Company X.
- A lot of different Excel files and queries are used. The base information is already displayed in the current return dashboard. This is the information about how many items need to go to which supplier. However, during the rest of the process, multiple Excel files were used to send the information to all the people involved in the process.
- Since suppliers have different agreements about the number of items that can be returned, they also need different information about the items that are returned. Some suppliers only need the EAN code and the purchase date, but other supplier also need information like the title or the order numbers.
- The whole process needs a lot of manual work. The GSE files needed to be filled in manually per supplier. The EAN and the number of items were required. This could be retrieved from the dashboard, but the exported file was very large compared to the little information that was needed.

4.2.5. Draft version dashboard

In figure 17, the draft version of the dashboard can be found. The data displayed on this dashboard was defined using the problems from the problem identification phase and the input from the employees from the interviews.

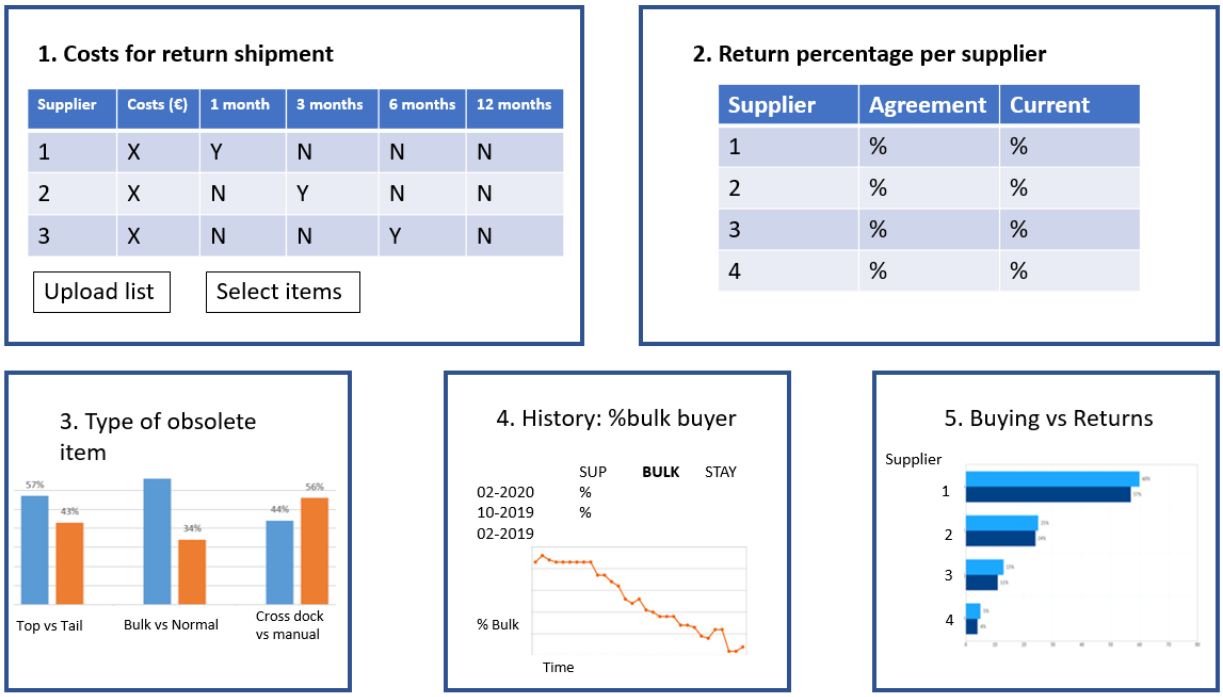


Figure 17: Draft version of the dashboard

The first table will be used to give an advice based on the costs and the right of return. Per supplier, the costs for sending the selected items will be calculated and it is presented when the shipment should be returned based on the fact when the right for return is lost. For the costs, we will consider three scenarios:

- Sending to supplier: picking + transport
- Sending to bulk buyer: picking + transport
- Stay in the warehouse: warehouse + obsolete provision

In the second table the return percentage and the agreements per supplier are shown. It is useful to have this information in a central place to keep into account when buying items at a certain supplier. This is an issue since books can be ordered from several suppliers and sometimes it is better to buy at a more expensive supplier to keep the right for return for more books.

In the third graph the type of returned orders is shown. It shows for all the items that are considered obsolete what type of item it is and how it is ordered. When this is known, it can be taken into account when purchasing new items and it can therefore prevent unnecessary obsolete items in the future.

In box number 4 we combined a table and a graph to show the data in two different ways. We noticed that a lot of unnecessary costs are made when books lose their right for return and have to be sold to a bulk buyer. Therefore, it is an interesting KPI to consider the percentage of books that is sold to a bulk buyer per return moment since we want to reduce these numbers by providing more insight in the books

that are about to lose their rights. In table 4 all the percentages per destination are shown and in graph 4 the percentage of books that is sent to a bulk buyer is presented over time.

In the fifth graph we wanted to show where things are going wrong. In the graph the total purchase value is compared to the value returned per supplier. Here we can see for which supplier the restriction for the right of return is almost met.

4.3. Data model

As mentioned before, the Return dashboard I is built using queries in Google Data Studio. The queries are used to filter the required data from a bigger data source. Also, different data sources can be joined to combine certain information to form a complete view.
In the data models in figures 18 and 19 can be seen how different data sources, or tables, are used and combined to make the complete data source behind the dashboard. The dashboard runs on three new tables which are created using these existing tables. The three new tables are called: "DashboardMakenBQ", "KostenRetour" and "RvROverzicht". The query codes for these tables can be found in appendix G.

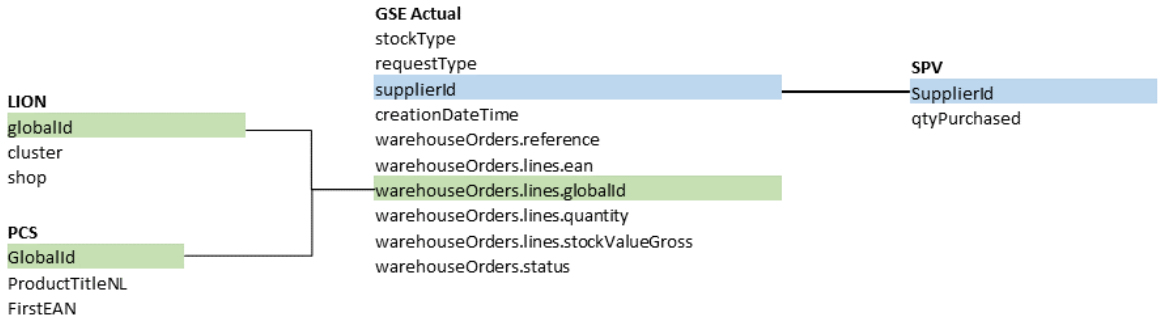


Figure 18: Data model for "DashboardMakenBQ" (blue green)

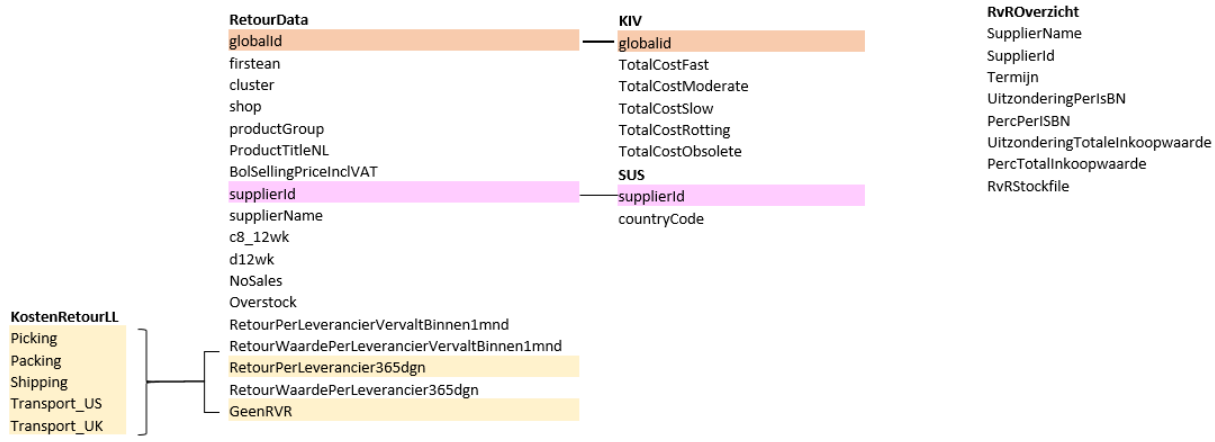


Figure 19: Data model for "KostenRetour" (red-yellow) and "RvROverzicht

4.4. Components Return dashboard II

The new dashboard, Return dashboard II, consists of two pages: an overview page and a monitoring page. In the overview page, the KPIs that are refreshed on a daily basis are displayed. On the monitoring page, the KPIs that are updated less frequently are shown. In this section we will cover all the KPIs that are

displayed on the dashboard and state which data is used to create the graph or table. The dashboard consists of three levels: Total costs, supplier overview and deep dive per obsolete item.

We start with the first level of the dashboard. We decided to make the data and figures more detailed as the user scrolls downwards. Therefore, the most general data is shown at the top of the dashboard.

One of the main issues that came foreward in the interviews is that the decision whether an item should be returned or not is not based on the costs. The table in figure 20 provides an overview of the total holding costs and the total return costs per shop to see which option is most viable. In this table, the total number of obsolete items (overstock), the number of items with and without the right of return and the costs and yields to return or to hold all the items with the right of return. The total costs for returning and holding are only mentioned for the items with right of return, because these costs can be compared to the yields. The yields for these books are the purchasing price. For the items without the right of return, the yield are unsure, since they have to be discussed with the bulk buyer. In order to provide an advice for the employee, a decision advice is added which says if the items for that shop should be returned or not, based on the return costs and the holding costs.

Total costs per shop

Costs for returning all obsolete items per shop

shop	overstock	RetourPerLeverancier365dgn	GeenRVR	TotalHoldingCostsWithRvR	TotalReturnCostWithRvR	Yields	Decision
Algemene Internationale ...	142,707	46,233	87,957	112.47K €	44.68K €	457.77K €	1
Educatieve Boeken	66,289	23,167	25,679	272.73K €	28.19K €	640.92K €	1
Algemene Nederlandstali...	27,960	1,160	626	3.76K €	583.88 €	13.38K €	1
School en Kantoor	74,119	3,687	10,407	15.65K €	3.97K €	23.7K €	1
Digitaal	11,230	729	5,012	15.41K €	372.63 €	111.5K €	1

1 - 5 / 5

Figure 20: Level 1: Total costs per shop

In figure 21, a slightly more detailed table can be found. Here, the returning costs are presented per supplier, to see what the costs would be to send all the items that still have the right of return back to the supplier. We splitted the return costs for the items with and without the right of return to see what the return costs would be for the items that cannot be returned to the supplier. Also here we provided an advice for the decision if the items should be returned or not. In this case, for only one supplier the returning costs are higher than the holding costs, resulting in a negative advice. In the next level of the dashboard, we provided more detailed information per supplier.

Costs per supplier

Costs for returning all items with right of return per supplier

supplierid	suppliername	RetourPerLeverancier365dgn	TotalReturnCostWithRvR	TotalReturnCostNoRvR	Decision
		21,485	41,986.75 €	36,932.57 €	1
		13,767	6,726.49 €	10,663.19 €	1
		9,860	12,094.6 €	16,374.28 €	1
		8,944	4,527.68 €	1,532.2 €	0
		4,844	2,355.68 €	8,419.06 €	1
		2,502	1,250.94 €	1,185.3 €	1
		2,235	1,076.45 €	164.27 €	1
		1,769	875.43 €	2,246.47 €	1
		1,653	842.91 €	867.94 €	1

Figure 21: Level 1: Costs per supplier

In figure 22, the return agreements per supplier are presented. As mentioned earlier, all the suppliers have different agreements for returning items and that information was stored in multiple spreadsheets. We wanted to provide an overview of the relevant information in one place and therefore all the agreements are presented in the dashboard as well. The agreements are different, but have similar elements. All agreements have a period in which the items have to be returned. This period is for most suppliers 365 days. Furthermore, suppliers have a restriction on the percentage of books that can be returned. Only a certain percentage of the purchase value can be returned and the exact percentage differs per supplier. During the interviews, we noticed that the agreements were complicated, because they are different for all suppliers. Also, the agreements were hard to find, because they are described in several Excel files, which makes it hard to include the agreements in the purchasing process. We therefore decided to list all the agreements in one central place in the dashboard.

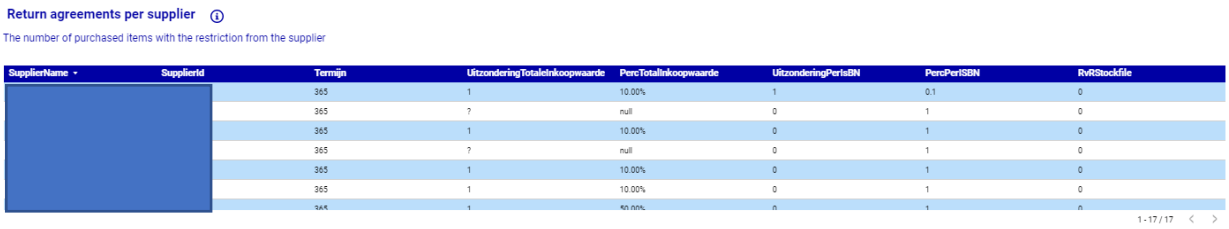


Figure 22: Level 2: Return agreements per supplier

In figure 23, the ratio between purchased items and returned items can be found per supplier. This information is also displayed in a table in figure 24. The ratio from the table can be compared to the restriction which can be found in the agreements table in figure 22. This way, the specialist has insights in how far the restriction is already reached. The two graphs are based on historical data, which means it contains information about items that already have been purchased and returned. In the interviews, most employees were interested to see at which suppliers the restriction was met. This information can help in the discussion for better agreements with suppliers, but it can also provide useful insights which can be taken into account when ordering books at certain suppliers.

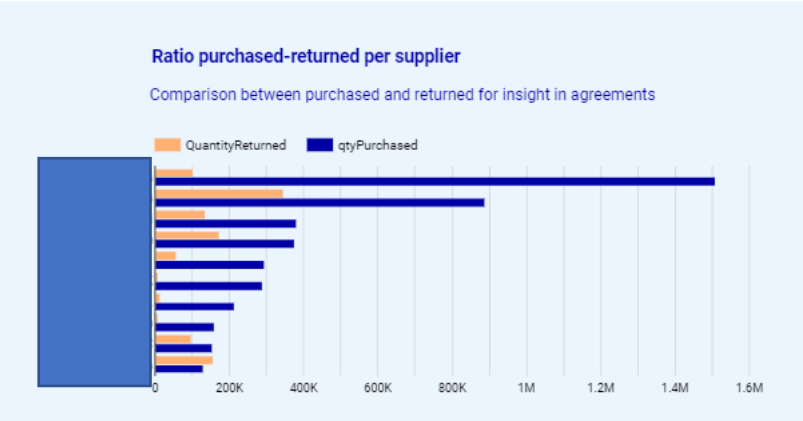


Figure 23: Level 2 (Historical data): Ratio purchased-returned per supplier (graph)

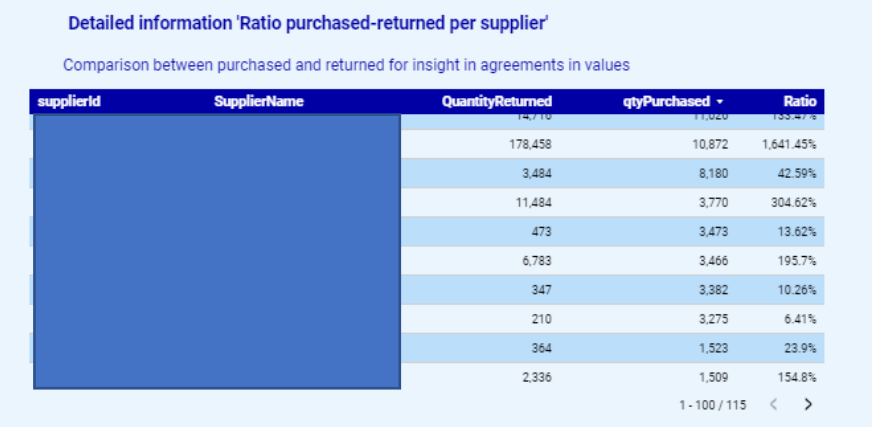


Figure 24: Level 2 (Historical data): Ratio purchased-returned per supplier (table)

In the next two graphs from the supplier level, information from forecasted data can be found. In figure 25 we can see the value of the obsolete items which are currently in the warehouse along with the value of items which have the return deadline within a month. The table in figure 26 shows the same information, but in more detail by showing the exact values and quantities. In the interviews, the employees suggested to add the return deadline per item. However, this is not possible since the deadline is linked to a title instead of a specific item. We therefore decided to present the value of all the items that are about to lose their right of return, to see for which supplier action needs to be taken.

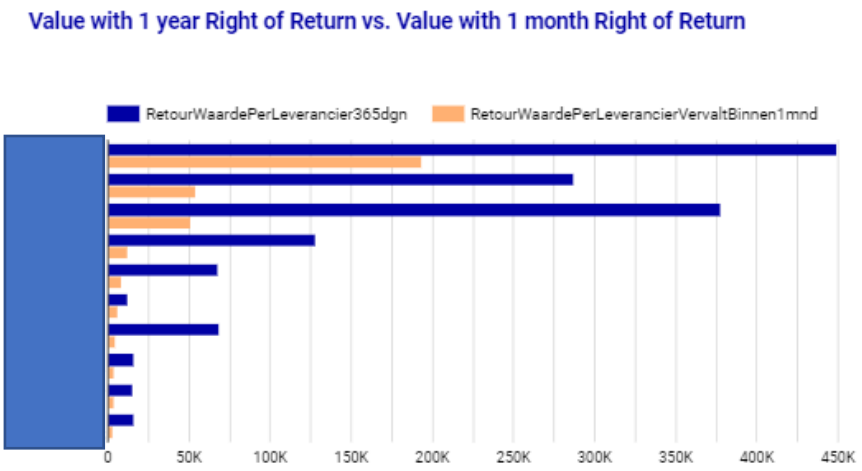


Figure 25: Level 2 (Forecasted data): Value with right of return per supplier (graph)

Number and value of items with right of return per supplier

Overview of number of items and value that have right of return for each supplier

suppliername	RetourPerLeverancier365dgn	RetourWaardePerLeverancier365dgn	RetourPerLeverancierVervaltBinnen1mnd	RetourWaardePerLeverancierVervaltBinnen1mnd
	22,126	377,896.99	3,698	51,052.89
	12,975	286,765.17	2,967	54,379.34
	5,653	449,124.19	1,532	193,169.73
	5,375	128,228.35	1,014	12,443.75
	4,031	68,701.36	474	4,745.15
	2,527	16,239.18	743	4,049.87
	2,094	67,729.4	255	8,226.7
	2,069	15,798.64	490	3,197.97
	1,808	15,356.63	0	0

Figure 26: Level 2 (Forecasted data): Value with right of return per supplier (table)

In the third level, the most detail is shown in two different tables. This way, it is possible to get information about a specific item. Therefore, we made it possible to click on the globalID code, which brings you to the Summa page. Summa is an internal Company X website which shows all the detailed information of an item, like sales history, purchase orders and stock levels. Furthermore, we added the GlobalID code as well as the EAN code per item, because we learned from our GSE experience that both codes are used in different stages in the process. Adding both to the list is therefore useful and saves time and effort.

The tables in figure 27 and figure 28 break down the total return costs into the different elements. In figure 27 this is done for items with the right of return and in figure 28, this is shown for items without the right of return. These tables can be used to calculate the total costs for one specific item. During the interviews we discovered that insights in all the involved costs is useful. At the top of the dashboard, in the table in figure 20 only the total costs are shown. Here is explained where all the costs come from and how they are calculated. The calculations and fixed values can be found by clicking on the information icon at the top of the table in figure 27. The text from the information text box can be found in appendix H.

Costs per shipment (with RvR)

Costs for picking, packing, shipping, transport, holding and obsolete provision for selected EANs/GlobalIDs with Right of Return

supplierid	suppliername	GlobalID (Link)	FirstEAN	RetourPerLeverancier365dgn	WithRvRHolding	TotalObsoleteProvision	WithRvRWarehouseCosts	TransportCost	TotalReturnCostWithRvR	TotalHoldingCostsWithRvR
		9200000048246231	9789030128427	null	null	0.00 €	null	0.00 €	null	null
		9200000075700215	9789018041274	null	null	4.51 €	null	0.00 €	null	null
		9200000016515037	9789023483113	null	null	0.97 €	null	0.00 €	null	null
		9200000101809723	9789461182579	null	null	94.58 €	null	0.00 €	null	null
		9200000117580654	7612176104333	null	null	0.00 €	null	0.00 €	null	null
		9200000085089985	9789045212074	null	null	0.91 €	null	0.00 €	null	null
		9200000095471682	9789043530699	null	null	11.52 €	null	0.00 €	null	null
		9200000059720761	9789018040048	null	null	0.56 €	null	0.00 €	null	null
		9200000102508257	9789492831149	null	null	8.64 €	null	0.00 €	null	null
		9200000107730308	9789049807153	null	null	10.42 €	null	0.00 €	null	null

1 - 100 / 58077

Figure 27: Level 3: detailed costs per shipment (with right of return)

Costs per shipment (no RvR)

Costs for picking, packing, shipping, transport, holding and obsolete provision for selected EANs/GlobalIDs with no Right of Return

supplierid	suppliername	GlobalID (Link)	FirstEAN	GeenRVR	NoRvRHolding	TotalObsoleteProvision	NoRvRWarehouseCosts	TransportCost	TotalReturnCostNoRvR	TotalHoldingCostsNoRvR
		9200000117516959	0681495007844	324	25.92 €	0.00 €	165.24 €	0.00 €	165.28 €	25.92 €
		9200000117516955	0681495007837	375	30.00 €	680.65 €	191.25 €	0.00 €	191.25 €	710.65 €
		9200000098462721	0681495007639	326	26.08 €	2,996.81 €	166.26 €	0.00 €	166.22 €	3,022.89 €
		9200000117516959	0681495007844	162	12.96 €	0.00 €	82.62 €	0.00 €	82.14 €	12.96 €
		9200000098462727	0681495007615	326	26.08 €	807.98 €	166.26 €	0.00 €	166.22 €	834.06 €
		9200000117516955	0681495007837	750	60.00 €	680.65 €	382.50 €	0.00 €	382.50 €	740.65 €
		9200000063311606	0681495007264	null	null	827.86 €	null	0.00 €	null	null
		9200000008862054	5052883214383	null	null	55.21 €	null	0.00 €	null	null
		9200000047979713	0071701001498	null	null	50.51 €	null	0.00 €	null	null
		9200000011684463	0043859526338	null	null	0.24 €	null	0.00 €	null	null

1 - 100 / 58077

Figure 28: Level 3: detailed costs per shipment (without right of return)

The table in figure 29 shows all relevant information per item. This table, like all other tables, can be exported to an Excel file, which can be used to set up the list of all returned items which is sent to the suppliers and the Buying department to be accepted. This was one of the main issues that came forward in the interviews. Data collection is very time consuming and this table contains all the information that is required to set up the lists for the suppliers.

Data table for selected EANs/GlobalIDs

Information about forecast and right of return for a supplier per item

cluster	shop	productGroup	globalid	FirstEAN	ProductTitleNL	suppliername	overstock	c8_12wk	d12wk	NoSales	RetourPerLeveranciervervaltBinnen1mnd	RetourWaardePerLeverancierVervaltBinnen1mnd	RetourPerLeverancier365dgn	RetourWaardePerLeverancierVervaltBinnen1mnd	listprice	BolSellingPricincVAT
Lezen en Leren	School en K...	School en Kanto...	9200000047388609	4026283013298	Tandberg Data Front bezel ...	null	6	0	0	6	null	null	null	null	null	8.09
Lezen en Leren	School en K...	School en Kanto...	9200000025055088	3329680121605	TROPHEE GROEN A4 120G...	Adveo Nederlan...	8	0	0	8	null	null	null	null	8.99	8.69
Lezen en Leren	School en K...	School en Kanto...	9200000013964247	4971850185703	Casio DF-120ECO - Bureau...	Adveo Nederlan...	7	1	5	0	null	null	null	null	27.99	21.99
Lezen en Leren	School en K...	School en Kanto...	9300000000577221	5055145096987	Forever Cards - Laser-cut ...	CORTINA	3	0	0	3	null	null	null	null	null	23.99
Lezen en Leren	School en K...	School en Kanto...	9200000011684463	0043859526338	Fellowes lamineerfolie 60x...	Difox	2	2	1	0	null	null	null	null	1.99	6.24
Lezen en Leren	School en K...	School en Kanto...	9200000063199229	3559231744603	NIETTANG METAAL 55TA...	Adveo Nederlan...	2	0	0	2	null	null	null	null	7.49	7.29
Lezen en Leren	School en K...	School en Kanto...	9200000126601050	4002432122042	Leitz WOW Tijdschriftenca...	Esselte B.V.	7	4	3	0	null	null	null	null	null	12.99
Lezen en Leren	School en K...	School en Kanto...	9200000085015203	5028252344319	Rexel Magnetisch Whitebo...	ACCO Brands B...	14	2	12	0	null	null	null	null	10.99	18.01
Lezen en Leren	School en K...	School en Kanto...	9200000008862054	5052883214383	HP Everyday - Glanzend fot...	Fjallraven B.V.	35	5	30	0	null	null	null	null	7.99	12.39

1 - 100 / 55883

Figure 29: Level 3: detailed information per obsolete item

On the second page of the dashboard, we presented the KPIs which are updated less frequently. Nevertheless, these KPIs are equally relevant for the process. In figure 30, the performance of the previous years is displayed. In figure 31, this information can be found in a bar chart. This performance is measured by the percentage of items that was sent to a bulk buyer. A lot of unnecessary costs are made when books lose their right for return and have to be sold to a bulk buyer. It is useful to monitor this percentage to improve the return process. If fewer books are sold to bulk buyer instead of being returned to the supplier, it would increase the revenue.

The table in figure 32 provides a more detailed insight when a certain destination from the bar chart is selected. Then the exact items with all the information for that destination. This was also briefly mentioned in the interviews, because reducing the number of books that is sent to a bulk buyer will reduce unnecessary costs, which is also interesting for Company X.

Percentage per destination

Destination of all the returned items in 2019

returnType	GlobalId	GlobalId	QuantityReturned	PercentageReturned
NCK	87,216	53.87%	1,272,749	33.68%
Supplier	64,876	40.07%	1,580,744	41.83%
Wholesaler	12,142	7.5%	497,712	13.17%
Destroy	9,072	5.6%	182,645	4.83%
Internal	5,790	3.58%	243,696	6.45%
Photographer	173	0.11%	1,124	0.03%

Figure 30: Percentage per destination (table)

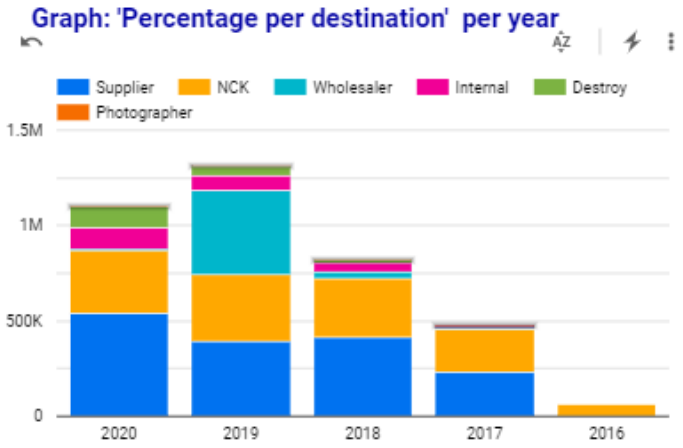


Figure 31: Percentage per destination (graph)

Detailed table: Percentage per destination

Deepdive data from destination graph

Year	EAN	GlobalID (Link)	supplierId	QuantityRetur...
2019	9789059654679	9200000106203...	0	1.54%
2019	9789059654983	9200000112333...	null	1.3%
2018	9789059654563	9200000094388...	0	1.19%
2019	9781250158062	9200000086285...	null	0.85%
2018	9781586638450	1001004002409...	null	0.68%
2020	9780399175213	9200000037373...	118	0.59%
2018	9780060891541	1001004002653...	null	0.4%
2019	9789059654655	9200000089255...	0	0.38%
2018	9781935589679	9200000007713...	null	0.37%
2020	9789059655133	9200000120344...	null	0.35%
2019	9781250158062	9200000086285...	21409	0.31%
2019	9780062469670	9200000051106...	null	0.29%
2019	9789463053914	9200000112166...	1454	0.28%
2018	9789059654280	9200000082321...	21409	0.27%
2020	9789059654907	9200000105188...	null	0.26%
2018	9780321013491	1001004000799...	null	0.26%

Figure 32: Detailed information: percentage per destination

The last section of the dashboard shows the status per NCO code. When a return shipment is listed in the internal system it gets an NCO code. The reference number starts with NCO and an additional letter which indicates the destination of the shipment. In the textbox on the left the explanation of the reference number is described. The different destinations are: **S**upplier, **W**holesaler, **I**nternal, **P**hotographer and **D**estroy.

The options for the status are as follows:

- Created: a request is created in the GSE system
- Announced: the request is sent to the warehouse to be transported
- Shipped: the item is shipped to the supplier
- Paid: the money is paid by the supplier and transferred to Company X
- Archived: the file is archived in the books of the finance department

In a filter at the top of the dashboard, the exact NCO code can be entered to find the status. It is also possible to filter per status to find all the corresponding NCO codes. The overview and the result of the filter can be found in the table in figure 33.

Status per NCO request

reference	status
NCOI17000033	Announced
NCKB19049758	Shipped
NCKJ18027324	Shipped
NCKB16001822	Announced
NCOI17000038	Announced
NCKJ17010627	Announced
NCKJ17005708	Shipped
NCKL19056509	Shipped
NCKJ17013065	Shipped
NCOS19005357	Paid

Figure 33: Status per NCO request

4.5. Filters

Figure 34: filters dashboard (page 1)

At the top of the dashboard are the filters which work on all the graphs and tables on the whole page. The filters can be found in figure 34. The filters can be used to add more detail by displaying certain information. As can be seen in figure 34, there is a standard filter working for the return type. This is filtered on supplier by default, because we are only interested in return shipments to a supplier on the first page of the dashboard. This filter can also be changed to a different return type if that would be necessary. The rest of the filters can be used to find information for a specific item (EAN, GlobalId, ProductTitleNL), supplier (SupplierName, supplierID), cluster or productgroup.

At the bottom of the dashboard we used optional metrics, which are hidden filters, to maintain the overview, however more details can be added if that is necessary.

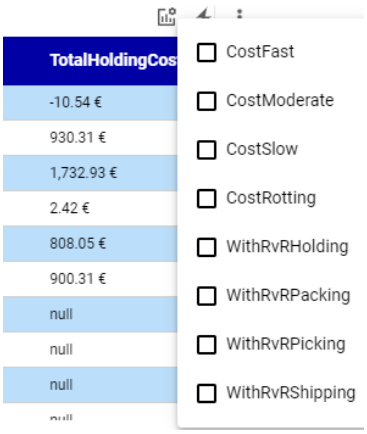


Figure 35: Optional metrics

In figure 35 the optional metrics for the table costs per shipment (with RvR) (figure 27) are shown. These can be selected for dive deeper in a specific cost.

4.6. Conclusion

We designed a dashboard using the approach mentioned by Orts (2004). We first made a draft version of the dashboard with the knowledge we already had from the problem description, which we received at the start of the research. We have conducted interviews with the end users of the dashboard to gain insights in the problems and in the missing data. We used the outcomes of the interviews to create tables and graphs which would provide insight in the costs that are involved in the return process. We decided to expand an existing dashboard instead of creating a new dashboard, to have all relevant data in one place.

Return dashboard II differs from the initial idea, mentioned in section 4.2.5, in some places. First of all, the graph which shows the type of obsolete stock was taken out because the data was not available. For example, an item can be bought in a manual order once and in a bulk order the next time. Therefore, it is hard to define in which order the obsolete item was.

Next, we wanted to provide an advice for returning or holding a book for 1 month, 3 months, 6 months and one year. During this research, the book team decided they wanted to experiment with the number of return moments per year. Currently the return process is executed twice a year. However, they want to test the influence on the process of increasing the return moments to four. Therefore, the advice for all the stated time periods was considered unnecessary and only the total return and holding costs for the current obsolete items are presented on the dashboard.

We extended Return dashboard I by adding several components. First of all, we added the total costs per shop and supplier along with an advice, to provide a more general insight in the return process. Next, we added the return agreements and the ratio between the purchased and returned items per supplier to have all the relevant data about the agreements in one central place. Lastly, we provided detailed information for the items with and without right of return to provide insight in the costs and yields of these items.

5. Validation of the dashboard

In this chapter we will describe how we validated our dashboard. We will describe the questionnaire that was sent to the end users and we will discuss the results. Furthermore, we will discuss how the dashboard solves the core problem. Lastly, we will discuss the effects of the dashboard on the time the process takes.

5.1. Validation questionnaire

We suggested that a dashboard would be a solution for the problem stated in section 1.6. However, the end users of the dashboard should agree that the new dashboard actually solves the problem. To determine that, we made a questionnaire which we sent to the same employees we interviewed at the beginning of the research. The questions of the questionnaire can be found in appendix I. In the end the questionnaire was filled in by 7 people.

We divided the questionnaire in four different segments. We started with two general questions which display the background of the employee. The next segment contains questions about the current process without the use of the dashboard, to quantify the current process and to have values to compare the new process to. Next, the third segment is about the requirements that were set up in section 1.8. Using the questionnaire, we wanted to see if the requirements were met and to which extend they were met. Lastly, the fourth segment was about the use of Return dashboard II and to what extend it helps to solve the problem.

In appendix J, the results of the questionnaire are displayed. Here we will address the most important findings. The main issue we wanted to discover is to which extend the dashboard helps to solve the core problem according to the end users of the dashboard. We asked the employees to which extend the dashboard was a solution to the stated problem. The average grade the dashboard received to this question was 8.4. Therefore, we conclude that the dashboard offers a solution to the core problem.

Furthermore, we also wanted to know to which extend the requirements were met.

- The dashboard should be user friendly, was graded on average with an 8.1 (out of 10);
- The dashboard's theme and lay-out should fit in with the existing dashboards, was graded on average with an 9.2 (out of 10);
- The dashboard should be extendable for other shops/clusters/departments, was graded on average 6.4 (out of 10);
- The dashboard should present different types of data, was graded on average 3.3 (out of 4).

Therefore, we conclude that the requirements for the dashboard were met.

Even though a lot of the reactions were very positive, there are some remarks where the dashboard could be improved.

- It could be clearer that the dashboard is extendable for other shops/clusters/departments. This could be done, by adding filters that are relevant for these users. Furthermore, the name of the new dashboard is 'Return dashboard (Books)' which is not so useful if other products will be included as well.
- The dashboard could be more self-explanatory. This way there is no explanation necessary when a new user uses the dashboard. This could be improved by using more information text boxes and making them more prominent or by expanding the subtitles of the tables and graphs to provide a

more elaborate explanation. There was also mentioned that the explanation of the cost calculation was missing. Therefore, more prominent information icons could help.
- In addition to the previous point, the dashboard could be improved using more storytelling, by thinking about the message we want to send to the user by displaying this data.
- The tables and graphs could be placed closer to each other, so users would have to scroll less.
- The destroying option would be nice to include in the dashboard, to make the tradeoff between returning and holding an item complete.

5.2. Dashboard as a solution for the core problem

In section 5.1. we concluded that the dashboard is a solution to the core problem according to the end users of the dashboard. In this section we will describe how the dashboard solves the core problem.

The core problem was that there was no clear overview of all the costs that are involved in the returning process from Company X to the suppliers for international books. The dashboard solves the problem by displaying the involved costs for all the obsolete books. The costs are displayed for different levels of detail which makes it possible to see the costs per shop, supplier and per item.

Furthermore, the dashboard was meant as a tool to help with deciding which books need to be returned to which supplier. The dashboard not only shows the costs that are involved, but also the magnitude and bases an advice on those costs. This advice is presented at the top of the dashboard, so the specialists only need a quick look to know what to do. In figure 36 the advice can be seen in the tables in the dashboard. The advice is calculated by making a tradeoff between the total return costs and the total holding costs. When the returning costs are lower than the holding costs, the advice is green and when the returning costs are higher than the holding costs, the advice is red. A green advice means returning the items is the most viable option, because the returning costs are lower than the holding costs. A red advice means holding the items is the most viable option, because the holding costs are lower than the returning costs.

Costs per supplier

Costs for returning all items with right of return per supplier

supplierid	suppliername	RetourPerLeverancier365dgn	TotalReturnCostWithRvR	TotalReturnCostNoRvR	Decision
		21,485	41,986.75 €	36,932.57 €	1
		13,767	6,726.49 €	10,663.19 €	1
		9,860	12,094.6 €	16,374.28 €	1
		8,944	4,527.68 €	1,532.2 €	0
		4,844	2,355.68 €	8,419.06 €	1
		2,502	1,250.94 €	1,185.3 €	1
		2,235	1,076.45 €	164.27 €	1
		1,769	875.43 €	2,246.47 €	1
		1,653	842.91 €	867.94 €	1

Figure 36: Advice for all suppliers

Additionally, the dashboard helps with the decision making by presenting all the relevant information in one place. Because the information can be found in one place, the decision can be made easier and faster which also reduces the time the process takes.

The dashboard helps with making decision by providing the required data and an advice based on that data. Furthermore, the dashboard can improve the quality of the decisions. The decisions are currently based on the forecast and the expertise of the specialist. By using the dashboard the decisions will be more objective instead of subjective. The actual effect on the decisions has not yet been tested as would therefore be useful to include in a future test run. In addition to the effect on the decisions, the effect on the resulting costs in useful to monitor. One of the problems of the current situation is that the costs involved are unknown, which also results in the fact that the current total costs are unknown. Therefore, after some test runs the costs could be compared in order to see if the costs are reduced.

5.3. Time savings

In addition to the lack of insights in the costs, the return process takes a long time. Therefore, we also decided to investigate the effect on the time savings with the use of the dashboard. In order to do that, we decided to compare the time each activity of the process takes, because this way we could monitor the activities where the dashboard would be involved and we could neglect the other activities. We executed a test run with one employee of each involved department of the whole return process using the current method, without any dashboard for the first run. In the second run we used the existing dashboard, described in section 4.1. and in the third run we used Return dashboard II. This way we could see how much time is saved and therefore how much money is saved as well.

The whole process using the current method took 59.5 hours. This process can be found in appendix B with the corresponding times. During this research, we executed two sample runs of the process, using the first version of the dashboard in the first run and the complete dashboard in the second run. We made a similar flowchart for these processes along with the time each activity took. These flowcharts can be found in appendices C and D.

Using Return dashboard I, the process would take approximately 53.5 hours. The activities where the time changed are colored in red in the flowchart in the appendix. This version of the dashboard was able to reduce the time it takes to decide which books need to be returned and to which supplier the books has to be returned to.

Using Return dashboard II, the process would take approximately 50.5 hours. The activities where the time is reduced are again colored in red in the appendix. This version of the dashboard was able to reduce the time it takes to determine if there are other suppliers, which would accept the book, due to the better insight in the right of return per supplier. Next the dashboard is useful for the Buying department and would reduce the negotiation time, because all agreements are in one central place.

We executed the test runs with the employees of the involved departments. A limitation of the method we used could be that the employees got used to the procedure and therefore the activities were executed faster. For some activities this could be the case, however, most activities are executed in a different way using the dashboard. For example, the employee does not have to find the supplier for each item by looking through several spreadsheets, but simply exports the table from the dashboard to an Excel file which states the supplier per item. We therefore conclude that habituation does not have a significant influence on the time reduction.

The time reduction using Return dashboard II, would reduce the process by 9 hours. This is a reduction of 15%, comparing it to the initial 59.5 hours. It saves more than a full workday of 8 hours, which can be considered as an improvement according to the book team. Furthermore, the dashboard was meant for

providing insights in costs and the fact that the time is reduced as well is a nice addition to the result. Therefore, the time savings do not contribute to solving the core problem directly, but it can be considered as an improvement of the process.

5.4. Conclusion

We used a questionnaire to validate whether the new dashboard solves the core problem. We sent the questionnaire to the same employees as we interviewed at the beginning of the research. The employees' reactions were positive about the dashboard and therefore we can conclude the dashboard does help with solving the core problem and improves the return process of international books. The employees graded the dashboard with an 8.4 (out of 10) as a solution for the core problem.

However, from the questionnaire we gathered some improvement possibilities. These are that 'story' of the dashboard could be clearer. This would make the dashboard more user friendly and easier to understand without an explanation. This could also be done by expanding the captions and making the information icons more prominent. Furthermore, the lay out could be more generic, to make it easier to extend for other shops, clusters or departments. Additionally, the graphs and tables could be placed closer to each other to reduce the amount of scrolling that is necessary. Lastly, it would be useful to include the destroy or recycling option to make the tradeoff between returning or holding an item complete. The destroy costs could help in the decision for how long an item should stay in the warehouse after the deadline is reached. The costs can be compared to the returning costs to a bulk buyer, in order to decide when it is more viable to destroy the item.

In addition to knowing that the dashboard works as a solution to the problem, we need to know how the dashboard contributes to solving the core problem. First of all, the dashboard provides all the involved costs and data that is required for the decision-making process in one place. Next, the dashboard provides an advice based on the total return and holding costs to see if a batch of books should be returned or not in one quick look at the dashboard. The decisions that are made using the dashboard will depend more on data than on the expertise and experience of the specialist and will therefore be more objective instead of subjective. However, the subjectivity is not only based on the amount of data, but also the quality and completeness of the data. In this case, we improve the quality of the decisions by supplying data which can be used for certain tradeoffs. For example, the total return costs can be compared to the total holding costs. By basing the decisions and tradeoffs on more data, more objective decisions can be made.

6. Implementation

In this research we designed a dashboard which helps to reduce the time the return process takes. In this chapter we will discuss which steps need to be taken in order implement the dashboard in the current process. Additionally, we will describe a standardized plan for the whole return process, which includes the role of the dashboard and the responsibilities of the involved departments.

6.1. Implementation tasks

The dashboard is currently done and in a live environment, so it is ready to be used. However, before the dashboard can be implemented in a standardized process some steps need to be taken. The dashboard could be improved to make the dashboard more efficient and better implemented in the process. We already executed some test runs with the dashboard to see how much time is saved by using the dashboard. These results are described in section 5.3. As mentioned in section 5.2, some more test runs should be executed to further investigate the effect of the dashboard on the return process. We need to review the differences in the outcomes of the process using the dashboard and the current method. We need to see if different decisions are made using the dashboard or that the outcome is relatively similar. Next to the difference in the decisions, we need to consider the money the process costs and see if using the dashboard saves money. Currently, it is unclear what the whole process costs in total after it is executed. With this research we defined all the elements that add up to the total costs. Because these elements were unknown before, there is no insight in how much the whole return process costs in total. Now that all the costs are included in the overview, monitoring the total costs is easier. Monitoring these total costs needs to be done over a longer period to make a conclusion.

The test runs could also be used to collect more feedback to further improve the dashboard. One main factor is to make sure that the output of the dashboard is ready to be entered in the GSE system. This is still a manual task and can therefore be improved by making the output from the dashboard fit for the system. The test runs will take approximately three hours, because we only need to set up the list for the GSE system to determine the differences in the decisions and expenses between the two processes. It is hard to determine the time it takes to implement the feedback that comes from the test run, because it depends on the amount and difficulty of the feedback.

Lastly, we need to document every aspect of the back end of the dashboard. This means, an overview of all the code that runs behind the dashboard, the location of this code and the structure of the code and the dashboard. This way problems can be solved when the research is finished. For the most part, this documentation is already written for this research. This will be finalized when the research is completed. Therefore, we can conclude that the dashboard can be used within one week after the test runs, depending on the amount of feedback. However, there have been some feedback sessions on the dashboard already, so we think one week for implementing the last feedback is enough.

6.2. Standardized plan and responsibilities

In order to make the dashboard work optimally, we made a list of all the activities involved in the process along with the responsibility. This way, the dashboard can be implemented correctly after the research is finished. The list can be found in table 3.

Table 3: process tasks with responsible department

Activity	Process task	Responsible department

Contract arrangements	Contract negotiation with supplier	Buying
	Fill contract arrangement in CDN	Buying
Create an order	Select obsolete stock items (check the 8-week forecast and check the suppliers where the deadline is close for a high value of items)	RE
	Check from which supplier the item is bought	SCE
	Check the return restriction per supplier for each list	SCE
	Check whether the return shipment is viable	RE
	Send return request to supplier	SCE
	Order negotiation with supplier	SCE
	Create NCO order in GSE	SCE
	Check the status of the order	SCE
Send order	Order received by Ingram	Logistics
	Pick & pack order	Logistics
	Order shipped/pick up by supplier	-
Received by supplier	Goods received by supplier	-
	Send credit invoice	Supplier
	Chase credit invoice	Reverse
Credit processing	Receive invoice via facturen@Company X or EDI	-
	Approve credit invoice	Reverse
	Match credit invoice to order in GSE	Reverse
	Payment made or settled	Reverse
Evaluate	Check performance with the percentage sent to bulk buyer	RE
All year	Monitor the ratio returned-purchased	SCE
	Monitor the products with a close return deadline	RE
	Keep the return agreements updated	RE + Buying
	Keep the data in the dashboard updated and maintaining the dashboard	RE

In table 3, all the process tasks are displayed with the departments that are responsible for that tasks. For the implementation of this dashboard, we focus on three activities: Create an order, Evaluate and All year.

The process starts by selecting the obsolete stock items. This is the responsibility of the Retail Excellence department, because their function is to determine the pricing strategy, by for example determining whether an item should be returned or the selling price should be reduced. This should be done by checking the forecast for the coming 8 weeks and determine which items are forecasted not to be sold. In addition to that the graph (figure 22), containing the value of the items with the deadline within one month, in the return dashboard, to make sure all those items are included in the return process as well.

When the assortment is selected the specialist from the Supply Chain Excellence department have to check from which supplier the item is bought. This can be exported from the data table from the return dashboard (figure 26). Next, the Supply Chain Excellence specialist needs to check the return restriction in the return agreements table (figure 19) and the ratio purchased-returned (figure 20) table to make sure that all the items fit within the restriction of each supplier.

Next, it has to be checked if the shipment is viable for each supplier. This needs to be checked by the Retail Excellence specialist since they are responsible for the financial side of the return process. This can be checked in the costs per supplier table (figure 18) in the return dashboard.

When all the checks are done, the list can be sent to the supplier by the Supply Chain Excellence specialist. Along with that, the list has to be filed in the GSE system by the Supply Chain Excellence specialist to get the NCO code, which has to send to the supplier as well. The status of the NCO shipment can then be tracked in the return dashboard in the NCO status table (figure 30).

When the process is completed and all the items are returned the process needs to be evaluated. The evaluation is done with the whole Book team to discuss all the activities that went well and the activities that can be improved. The return dashboard offers a performance indicator by displaying the percentage of books that sent to different destinations. It would be interesting to have an insight in the percentage of books that is sent to the bulk buyer per return moment to see how much unnecessary costs are made. Monitoring this over more return moments provides insight in the quality of the return process.

When there is no return process in progress, the return dashboard can be used as well. During the year, the ratio returned-purchased (figure 20) should be monitored, to prevent the restriction from the return agreements to be met. This way the ratios can be taken into account when purchasing items. Therefore, it should be monitored by the Supply Chain Excellence specialist, since they place the orders.

Another KPI to monitor over the year is the value of items that is about to reach the return deadline. This should be monitored by the Retail Excellence specialist to prevent items from reaching the return deadline. This means the book team is more alert and a small return process can be executed for a certain supplier if that is necessary.

Lastly, the data in the dashboard should be updated in order to work. The return agreements should be updated by the Buying department to make sure that the agreements in the dashboard are correct. Furthermore, the rest of the data should be updated and monitored as well. This should be done by the Retail Excellence department, because they made Return dashboard I and they were involved in the design of Return dashboard II.

In section 2.2.2, we discussed all the involves stakeholders. Here we will briefly reflect on the actual level of involvement of the mentioned stakeholders. We distinguished the following stakeholders: the chief of the shop ‘Educatief en Internationale boeken’, employees of the Supply Chain Excellence, Retail Excellence, Buying and the logistics department, the researcher and the suppliers. In the development we only included the employees of the Supply Chain Excellence, Retail Excellence and Buying department, since they are the end users of the dashboard, as we explained in the beginning of the section. When the dashboard was finished we asked feedback to the chief of the shop ‘Educatief en Internationale boeken’, because her opinion is important. The employees of the logistics department and the suppliers were not taken into account in the development of the dashboard as their required data differed too much from the data required by the employees of the Supply Chain Excellence and Retail Excellence departments.

6.3. Conclusion

Before the dashboard can be implemented in the process, some steps need to be taken. We need to do some test runs to determine the effect of the dashboard on the decisions and the money savings. Next, the test runs can be used to collect and implement more feedback. Furthermore, we can investigate if the

output of the dashboard is ready to be entered in the GSE system. Also, the documentation of the back end of the dashboard needs to be complete to anticipate on future issues.

In order to use the dashboard the best way, a standardized method should be used. The dashboard should be used during the return process, but also during the rest of the year as monitoring tool. The different departments that are involved in the process have different responsibilities during the process and during the rest of the year.

7. Conclusion

In this chapter we will conclude all our findings and state the proposed solution to the core problem:

'There is no clear overview of all the costs that are involved in the returning process from Company X to the suppliers for international books.'

Furthermore, we will provide answers to the stated research questions.

7.1. Research questions

To conclude this research, we will first answer the research questions stated in section 1.6.

Q1: Which costs are involved in the return process?

To answer this question, we conducted interviews and used internal documents. In the current return process, the following costs are involved. Firstly, the employee costs which are the costs for one specialist to work one hour. Next the warehouse outbound costs are involved, which describe all the costs made in the warehouse to prepare a package for transport. Thirdly, we have the transportation costs, which are the cost for transporting a package to a destination. Next the obsolete provision plays a role, which is a reserve for obsolete items which are hold in the warehouse. Lastly, the inventory costs, which are the costs for holding an item for a period of time. For now, we only focused on providing in which costs are involved in the return process and what their values are.

Q2: Which suppliers are involved in the current return process?

There are many suppliers where international books are bought. However, for this research we only included the suppliers where the most books have been returned to in the last year. The suppliers that are involved are listed in a table in appendix A.

Q3: How is decided if a book needs to be returned?

The Retail Excellence specialist decides whether to discount or return an item. Generally, the items that are forecasted not to be sold in the next 8 weeks are considered obsolete and will be returned in the next return moment. So, currently only the data of the forecast is used to decide whether an item should be returned or not.

Q4: What is the best way to present costs in a dashboard to support the decision-making process?

The literature provides many frameworks for dashboard design. In this case, the best way to present costs in a dashboard to support the decision-making process is to follow the method mentioned by Orts (2004), because this method would create a dashboard that fits the requirements of the end users. This was determined by subjecting all available methods from the literature to the requirements for the dashboard. Using the information requirements provided by the end users to make a dashboard that fit their needs, but is also extendable in order to fit more clusters or shops. Lastly, it is important to keep the purpose in mind during the whole design process to keep all the data relevant and to keep the dashboard as simple and clear as possible.

In the case of this research, we designed the dashboard in such a way that it supports the decision-making process in four ways. First of all, the dashboard presents all required data in one place which makes finding the data for basing the decisions on less time consuming and therefore the decision-making process easier.

Secondly, the dashboard already provides an advice for the specialist based on the costs. This is presented in a green or a red box in the tables at the top of the dashboard. This way the advice can be seen in one quick look. Thirdly, because the costs are now displayed in the dashboard, more data is available to base the decisions on which items need to be returned on. This will result in more objective decisions rather than subjective decisions. Lastly, the dashboard fits in a standardized process with 4 return moments. The process is executed more often and therefore the decision-making process is easier as specialists are more used to the process.

Combining the answers from the previous questions, we will provide an explanation about our proposed solution to the core problem: 'There is no clear overview of all the costs that are involved in the returning process from Company X to the suppliers for international books.' Our proposed solution to create a dashboard to provide insights in the unavailable and unknown costs. We created the dashboard using the method of Orts (2004) which was the most suitable method for this research as it met the requirements the best. In the dashboard an overview is provided of the following costs: the warehouse outbound costs, the transportation costs, the obsolete provision and the inventory costs. This way the decisions can be based on the forecast and the costs involved in the process instead of only the forecast as is currently done.

7.2. Time savings

If Return dashboard II would be implemented in the return process, it would reduce the process by 9 hours. The process currently takes 59.5 hours, so a reduction of 9 hours would be a reduction of 15%. Any time saving in the return process is considered as an improvement by the book team. Furthermore, a reduction of 9 hours does save more than a full workday, which can then be spend doing other activities. Additionally, the dashboard was meant for providing insights in costs and the fact that the time is reduced as well is a nice addition to the result. Therefore, the time savings do not contribute to solving the core problem directly, but it can be considered as an improvement of the process.

7.3. Validation of the solution

To verify that the proposed solution actually solves the core problem, we sent a questionnaire to the end users of the dashboard. The employees' reactions were positive about the dashboard and therefore we can conclude the dashboard does help with solving the core problem and improves the return process of international books. The employees graded the dashboard with an 8.4 (out of 10) as a solution for the core problem.

The questionnaire also provided useful feedback on how the dashboard can be improved. Firstly, the 'story' of the dashboard could be clearer, which would make the dashboard more user friendly and easier to understand without an explanation. This could also be improved by providing more information in the subtitles of the graphs and tables, in order to make them more self-explanatory. Additionally, the information icons could be more prominent, so that people do not miss them. Furthermore, the extendibility could be improved. For example, the titles and the lay out could be more generic, to make it easier for other shops, departments or clusters to add their information as well. Additionally, the graphs and tables could be placed closer to each other to reduce the amount of scrolling that is necessary. Lastly, the destroy costs are useful to include in the dashboard, because they could help in the decision for how long an item should stay in the warehouse after the deadline is reached. The costs can be compared to the returning costs to a bulk buyer, in order to decide when it is more viable to destroy the item.

8. Discussion

During this research, we had several limitations which are good starting points for further research. In this chapter, we will discuss the limitations and state our recommendations for further research. Additionally, we will state the academic contribution of this research.

8.1. Contribution

8.1.1. Contribution to practice

The dashboard created in this research is ready to be used for the return process of international books. The dashboard is created in such a way that is simple to expand the data, so that it can be used by other shops, clusters and departments. Furthermore, the research that is conducted to determine all the involved costs, will help to improve the return process as well. The whole process is mapped in a flowchart which makes it easier to keep track of the progress of each task in the process. Next, the costs are determined which could aid in improving related processes, like for example discussing agreements with suppliers. Furthermore, determining the values of the involved costs is the base of improving the return process.

In order to use the process, we can formalize the process in a simple framework. This way other companies and organizations can use the framework to design a dashboard in a similar way. The company has to comply with some inclusion criteria in to make the framework applicable. The inclusion criteria are as follows:

- The company must know which employees will use the dashboard. This way the interviews can be used to determine the requirements for the dashboard and can the dashboard be validated and tested at the end of the process.
- The data for the dashboard has to be traceable. In this case the data for the dashboard was partially unknown and the known data was divided over several locations and spreadsheets. However, the unknown data was traceable and therefore we could provide a complete overview. If not all the data is traceable, the dashboard would be incomplete and would miss important functions, like the advice based on all the involved costs.
- The company has to know what the purpose of the dashboard is. A pitfall of a dashboard is to include too much data which will result in losing the overview. By defining the purpose at the beginning of the design process, the presented data will support the purpose which will result in a useful dashboard.

The framework for the process of this research can be defined by an 8-step guide.

1. Define the purpose of the dashboard. As mentioned above, it is important to determine the purpose of the dashboard to make smart decisions on what data to include and what data to exclude to keep a clear overview.
2. Define the requirements of the dashboard. We interviewed the employees that will be using the dashboard to find out what the requirements of the dashboard are. The requirements range from the lay-out to the data that should be presented. This way the dashboard was as useful for the users as possible.
3. Create a draft version of the dashboard. Using the draft version, constant feedback can be obtained which makes the design process go very efficiently.

4. Gather data for the dashboard. The dashboard needs to present the data determined by the purpose and requirements of the dashboard.
5. Validate whether the dashboard improves the current situation. A questionnaire can be used to examine to what extend the requirements are met and to what extend the dashboard improves the current situation.
6. Perform test run with the dashboard. By performing test runs, the outcome of the dashboard can be inspected. This way the performance of the dashboard can be tested. Evaluation is an important step here as well, because during the test runs issues can arise which can be improved before the dashboard is used.
7. Write an implementation plan. It is important to write down how the dashboard is built, to anticipate on future issues. Additionally, it is important to know who is responsible for which part of the process and how the dashboard should be used in each part of the process.
8. Go live. Use the dashboard as is stated in the implementation plan.

8.1.2. Contribution to theory

Next to the practical application of this research, is the theoretical contribution of the research. During this research, we determined and followed a process of creating insight in unknown data for a process where multiple departments are involved. We used the approach of interviewing the employees and using internal information to determine the unknown data. Furthermore, we determined the level of involvement of the interviewed employees to filter what requirements were relevant and had to be implemented. This process could be useful for similar companies like other web shops, who are dealing with similar problems. Additionally, the design process for the dashboard in Google Data studio would be useful for other companies that use this program. Furthermore, the design process would be applicable for companies that use other programs. However, the query set up would have to be different, depending on the program that is used.

8.2. Recommendations

In this section, we will discuss our recommendations for further research about the return process of international books and recommendations for adaptations to the current process.

First of all, the number of return moments can be adjusted. Currently there are only two return moments in one year because the whole process is very time consuming. However, since the dashboard reduces the time the process takes, it can be done more often. This will increase the overall time the process takes over the whole year. However, since the process is done more frequently, the number of obsolete items that need to be returned is smaller and therefore each return process is less time consuming. Furthermore, it could improve the stock level of obsolete items by reducing the number of items that lose their right of return even further, because more return moment would give more opportunity to return a book within the return deadline to the supplier. This would result in less books that are sent to a bulk buyer, which reduces the unnecessary costs.

Next, the dashboard shows the percentage of returned items compared to the purchased items. This can be linked to the restriction each supplier provides in the agreement, in which a certain percentage of the total purchased value can be returned to the supplier. Further research could be executed to determine a better buying strategy. When a restriction is almost met, it could be better to purchase the same book from another supplier with a higher price, to keep the right of return. It could be useful to define an allowed percentage for a price difference between the suppliers. Another strategy could be to purchase

books from fewer suppliers and to make agreements with the chosen suppliers. This way the purchase price is not always the lowest price, but fewer supplier would make the return process less complicated.

Furthermore, there are a lot of possibilities for applying data mining methods to the return process, and other processes within Company X. An example could be to decrease the return rate using data mining to look for patterns in the returns of customers. Certain authors or genres could be more likely to be returned, based on historical data. This knowledge could be used to determine the books that need to be returned or purchased, to decrease the number of obsolete items in the warehouse.

The focus of this research was to provide insight in what items are obsolete and how Company X could get rid of the items. There is still a lot to discover on why the current stock is obsolete and what the composition of the obsolete stock is. Examples could be, the type of order, the stock method and the time the item is purchased. This way, mistakes can be uncovered and can be prevented in the future, which can reduce the obsolete stock.

Additionally, with this research, we determined the involved costs, including the transportation costs per item. Currently, these are not taken into account when determining which books need to be returned. To determine an optimal planning, which includes the number of return moments per year and the books that are returned during that return moment, all the determined costs need to be taken into account. Optimizing the planning would also require considering the magnitude of the costs.

Next, we focused on the books that are sent to the suppliers and bulk buyers. However, if the books cannot be returned to the supplier and there is no bulk buyer who wants to buy the books, the books stay in the warehouse. It would be useful to research the trade-off of keeping the item in the warehouse and destroying the item and therefore make place for new items. This could improve the obsolete stock level and reduce unnecessary costs. This issue is not only relevant for international books, but also for other items that are stored in the warehouse of Company X. In addition to that, the option of recycling the paper of the books should be taken into account since Company X focuses on sustainability.

Lastly, the activity that takes a long time, which is not really affected by the dashboard is filing the lists of items per supplier in the GSE system. Additionally, when the lists are filed there is back and forth communication about the list since all suppliers need different information about the items. The process of filing a list of items for each supplier could be improved by standardizing the list to make sure each supplier receives the right information from the beginning.

8.3. Limitations

The main limitation of this research is that we cannot provide a conclusion about the performance of the dashboard, with regard to the difference in decisions and money savings. As can been seen in section 6.1, there are some tasks that need to be executed to complete the validation of the dashboard. Even though the dashboard received positive reactions from the end users in the questionnaire the outcomes of the dashboard should be evaluated. The optimal way to complete the validation of the dashboard would be a series of test runs that compares the current practice without the dashboard with that of the new dashboard. In order to eliminate as much confounding factors as possible, current team members must be randomly assigned to either the ‘new’ or the ‘control’ team and both teams should be randomly assigned over titles and suppliers. This will result in an objective overview of the performance of the dashboard.

Furthermore, we were not able to derive a new planning for the whole process. This can be the next step using the dashboard developed in this research. Next, we have interviewed a total of 12 people of the three main departments involved. There could be a limitation in the outcomes of the interviews, due to the fact that we missed important opinions from certain employees. However, we tried to choose the employees in such a way that the best variety possible and we asked each interviewed employee if they had a recommendation for another useful employee. Lastly, the research is focused on the return process of international books only. The return process for Dutch books differed significantly and was therefore excluded from this research. Furthermore, different inventory methods are used like drop shipping where orders are directly placed at the supplier and never arrive in the Company X warehouse. This applies to other shops and clusters from Company X. It would therefore be useful to research if the dashboard and design process would be applicable to these shops and clusters as well.

8.4. Concluding remarks

Despite the limitations, the developed dashboard has proven to be useful. Since most limitations can easily be resolved by follow up to the recommendations, the dashboard can be implemented and used by Company X in the near future. The test runs that are mentioned in section 8.3 would solve the main limitation and are already planned to be executed. Therefore, we consider the research to be a success. After adaptation to the particular situation the dashboard could be applied to other business areas within Company X or even in other companies.

References

Allio, M. K. (2012). Strategic dashboards: designing and deploying them to improve implementation. *STRATEGY & LEADERSHIP*, 24-31.

Cahyadi, A., & Prananto, A. (2015, August 10). Reflecting design thinking: a case study of the process of designing dashboard. *Journal of Systems and Information Technology, 17*(3), 286-306.

Cooper, D., & Schindler, P. (2014). *Busisness Research Methods.* New York: McGraw-Hill/Irwin.

Gensinger, R. (2014). *Analytics in Healthcare: An Introduction.* Chicago: Himss Publishing.

Geschiedenis van Company X. (n.d.). Retrieved from website of Company X

Graaf, R. d. (2014). *Basisboek Systems Engineering in de bouw.* Enschede.

Heerkens, H. (2015). *Microlecture: Research Design*.

Heerkens, H., & Winden, A. v. (2012). *Geen probleem: Een aanpak voor alle bedrijfskundige vragen en mysteries.* Nieuwegein: van Winden communicatie.

Kintz, M. (2012). A semantic dashboard description language for a process oriented dashbaord design methodology. *CEUR Workshop Proc.*, 31-36.

Kojal, N., & Cyrus, K. (2013). Introducing a road map to deploy strategic process in local organizations successfully; Case study: Iranian car manufacturing large company. *CIE43.* Hong Kong.

Liberto, D. (2020, august 24). *General Provisions*. Retrieved from Investopedia: https://www.investopedia.com/terms/g/generalprovisions.asp

Orts, D. (2004). *Dashboard Development and Deployment: A Methodology for Success.* Redmond: Noetix Corporation.

Paesschen, H. v. (2020, april 16). *Bezoek Nederlandse webshops stijgt 8% sinds corona*. Retrieved from Ecommerce news: https://www.ecommercenews.nl/bezoek-nederlandse-webshops-stijgt-8-sinds-corona/

Pankaj, P., Hyde, M., & Rodger, J. (2006). Business Dashboards- Challenges and Recommendations. Acapulco (Mexico).

Pappas, L., & Whitman, L. (2011). Riding the Technology Wave: Effective Dashboard Data visualization. *mith M.J., Salvendy G. (eds) Human Interface and the Management of Information. Interacting with Information. Human Interface 2011. 6771.* Berlin: Springer, Berlin, Heidelberg. doi:https://doi.org/10.1007/978-3-642-21793-7_29

Saini, R., Marriboyina, V., & Sood, S. (2019). A Novel Dashboard Framework To Enhance Patient Outcome In Health Informatics. *International Journal of Innovative Technology and Exploring Engineering (IJITEE)*.

Schutijser, J. (2020, April 28). *Thuis werken en leven jaagt omzet webshops omhoog*. Retrieved from NOS.nl: https://nos.nl/artikel/2331982-thuis-werken-en-leven-jaagt-omzet-webshops-omhoog.html

Team, M. T. (n.d.). *Stakeholder Analysis - Winning support for your projects*. Retrieved from Mindtools: https://www.mindtools.com/pages/article/newPPM_07.htm

Team, T. M. (2020). *Smart goals: hoe to make your goals achievable*. Retrieved from Mindtools: https://www.mindtools.com/pages/article/smart-goals.htm

Thompson, C. (2009). Descriptive Data Analysis. *Air Medical Journal*, 56-59.

Verbesselt, Y. (2020, march 16). *Webshops zien opvallende stijging in verkoop door coronavirus*. Retrieved from HLN: Het laatste nieuws: https://www.hln.be/nieuws/binnenland/webshops-zien-opvallende-stijging-in-verkoop-door-coronavirus~a0e4b5a4/?referer=https%3A%2F%2Fwww.google.com%2F

Woodworth, S., Neville, K., & Frédéric, A. (2009). A Teaching Case Exploring The Development & Value Of A Retail Dashboard. *MCIS 2009 Proceedings.*

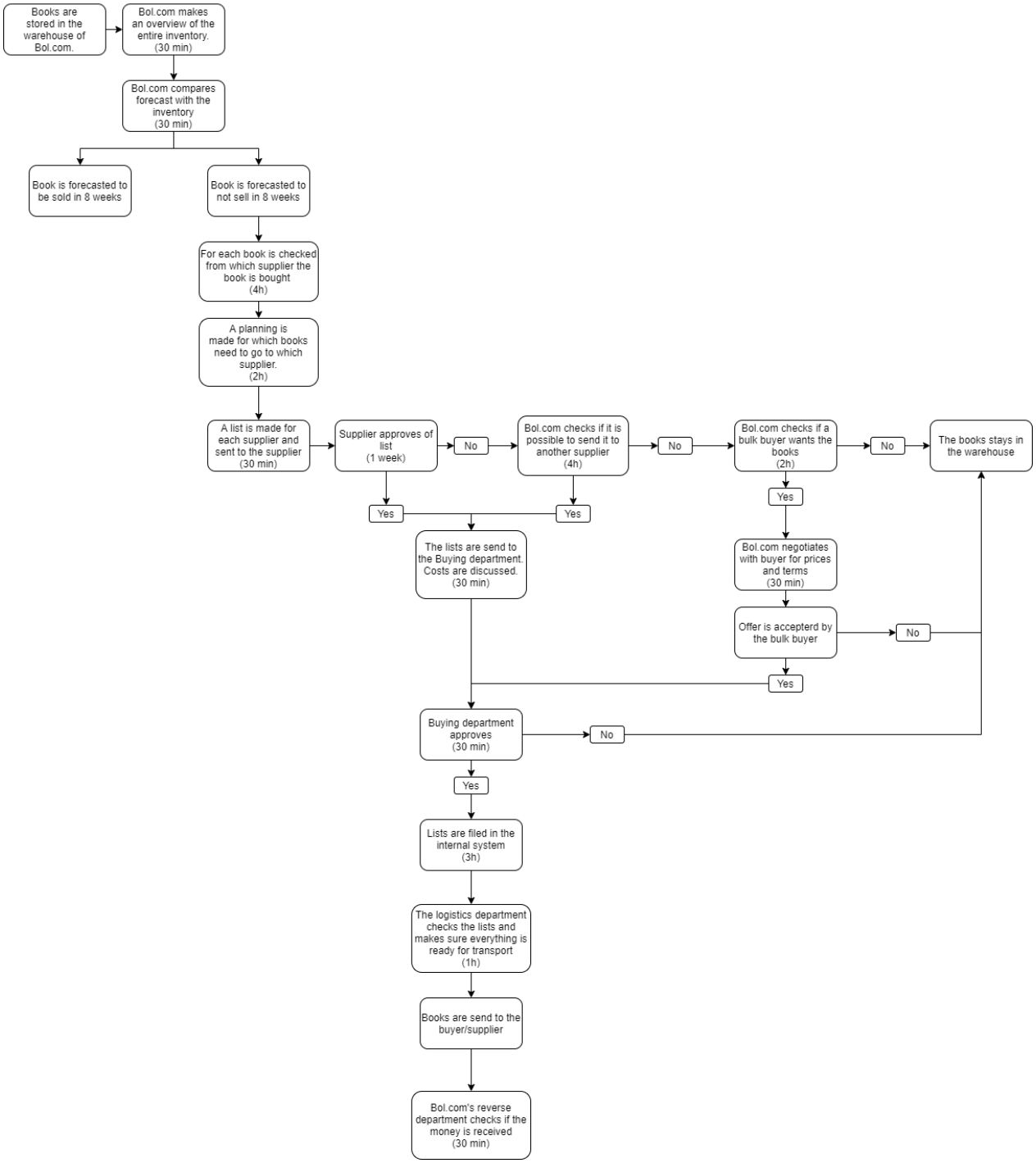
Appendices

A. List of involved suppliers

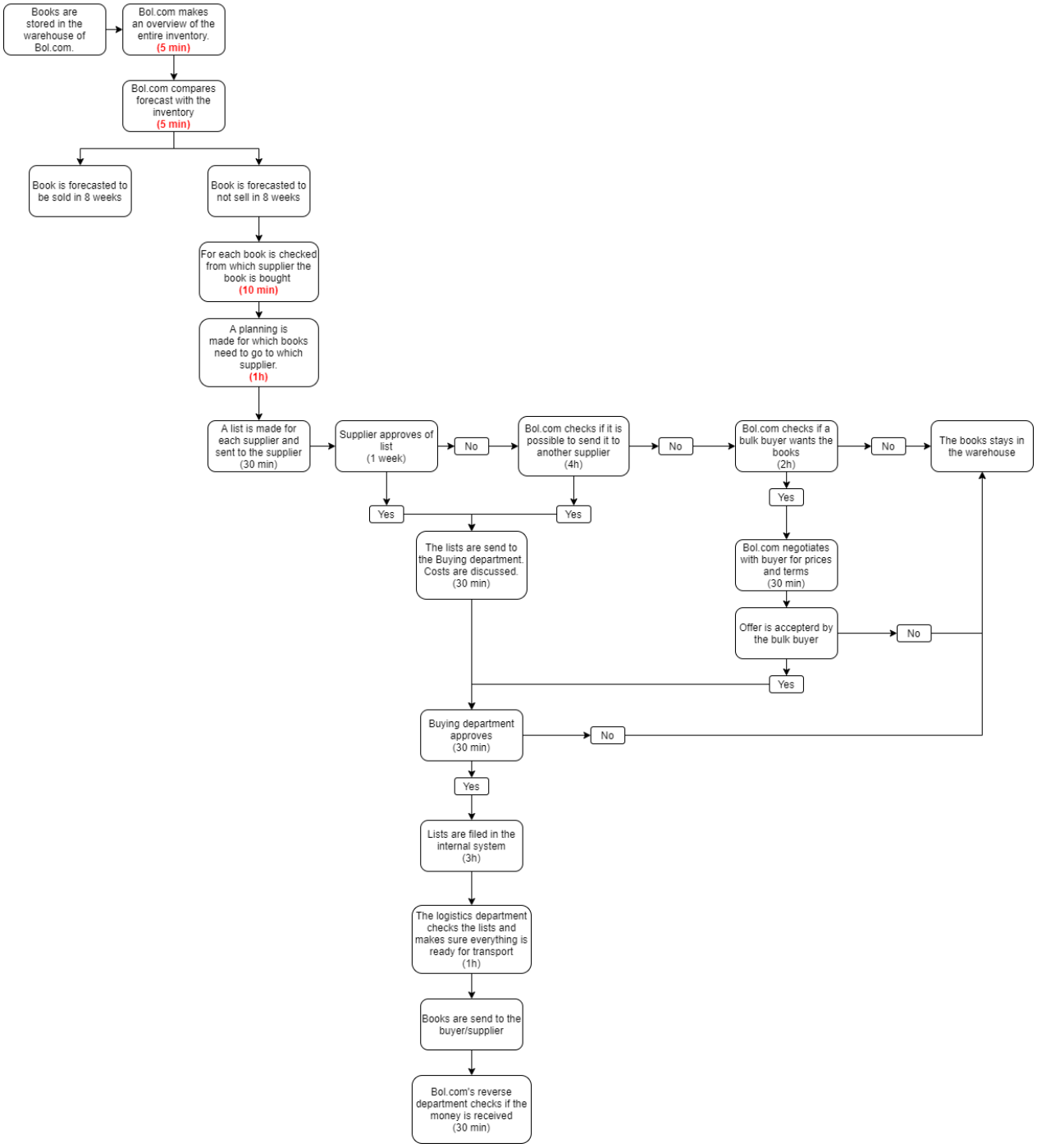
Table 4: Suppliers with location and transportation method

Supplier	Location	Shipping method
A	United States (US)	Boat
B	United States (US)	Boat
C	United Kingdom (UK)	Truck
D	United Kingdom (UK)	Truck
E	United States (US)	Boat
F	Germany (DE)	Truck
G	United Kingdom (UK)	Truck
H	United Kingdom (UK)	Truck
I	United Kingdom (UK)	Truck
J	Belgium (BE)	Truck
K	United States (US)	Boat
L	United Kingdom (UK)	Truck
M	United Kingdom (UK)	Truck
N	United Kingdom (UK)	Truck

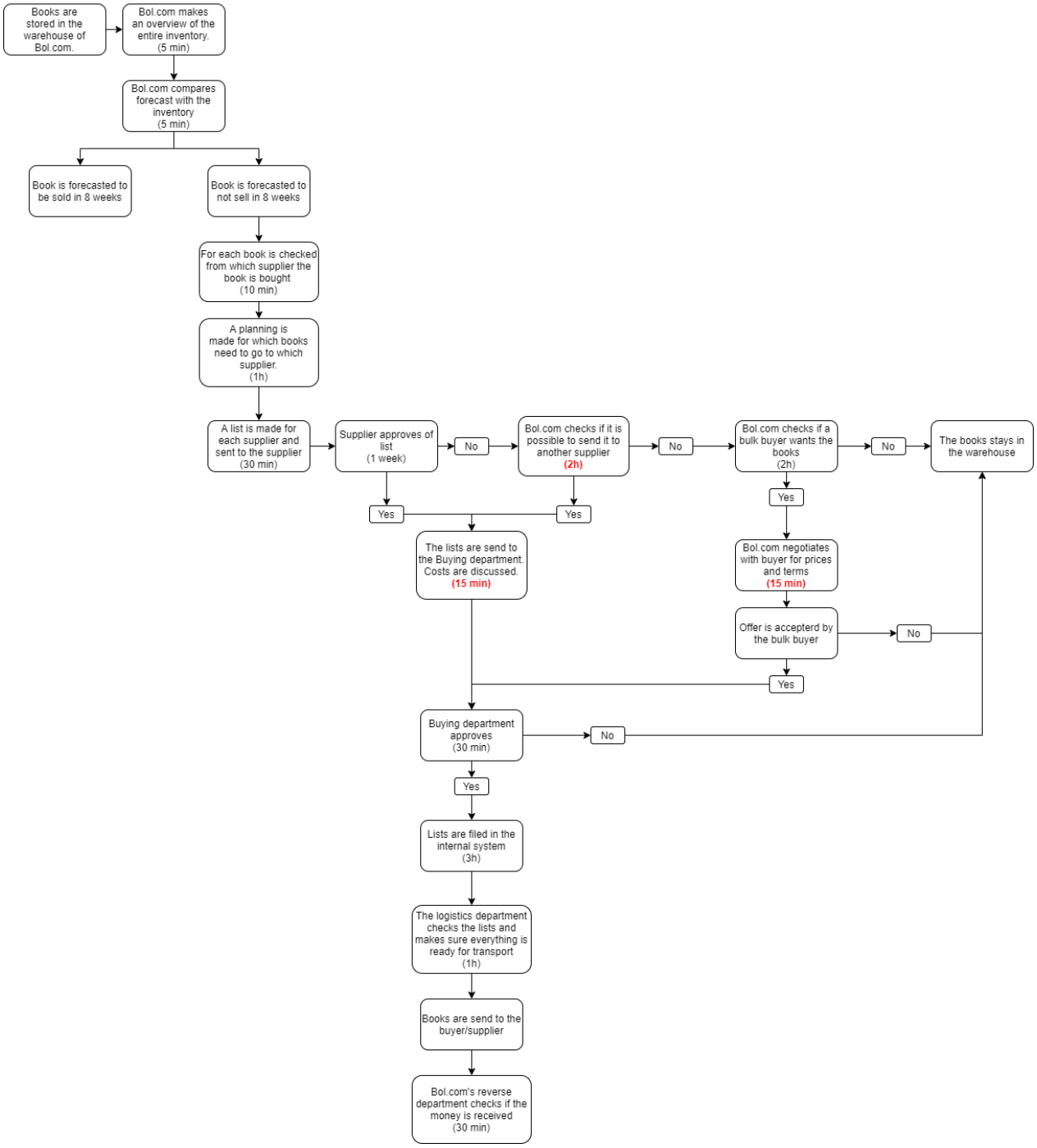
B. Flowchart current process



C. Flowchart Return dashboard I



D. Flowchart Return dashboard II



E. Interview questions

The aim of the interview is to determine which problems play a role in the return process of international books and how employees experience the whole process. Furthermore, I will make a new dashboard (or extend an existing one) and the outcomes of the interviews will be used to state the requirements for the dashboard and to determine other relevant indicators.

General:

- Who are you and what is your function within the company?
- How long have you been working at Company X?

Return process:

- What does the process look like for you?
- What is your role and responsibility within the process?
- What is the main difference between international books and Dutch books?
- What are the current agreements?
- What would be the ideal agreements according to you?
- Which problems do you encounter during the return process?
- Which improvements would you like to see?

Costs:

- Which costs are involved in the process?
- Which costs are known and which costs are unknown?
- How high are the known costs?
- Where can I find the involved costs and their values?
- Which costs should be insightful according to you?

Time:

- How long does the current process take according to you?
- Which part of the process could be improved the most?

Dashboard:

- Which dashboards do you use most often?
- Which data is in those dashboards?
- Which information would you like to see about the return process?
- For what purpose would you use the dashboard?
- What are the characteristics of a good dashboard for you?

F. Summary: outcomes interviews

Process

- SCE: places the orders and makes the list of obsolete items
- RE: determines the prices and starts the return process
- Buyers: contact with suppliers about the return agreements

First a selection is made and it is decided which items are obsolete. After that it is checked which items come from which supplier and what the agreements of each supplier are, in order to check whether the items still have their right of return. This process is done using Bigquery and Excel and therefore takes a long time. The list of all the items per supplier is made in Excel and is sent to each supplier. Then the supplier has to approve the list or state if any adaptions have to be made. Then the list is sent to the Buying department to ask for their approval as well. When everything is approved, the transport is arranged and at the end it is checked if the money is received. The process is the same for the bulk buyer.

Problems

- Return agreements are unclear and differ per supplier. For example, POD titles cannot be returned.
- Return agreements cannot be found in one central place. Therefore, the insight in how much and what can be returned is missing.
- The return agreements are not available in Bigquery, but are described in different Excel files.
- Books are ordered that are not sold. These are the cross-dock orders with very few items (1 or 2) which are returned and stay in the Company X warehouse.
- The return agreements are not taken into account when ordering books.
- Data collection takes a long time.
- The optimal return moments are unknown
- The transport costs are not taken into account and there is little insight in the value of those costs.
- It is hard to determine which items are obsolete. For example, an item is ordered via cross dock and returned by the customer to the Company X warehouse one week before the return process starts. We know that the probability of selling the book is low and therefore it should be returned. However, it is not considered obsolete using the 8-week forecast method. Therefore, it is currently not returned and stays in the warehouse. It is unclear for how many books this applies.
- Books can be ordered by different suppliers and should be returned to the supplier where came from.
- The process is large because the suppliers are located all over the world.
- The sales of books depend on the media. Therefore, the forecast could be improved as well.

Ideal agreements

- It would be ideal if there is no restriction.
- It would be ideal if all the obsolete items can be returned to the supplier and no items have to be sent to the bulk buyer.

Costs

- Transport: look for old invoices to determine the average costs per country.
- If the decisions are better, time and costs will be reduced.
- Transport: some suppliers take the items back if they deliver a load of items.
- It is useful to look at the obsolete provision because the costs per title are hard to determine.
- Transport costs, holding costs, Warehouse costs, costs for lost sales and other logistic costs are involved.

Solutions

- Add a percentage to the purchase value when the right of return is about to be exceeded at a certain supplier. This way the right of return if maintained.
- There should be insight in the right of return per title
- A standardized return process
- Think about the implementation of a dashboard and a new return process along with that.
- There should be more return moments than two in one year. This will prevent unnecessary holding costs and deadlines will be exceeded less. Furthermore, the process will go smoother because people are more used to the process. Also, it is better for supplier because they know better what to expect and therefore the conversations for new agreements will go smoother.
- The destroy option should be considered earlier. There is a moment where it is more expensive to hold a book instead of recycling it.

Dashboard

- Which items are obsolete
- Transport costs per supplier
- The dashboard has filters to see a more detailed view
- The main goal should be to save time and money by improving the process of getting rid of obsolete items.
- Return costs per supplier versus the holding costs per supplier: when is it viable to return all the items.
- The total purchase value versus the total returned value, to see what the status of the restriction is
- Insights in the deadlines for the right of return. Missing the deadlines results in unnecessary costs.
- What does the obsolete stock consist of? When is it bought? Is it top or tail? Bulk order or normal order?

G. Codes for the queries

```
Create or replace table `com-pro-se-cluster-3c5.ethelen.DashboardmakenBQ` as
select date(creationDateTime) as CreationDate, extract(isoweek from creationDateTime) as Week, extract(Month from creationDateTime) as Month,extract(isoyear from creationDateTime) as Year,lion.cluster, lion.shop, lion.productGroup, lion.GlobalId, EAN, pcs.ProductTitleNL, stockType , requesttype, gse.reference, gse.status, gse.supplierId, stockValueGross, quantity as QuantityReturned, qtyPurchased, PurchaseValue.SupplierName,

case
when lower(gse.reference) like '%ncod%' then 'Destroy'
when lower(gse.reference) like '%ncos%' then 'Supplier'
when lower(gse.reference) like '%ncoi%' then 'Internal'
when lower(gse.reference) like '%ncow%' then 'Wholesaler'
when lower(gse.reference) like '%ncop%' then 'Photographer'
when lower(gse.reference) like '%nck%' then 'NCK'
else null end as returnType,

FROM (select * from(select * from `com-pro-gse-2ac.request_v1.actual` left join unnest(warehouseOrders) warehouseOrders) left join unnest(lines) lines )gse
left join `com-pro-lion-72d.product_category_finance_current_v1.actual` lion on cast(gse.globalId as string) = lion.globalId
left join `com-pro-pcs-714.product_v3.actual_flattened` pcs on cast(lion.globalId as string) = pcs.globalId
left join
  (SELECT SupplierId, SupplierName, sum(qtyPurchased) as QtyPurchased
    FROM `com-pro-se-cluster-3c5.tdoeswijk.TD_DataSupplierPurchaseValue`
    WHERE year = extract(isoyear from current_date)
    and lower(cluster) like '%leze%' and lower(shop) not like '%school%'
    group by supplierid, SupplierName) PurchaseValue on  gse.SupplierID = PurchaseValue.SupplierID

where lower(Cluster) like '%leze%' and lower(shop) not like '%school%'
And retailerid = 0
```

```
CREATE OR REPLACE TABLE `com-pro-se-cluster-3c5.ethelen.KostenRetour` as

with Basis as (SELECT *
FROM `com-pro-se-cluster-3c5.tdoeswijk.RetourData`
CROSS JOIN `com-pro-se-cluster-3c5.ethelen.KostenRetourLL`)

Select basis.globalid, FirstEAN, basis.supplierid, suppliername, overstock, CostFast, CostModerate, CostSlow, CostRotting, TotalObsoleteProvision, Holding, cluster, shop, productGroup, ProductTitleNL, SellingPriceInclVAT, c8_12wk, d12wk, NoSales, RetourPerLeverancierVervaltBinnen1mnd, RetourWaardePerLeverancierVervaltBinnen1mnd, TotalReturn, RetourPerLeverancier365dgn, RetourWaardePerLeverancier365dgn, GeenRVR,

round(geenRvR*holding,2) as NoRvRHolding,
round(RetourPerLeverancier365dgn*holding,2) as WithRvRHolding,
```

```
round(geenRvR *Picking,2) as NoRvRPicking,
round(geenRvR *Packing,2) as NoRvRPacking,
round(geenRvR* Shipping) as NoRvRShipping,
round(round(geenRvR *Picking,2) + round(geenRvR *Packing,2) + round(geenRvR* Shipping,2),2) as NoRvRWarehouseCosts,

round(RetourPerLeverancier365dgn *Picking,2) as WithRvRPicking,
round(RetourPerLeverancier365dgn *Packing,2) as WithRvRPacking,
round(RetourPerLeverancier365dgn* Shipping) as WithRvRShipping,
round(round(RetourPerLeverancier365dgn *Picking,2) + round(RetourPerLeverancier365dgn *Packing,2)
+ round(RetourPerLeverancier365dgn* Shipping,2),2) as WithRvRWarehouseCosts,

 case when countrycode = "UK"
 then round(RetourPerLeverancier365dgn*Transport_UK,2)
 when countrycode = "US"
 then round(RetourPerLeverancier365dgn*Transport_US,2)
 else overstock*0
end
 as TransportCost

FROM Basis
Left join (SELECT globalid,
ROUND(IFNULL(AmtFast,0)* percDepreciationFast,2) AS CostFast,
ROUND(IFNULL(AmtModerate,0)* percDepreciationModerate,2) AS CostModerate,
ROUND(IFNULL(AmtSlow,0)* percDepreciationSlow,2) AS CostSlow,
ROUND(IFNULL(AmtRotting,0)* percDepreciationRotting,2) AS CostRotting,
ROUND((ROUND(IFNULL(AmtFast,0)* percDepreciationFast,2) + ROUND(IFNULL(AmtModerate,0)*
percDepreciationModerate,2) + ROUND(qtySlow* percDepreciationSlow,2) +
ROUND(IFNULL(AmtRotting,0)* percDepreciationRotting,2) ),2) as TotalObsoleteProvision
FROM `com-pro-se-cluster-3c5.PersistentnonPII.ProductDepreciationActual_v1`) KIV on cast
(Basis.globalid as int64) = KIV.globalid
left join (Select distinct(supplierid), countryCode from `com-pro-sus-9f0.warehouse_info_v3.actual`) SUS
on cast (basis.supplierid as INT64) = sus.supplierid
```

H. Information text box: calculation costs

Calculated costs:

- NoRvRHolding: geenRvR*holding
- WithRvRHolding: RetourPerLeverancier365dgn*holding
- TotalHoldingCostsNoRvR: NoRvRHolding + TotalObsoleteProvision
- TotalHoldingCostsWithRvR: WithRvRHolding + TotalObsoleteProvision

- NoRvRPicking: geenRvR *Picking
- NoRvRPacking: geenRvR *Packing
- NoRvRShipping: geenRvR* Shipping
- NoRvRWarehouseCosts: NoRvRPicking + NoRvRPacking + NoRvRShipping

- WithRvRPicking: RetourPerLeverancier365dgn *Picking
- WithRvRPacking: RetourPerLeverancier365dgn *Packing
- WithRvRShipping: RetourPerLeverancier365dgn * Shipping
- WithRvRWarehouseCosts: WithRvRPicking + WithRvRPacking + WithRvRShipping:

- TransportCost: (RetourPerLeverancier365dgn*Transport_UK); (RetourPerLeverancier365dgn*Transport_US); (overstock*0)

- CostFast: AmtFast* percDepreciationFast
- CostModerate: AmtModerate* percDepreciationModerate
- CostSlow: AmtSlow* percDepreciationSlow
- CostRotting: AmtRotting* percDepreciationRotting
- TotalObsoleteProvision: CostFast + CostModerate + CostSlow + CostRotting

- TotalReturnCostNoRvR: NoRvRPacking+ NoRvRPicking +NoRvRShipping+ TransportCost
- TotalReturnCostWithRvR: WithRvRPacking+ WithRvRPicking +WithRvRShipping+ TransportCost

Fixed costs:

Picking € 0,49
Packing € 0,18
Shipping € 0,04
Holding € 0,08

Transport_UK € 0,30
Transport_US € 1,48
Transport_NL € 0,00

I. Questions from the validation questionnaire

Section 1: general

Q1: For which department do you work?
Q2: What is your role in the current return process for international books?

Section 2: Current process (without dashboard)

Q3: which problems did occur during the return process of international books?
Q4: Can you give an indication on how long the process takes? (in hours)
Q5: Which data do you need for your part of the process?
Q6: On a scale from 1 to 10, to which extend was all relevant data available?
Q7: On a scale from 1 to 10, to which extend was there insight in all relevant data?
Q8: Which data was missing?

Section 3: Requirements dashboard

Q9: On a scale from 1 to 10, to which extend is the requirement 'the dashboard should be user friendly' reached?
Q10: On a scale from 1 to 10, to which extend is the requirement 'the dashboard's theme and lay-out should fit in with the existing dashboards ' reached?
Q11: On a scale from 1 to 10, to which extend is the requirement 'the dashboard should be extendable for other shops/clusters/departments' reached?
Q12: On a scale from 1 to 4, to which extend is the requirement 'the dashboard should present different types of data' reached?
Q13: On a scale from 1 to 10, to which extend is all relevant data available now?
Q14: On a scale from 1 to 10, to which extend is there insight in all relevant data now?

Section 4: New dashboard

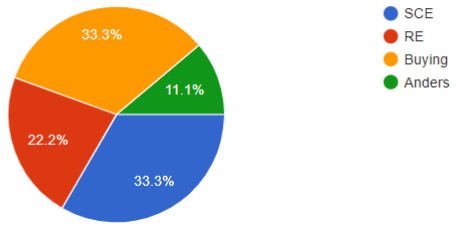
Q15: On a scale from 1 to 10, to which extend is the data presented in a logical way?
Q16: On a scale from 1 to 10, to which extend is the dashboard understandable without any explanation?
Q17: Which data would you use?
Q18: On a scale from 1 to 10, to which extend is the dashboard a solution for the problem: 'There is no clear overview of all the costs that are involved in the returning process from Company X to the suppliers for international books' ?
Q19: Do you have any remarks?

J. Results from the validation questionnaire

Section 1: general

Q1: For which department do you work?

9 responses



Q2: What is your role in the current return process for international books?

- Providing an indication for which number of items needs to be returned and to which suppliers these items need to go
- Determining the obsolete items, discussing with supplier, filing NCO requests and arranging transport
- Support from RE in determining which assortment may be returned.
- Buyer - negotiate the agreements regarding the right of return with suppliers
- Negotiating and consulting with the supplier about return arrangements
- Determine which assortment should be returned and determine the pricing strategy
- Determining obsolete assortment, sending lists to suppliers and arranging transport
- Store manager, ultimately look at total impact on cm1
- Contact wholesalers + negotiation agreements

Section 2: Current process (without dashboard)

Q3: which problems did occur during the return process of international books?

- *A lot of manual work, appointments not always transparent everywhere, especially for Dutch books*
- *Very large assortment with a large long tail, and many different suppliers where we buy at different prices. The return agreements are also not always clear. This makes it difficult to know before which date an item must be returned and to which supplier this must / can be returned. Book suppliers also often have additional requirements after the return requests have been sent (e.g. PO data).*
- *It takes a lot of time to compile lists for returns. The difficulty lies mainly in determining which assortment can go to which supplier. In addition, it does not help that everything is done via Excel lists and that there is little standardization. The biggest problem is ultimately that we do not have a good overview of the costs / revenues of a return.*
- *Not clear exactly what it costs us to return books, we return as efficiently as possible (which book can be returned to which supplier, in order to be able to return the highest possible price and as many books as possible, how long do we have book to return it before term expires).*
- *Long process, a lot of manual work, costs are not clear and not transparent*
- *It takes a lot of time to find out whether the range is obsolete and which items should be returned*
- *It was difficult to find out which items had to be returned, which did and did not have right of return*
- *Not an up-to-date overview, always a manual action*
- *ambiguities on our side, few return moments*

Q4: Can you give an indication on how long the process takes? (in hours)

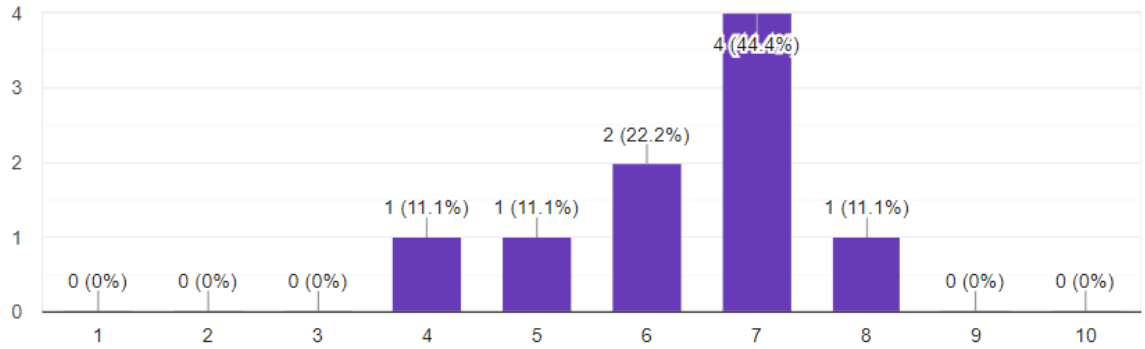
- 10
- 24? Difficult to estimate, also because the current process is still in progress.
- 12
- 20
- 23
- 18
- 20
- 24
- 20

Q5: Which data do you need for your part of the process?

- Return percentages, supplier agreements, overstock, purchase orders and supplier information
- Return agreements and accurate purchase data
- Amount of obsolescence / overstock per title, the right of return per supplier and an indication of the costs / revenues.
- NPP (Net Purchase Price) - costs of returning - costs of keeping in stock - costs of destruction
- Purchase price, costs for returns and non-returns
- The right of return per supplier, number of overstock items, costs and revenues
- The number of obsolete items, the RvR per supplier to see which items can be returned and the sales figures
- impact on the revenue, so the costs of returning / not returning

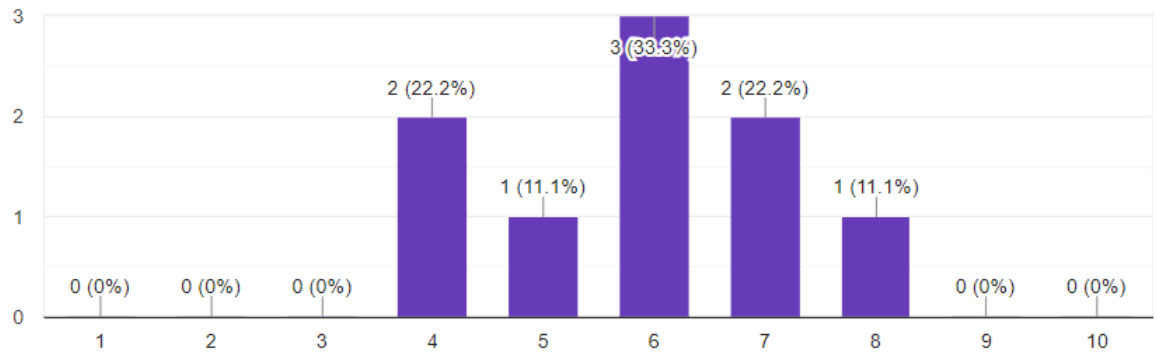
Q6: On a scale from 1 to 10, to which extend was all relevant data available?

9 responses



Q7: On a scale from 1 to 10, to which extend was there insight in all relevant data?

9 responses



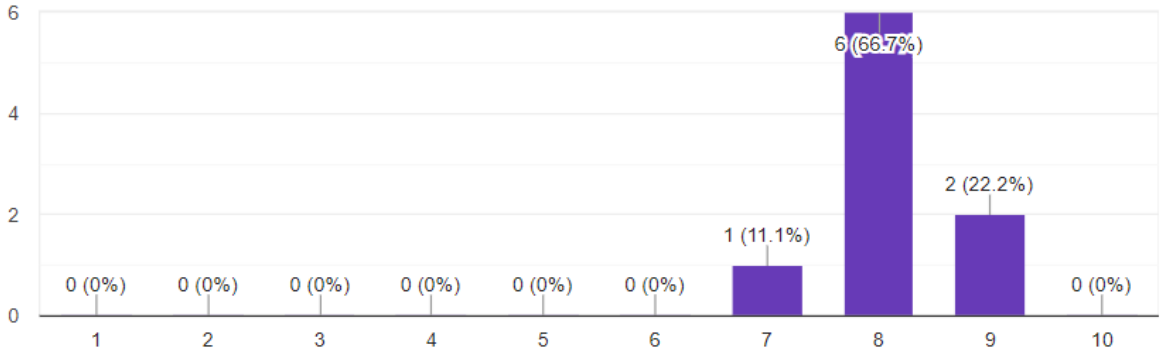
Q8: Which data was missing?

- Especially the part of the agreements and what can then be returned.
- Full return agreements that are also well processed in the data. After the export that is now made from the old dashboard, a lot of work is still needed to be able to make correct proposals per supplier.
- Costs / revenues of a return and the distribution per supplier.
- Costs of returning - costs of keeping in stock and destruction costs, return period per book
- An overview of the costs
- A combined overview where costs are included in the overview of obsolete items.
- An analysis of how costs can affect the obsolete range. Perhaps more / less items should be returned because that is more financially attractive.
- Up-to-date info instead of an insight per manual action

Section 3: Requirements dashboard

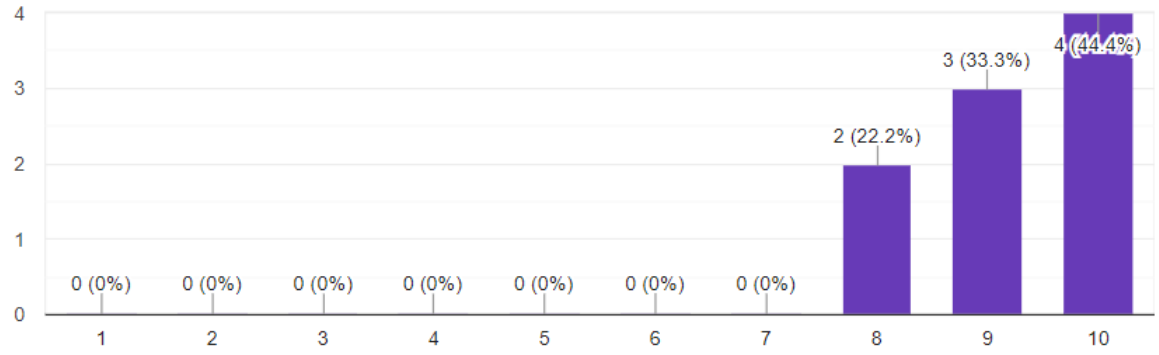
Q9: On a scale from 1 to 10, to which extend is the requirement 'the dashboard should be user friendly' reached?

9 responses



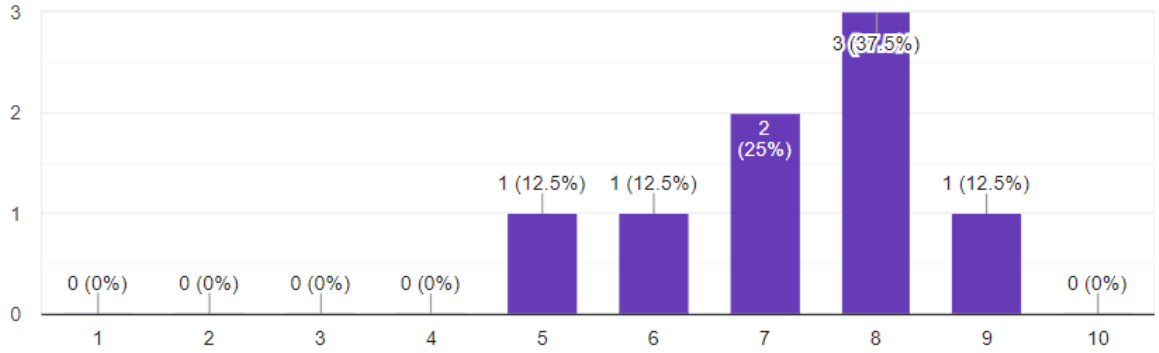
Q10: On a scale from 1 to 10, to which extend is the requirement 'the dashboard's theme and lay-out should fit in with the existing dashboards ' reached?

9 responses



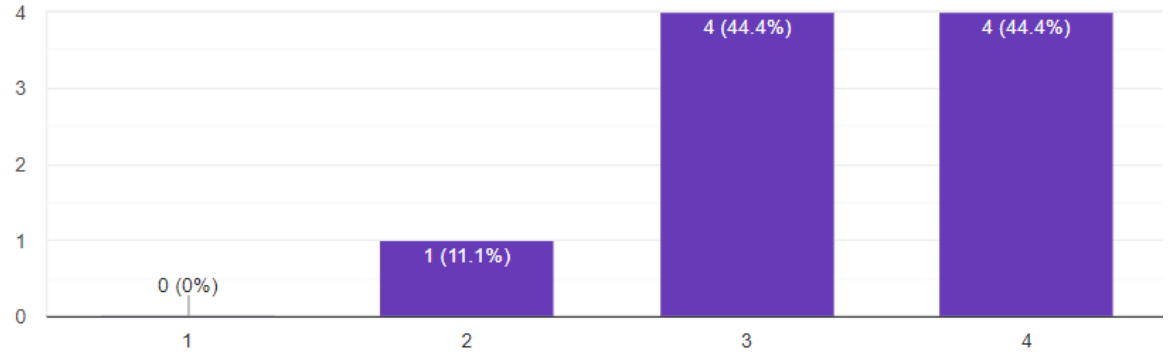
Q11: On a scale from 1 to 10, to which extend is the requirement 'the dashboard should be extendable for other shops/clusters/departments' reached?

8 responses



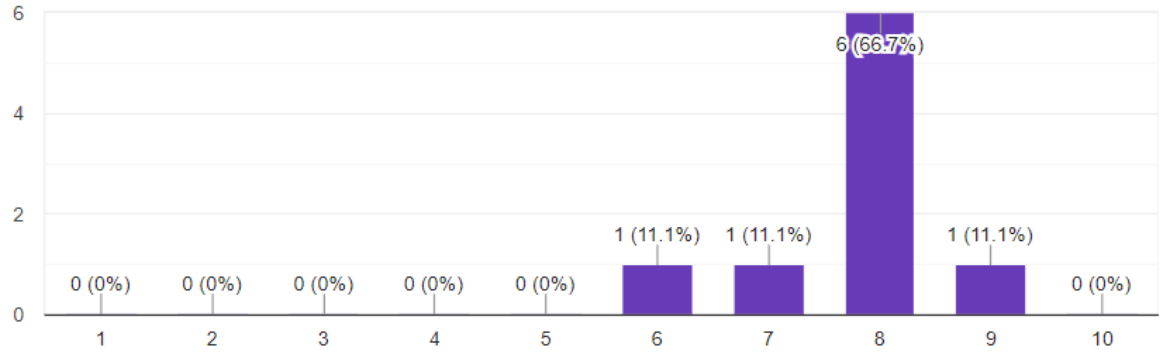
Q12: On a scale from 1 to 4, to which extend is the requirement 'the dashboard should present different types of data' reached?

9 responses



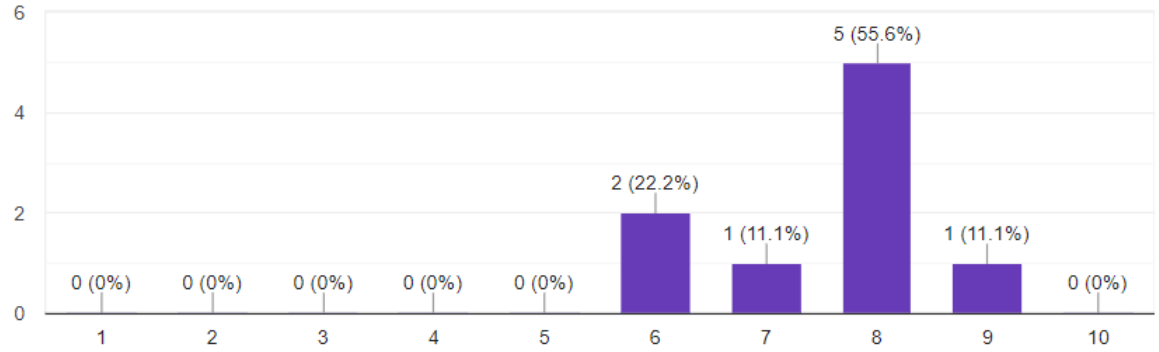
Q13: On a scale from 1 to 10, to which extend is all relevant data available now?

9 responses



Q14: On a scale from 1 to 10, to which extend is there insight in all relevant data now?

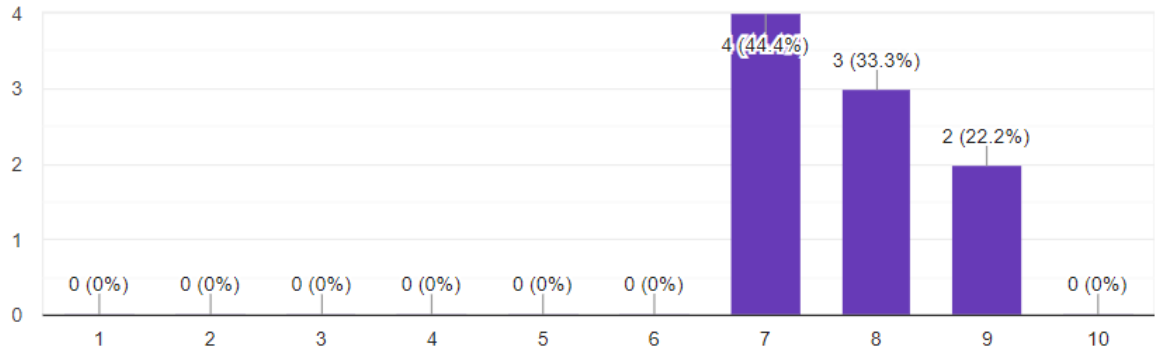
9 responses



Section 4: New dashboard

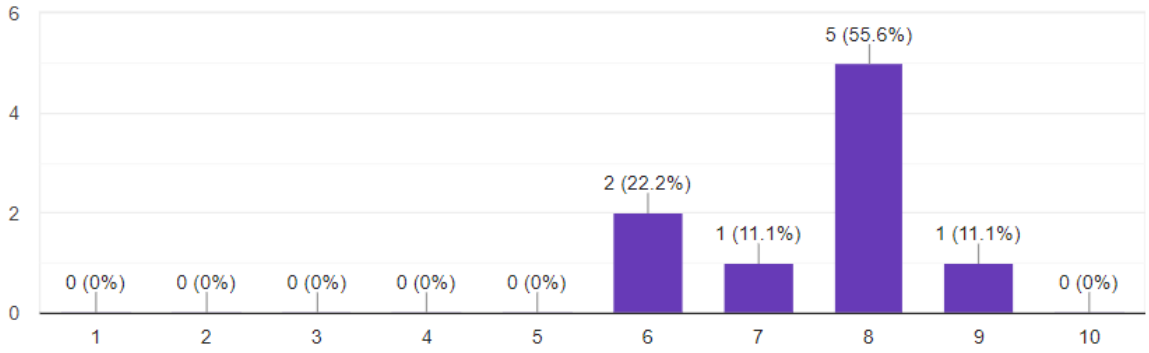
Q15: On a scale from 1 to 10, to which extend is the data presented in a logical way?

9 responses



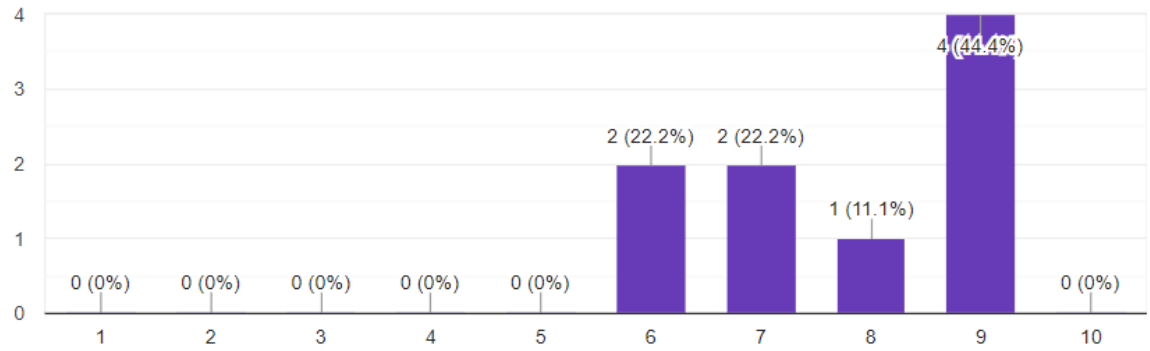
Q16: On a scale from 1 to 10, to which extend is the dashboard understandable without any explanation?

9 responses



Q17: On a scale from 1 to 10, to which extend would you use the dashboard?

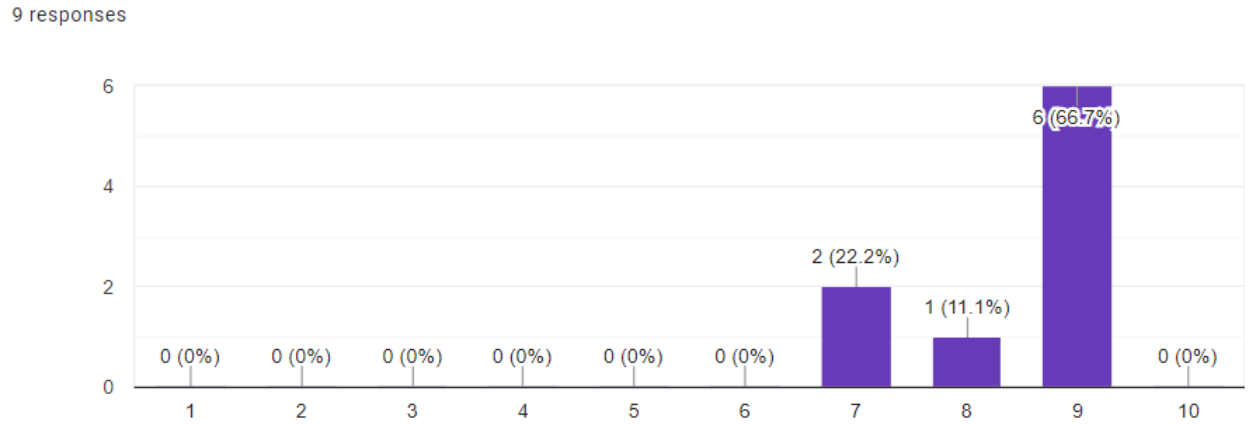
9 responses



Q18: Which data would you use?

- "Number and value of items with right of return per supplier
- Value with 1 year Right of Return vs. Value with 1 month Right of Return "
- Anything, but what I would use most is probably 'number and value of items with right of return per supplier'
- All of them
- Percentage returned per supplier, costs of returns (to make new agreements)
- Return agreements table
- The cost tables (Total costs per shop, costs per supplier and costs per shipment)
- The data table below to compile lists for suppliers. The cost tables above are also certainly interesting.
- What must be returned per supplier within a month, share what can and cannot be returned
- All the data on page 2

Q19: On a scale from 1 to 10, to which extend is the dashboard a solution for the problem: 'There is no clear overview of all the costs that are involved in the returning process from Company X to the suppliers for international books' ?



Q20: Do you have any remarks?

- I think there is still something to be gained from 'storytelling' in the dashboard. What do we see in the data and to which solution do you want to 'send' the user? Perhaps it would also help to add a little more visualities (graphs) and place the tables a bit closer together (because of a lot of white canvas you have to scroll a lot and the further people have to scroll, the less often they view something). Furthermore, I think it is very cool that you have managed to get all the data needed for a return in 1 place!
- Well done! Very clever how much costs you have been able to find out with regard to the return process and how you have been able to visualize that properly in a dashboard. It is also very nice that we now know how long we can still return it, that was information that was previously very difficult to retrieve.
- Maybe express everything with suppliers in euros instead of numbers, I think the contracts are based on% of the turnover that we are allowed to return. Maybe sometimes just give an explanation per table
- It is not entirely clear to me how the costs have been calculated (maybe I overlook it?). In any case, a really great dashboard! This will certainly help me to have a better overview!