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# Improving retailers' inventory updates in an online shopping platform

Establishing a method for real-time inventory connections

Sara Lute

University of Twente

BSc Industrial Engineering & Management

Faculty of Behavioural and Management sciences

## Preface

Dear reader,

This bachelor thesis is written for the completion of the bachelor Industrial Engineering and Management at the University of Twente. It was executed at the company Peddler as a part of the operations team, aiming at contribution to business development and process optimization for the operations (and sales) team of Peddler. The aim of this thesis is to establish a method for real-time inventory connections between Peddler and the local retailers that want to be on the platform.

First, I would like to thank all the employees at Peddler for welcoming me as an intern and a student and for the great learning environment, not only in my own field but from all the departments. I'm grateful for the trust in and excitement for me and my fellow intern Koen as the first interns of the company. A special thanks to Eric Richter, my supervisor at the company, for the support and brainstorm conversations about the possibilities of Peddler.

Also, I would like to thank Renata Guizzardi-Silva Souza, my supervisor from the University of Twente, for her time and effort to provide guidance and feedback on my research. The online meetings formed a great communication structure throughout the past semester. And Ipek Seyran Topan for being my second supervisor from the University. I also want to thank Prof.Dr. Gusztai Eiben from the VU Amsterdam for proofreading my thesis and being available for questions at all times.

Lastly, I want to thank my girlfriend Noa for the emotional support, not only during this semester, but during my entire bachelor. Even with the challenging lockdowns, she helped me to stay motivated.

Enjoy reading!

Kind regards,

Sara Lute

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*Keywords:* electronic marketplace, local retailer, operations, Point of Sales systems, process optimization, integrations, inventory management systems, real-time inventory updates.

## Management Summary

**Introduction.** Peddler is an electronic marketplace that aims to connect all types of local retailers with their customers, by delivering products quickly to their homes, and functioning as the last mile solution. Peddler uses electrical cargo bikes in the big Dutch cities, which makes itself unique by connecting local supply to local demand in a sustainable and affordable way. This research is written as a part of this start-ups' operations team, aiming to contribute to the business development and process optimization for the operations (and sales) team of Peddler. The local retailers on the platform of Peddler have different sizes and characteristics. From those with an up-to-date POS system or webshop to those who have no inventory system whatsoever. Retailers that are already online can be put on Peddler's website within 5 minutes and have inventory updates done automatically through integrations built by Peddler. Those that are not digitalized, however, must currently send their inventory updates manually through Excel sheets or PDF files. In this case, their inventory is not automated and has no direct integration. This research explores the options of reaching this direct integration. With over 400 local stores connected to the Peddler platform, there is a wide variety of inventory management approaches. At first look, a store can be in one of three states: a) fully integrated with an up-to-date POS system or webshop for which e.g., an API connection is built, b) partially integrated with another up-to-date POS system or webshop without a built connection and c) a store without any inventory management system at all. For states b and c this research finds a method.

**Research methodology.** One final method is sought out based on a combination of ten techniques. Two sections of each five techniques, and key performance indicators to evaluate them, are established based on initial research in literature and at the company. Based on these, qualitative data is gathered through semi-structured interviews amongst the Peddler employees and a sample group of retailers connected to the platform. The results of these interviews evaluate the techniques according to the key performance indicator results for each technique. The final method is depicted visually and with a business process model.

**Main findings.** Optimizing and supporting the existing merchant portal concluded to be essential. With one exception being the new POS exports, because retailers who are viable for this technique are known to have their systems in order and are only missing the integration on Peddler's part, and a quick and bulk update solution is easy for both the retailers and the Peddler employees. For the techniques supporting the process, it is essential that the technique would alleviate effort while being interesting to use or to have access to, such as the tablet and the guides. Or the techniques needed to add to the personal support and guidance, which is a key value in the Peddler methodology, such as the store metrics with the split helpdesk feature, and the launch day.

**Conclusion.** The final method offers a detailed and supported plan of approach for Peddler to deal with unintegrated stores. The techniques in the method will improve the processes of Peddler. However, it is essential to closely monitor and evaluate the implementation and execution of the method from here. Both Peddler and the involved retailers need to be involved in this part to realize the method as intended.

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## Chapter 1 - Introduction

Chapter 1 introduces the problem central to this research and the context thereof. Starting with the context description, the problem identification and the establishment of the core problem. This chapter builds to the definition of the knowledge problem and research questions. After which the research design and deliverables clarify on the structure and contents of this research.

### 1.1 – Context Description

Peddler is an electronic marketplace that aims to connect all types of local retailers with their customers, by delivering products quickly to their homes, and functioning as the last mile solution. Peddler uses electrical cargo bikes in the big Dutch cities, which makes itself unique by connecting local retailers to local demand in a sustainable and affordable way. This research is written as a part of this start-ups' operations team, aiming at contribution to business development and process optimization for the Operations (and Sales) team of Peddler.

### 1.2 – Problem identification

Local retailers have different sizes and characteristics, going from those with a webshop to those who have no inventory system whatsoever. Retailers that are already online can be put on Peddler's website within 5 minutes and have inventory updates done automatically through plugins created by Peddler. Those that are not digitalised, however, must currently send their inventory updates manually through Excel sheets or PDF files. In this case, their inventory is not automated and has no direct integration. Currently, this is **the** biggest problem in the entire sector of bringing local demand and local supply together. Table 1 shows the problem identified by the company.

Division	Topic	Explanation
Operations	Quality Control retailers without direct integration	Finding solutions to provide automated checks and updates for retailers that are currently managing their inventory manually, so these retailers may have updated and relevant inventory information at all times.

*Table 1 - Problem description*

In this research, the options of reaching this direct, automated integration will be explored. With over 400 local stores connected to the Peddler platform, there is wide variety of inventory management approaches. In Figure 1, the difference between a live (directly integrated) and not live (not directly integrated) store is depicted. At first look, a store can be in one of three states: a) fully integrated with an up-to-date POS system or webshop for which e.g. an API connection is built, b) partially integrated with another up-to-date POS system or webshop without a built connection (potentially an XML feed exists for these), and c) a store

without a proper POS system or webshop. A Point-of-Sale (POS) system is a system that streamlines retail operations by automating the transaction process and tracking important sales data.<sup>1</sup>

In this research, a store is defined as “not directly integrated” when there is no feed possible, such as in state c) (and state b) when noXML feed exists). The existing feeds and each’ share amongst the total number of stores connected to Peddler are shown in figure 2. Even though only GoogleSheets is considered not a direct integration, it covers roughly 35 % of all stores. This leads to 35% of all stores currently not having regularly updated inventories.

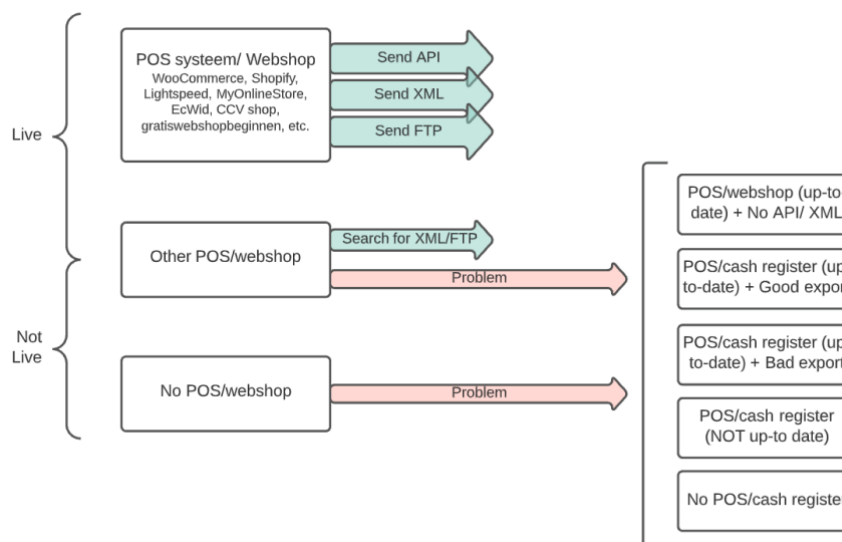


Figure 1 – Defining the problem group

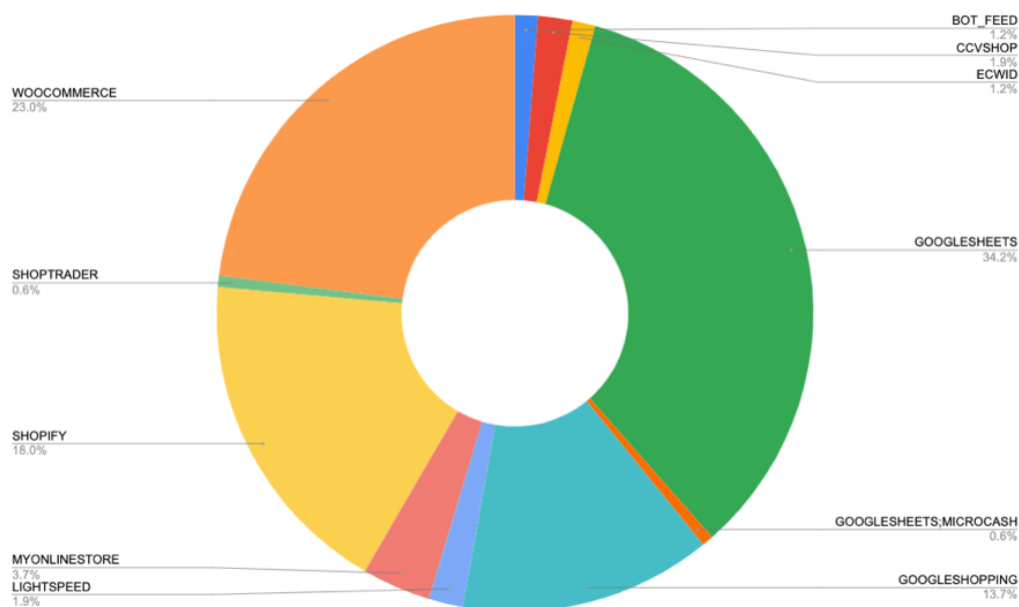


Figure 2 – Distribution of feed types over all Peddlers' stores

<sup>1</sup> Hayes, A. (2020, 26<sup>th</sup> of October). How Point of Sale (POS) Works. Investopedia. Retrieved on 08/12/2021 from <https://www.investopedia.com/terms/p/point-of-sale.asp>



### 1.3 – Core problem

The problem cluster in figure 3 identifies the main problems of Peddler targeted by this thesis. The cluster tree has been created by reasoning all the way from the leaf problems to the core (parent) problem. Starting at the bottom, a reason is identified for each problem. Once arrived at a problem with no direct cause itself, this is the core problem. Besides, the core problem needs to be within my span of control. There is no way to tackle demand variability itself, thus “Big fluctuations in demand for certain products/retailers” is not a core problem.

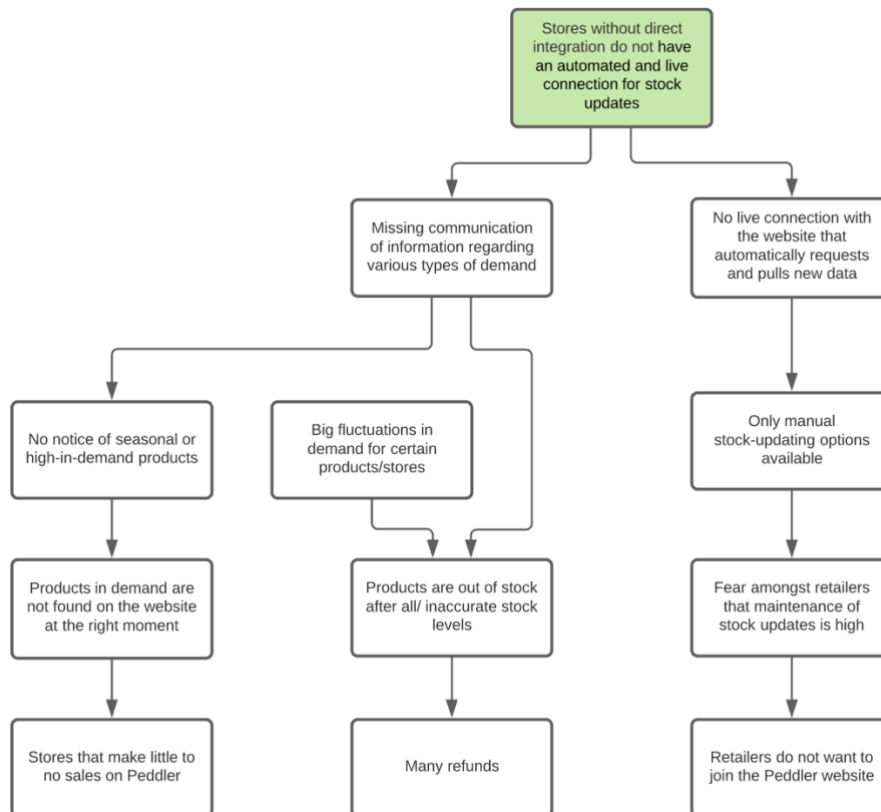


Figure 3 – Problem Cluster

One can see in the problem cluster that we start from the following problems:

- Retailers make few sales and many refunds due to not being able to supply the right products at the right times.
- Retailers do not want to join Peddler due to the burden of manually updating stock levels.

Concluding, these issues are caused by the following core problem targeted in this thesis:

#### Core problem

No real-time and automated connection between some of the retailers’ (from here called “unintegrated retailers”) actual inventory and the inventory levels stated on the Peddler website.

An important aspect of solving the core problem is how much effort the solution will be for the employees of Peddler. Currently, with no method at all, there are no direct difficulties for the work of the Peddler employees. Of course, indirectly missing out on connected retailers is undesirable. However, if the proposal involves too much effort on the part of the employees, this may lead to some resistance towards the proposed method. Hence, the effort the method will require from the employees is an important measurement in this thesis.

Another important aspect is the inclusion or exclusion of the ability to manage demand variability. A whole separate study can be made on techniques to achieve this. However, the focus of this research will lay on ensuring an up-to-date inventory. Indirectly, this research will strongly support retailers in handling demand variability because of its focus on automated and real-time inventory updates. Demand variability can occur for many reasons, such as seasonal demand variability when warm clothing and chocolate milk are high in demand during the winter, or sunscreen and bikinis in Summer. Another example is holidays like Christmas when toys and decorations are highly requested, or eggs during Easter. Even during a pandemic, Covid-19 measurements have led to the sudden hoarding, thus high demand, in necessary items like toilet paper. Demand variability is thus an expected or unexpected change in demand compared over time.

#### 1.4 – Defining knowledge problems and research question

There are three knowledge problems relevant to this thesis. They are presented in Table 2.

<b>Knowledge problems</b>		
We do not know the existing techniques for a real-time inventory connection, with automated updates that take demand variability into account.	We do not know what criteria the retailers nor the Peddler employees have for evaluating a technique, regarding their experienced effort level. (KPIs)	We do not know which method is optimal (for retailer and Peddler) to integrate the current unintegrated retailers, allowing them to have accurate, automated, and real-time inventory updates.

*Table 2 – Knowledge problems*

The research question is:

What is the optimal method for connecting a local retailer and the Peddler platform in real-time, providing automated inventory updates that take demand variability into account?

This question is broken down into the following three sub-questions:

- What are the techniques of creating real-time inventory connections with automated updates that take demand variability into account?
- What are the criteria for the retailers and the Peddler employees for evaluating a technique regarding their experienced effort level?
- What conclusions does the measurement of the KPIs support in relation to the proposed technique?

### **1.5 – Research design**

The problem-solving approach starts by considering the parties involved. These are Peddler (the employees from the sales, operations, and management departments) and the retailers of unintegrated stores. These are important parties since they will be working with the solution on a day-to-day basis.

The literature research will create the starting point for the first and second knowledge problems. Combined with research within the company's existing databases to get an initial measurement of the KPIs and to choose a sample group of unintegrated retailers. After this, the potential techniques of supporting real-time inventory information gathering are listed. The choice for a good (set of) technique(s) will be based on the preferences of all parties involved in this research, established by performing interviews, concluding in a proposed method. This method can be separate or a combination of techniques, represented in a Business Process Model.

The information required for the above mentioned KPIs is found in several places.

- The KPIs are almost entirely found in existing data within the company. For this, data-gathering methods were set-up at several repositories through the company HubSpot account.
- The KPIs regarding the experienced effort levels are gathered through interviews performed after the literature research.

The types of retailers will be based on the retailer categories existing within the website database, and information gathered from my coordinator on the company side.

The information required for the techniques that can be implemented will be based on suggestions from Peddler employees (collected by conducting interviews), academic articles on the related subjects, and other research specifically relating to the direct integration of inventories. A part of the solutions will be designed by incorporating existing POS systems that are currently available.

### **1.6 – Limitation and scope.**

The main limitation in this research is not being able to see the influence the solution techniques have on the day-to-day processes within the company. The list of gathered techniques cannot be implemented within the company during my research to see the effects each technique has. Therefore, the implementation is not part of this research. First, this research needs to be done and finished with advice based on the interviews. After that, the company might decide to give me space and opportunity to implement the optimal solution and test it. This will not fall within this research design. I believe this is a limitation that is fair and will not harm the research design overall.

### 1.7 – Theoretical framework

Goal modelling → Yu, E. S. (2009). *Social Modeling and i\**. *Conceptual Modeling: Foundations and Applications*, 99–121. [https://doi.org/10.1007/978-3-642-02463-4\\_7](https://doi.org/10.1007/978-3-642-02463-4_7)

Conceptual data modelling regularly focusses on static relationships and dynamic and behavioural properties, appropriate since the models are ultimately translated into data and operations for machine execution.

However, a successful system must be aware of its environment and that is where social modelling comes into the picture. (Yu, 2009, pp. 99-121). In this thesis social modelling “Goal modelling” within the i\* framework will be used.

This framework builds from the standing point of social actors who act with intent. “The analysis focuses on how well the goals of various actors are achieved given some configuration of relationships among human and system actors, and what reconfigurations of those relationships can help actors advance their strategic interests.” (Yu, 2009, pp. 100)

This type of modelling is important for this research due to the importance of the actors. As described at the beginning, the goals and opinions of the involved parties are of utmost importance for the relevancy of the final product. Goal modelling will be used to get an overview of the goals and dependencies between said actors and to get a good picture of what influences the problem. This model will be found in the beginning of the thesis, when introducing the problem and its actors, and will be created with the piStar tool (<https://www.cin.ufpe.br/~jhcp/pistar/tool/>).

Business process modelling → Weske, M. (2012). *Business Process Modelling Foundation*. *Business Process Management*, 73–124. [https://doi.org/10.1007/978-3-642-28616-2\\_3](https://doi.org/10.1007/978-3-642-28616-2_3)

A conceptual modelling language is the Unified Modelling Language (UML), this is an object-oriented modelling and design language. “Business processes consist of activities whose coordinated execution realizes some business goal. These activities can be system activities, user interaction activities, or manual activities.” (Weske, 2012, pp.73-124) This modelling language will be used in the thesis for the final method. This method will potentially exist out of multiple techniques, and these activities need to be coordinated. The activities making up these techniques, and thus the final method, need to be portrayed in one figure. Since the activities for said techniques vary from system to user interaction and more, UML is a fitting modelling language. This model will be found at the end of the thesis, when the method has been chosen it is described both by text and through a business process model.

### 1.8 – Deliverables

The final deliverable will be the description of a method to solve a problem that affects the whole sector. It will be a plan of approach, potentially composed of different techniques, to connect local supply with local demand with direct integration by creating a real-time connection between a retailer and the Peddler platform, with automated update request that take demand variability into account.

The method cannot be fully implemented at the end; therefore, the proposed deliverable is a description of the optimal method with recommendations for implementation.

This deliverable will be comprised of various parts, including a detailed description of the proposed approach and the motivation behind the choices made for the techniques that compose it.

Substantively, the method will describe how retailers and Peddler will be connected at real-time, the consideration of demand variability, and the practicality of getting regular inventory updates.

Table 3 presents in detail, the sections composing the final deliverable.

1.	Finalized problem definition agreed by all stakeholders
2.	Finalized list of KPIs for Peddler employees' perspective and ways to measure them
3.	Inventory of possible and feasible solutions → the techniques
4.	Description of the solution chosen by the KPIs of Peddler and the preferences of the retailers, also depicted by a business process model (see theoretical perspective)
5.	Examples, mock-up and, recommendations for implementation

*Table 3 - Sections of the thesis final deliverable*

## 1.9 – Thesis structure

In Chapter 1 the thesis is introduced. Starting with a case description it is built up to a research question, and finally builds to the deliverables. While taking ethics and research design into account.

Then, Chapter 2 introduces the field of inventory management and finds the areas of interest for the techniques, the first section of this chapter contains a literature review on existing POS systems, general inventory management, and other forms of tracking and supporting the inventory updates. The second section of this chapter describes the techniques that will be evaluated in this study. Chapter 3 describes and provides the initial measurement of the key performance indicators. These measure the techniques based on company data, literature research, and qualitative research. Chapter 4 evaluates all KPIs per technique, divided in two sections. The evaluation is established by the qualitative research performed at the company and its retailers. Section 4.1 clarifies on the set-up and structure of said qualitative research before the techniques are evaluation in section 4.2. In Chapter 5 the techniques evaluated in chapter 4 come together, to conclude the final method. By comparing the KPIs and applying the argumentations for passing or not passing, the final selection of techniques is defined in section 5.1. Followed by a detailed description and visualization of the techniques in section 5.2. And lastly, section 5.3 models the final methods process in a BPMN. Lastly, Chapter 6 provides the discussion, the recommendations for implementing the final method, and further research. In section 6.1 the main findings and limitations to this research are discussed, and section 6.2 comprises of recommendations on the implementation of the separate techniques and the final method, and what aspects of the research can be further analysed.

## Chapter 2 – Literature study

To introduce the field of inventory management and find the areas of interest for the techniques, the first section of this chapter contains a literature review on existing POS systems, general inventory management, and other forms of tracking and supporting the inventory updates. The second section of this chapter describes the techniques that will be evaluated in this study.

### 2.1 – Real-time inventory connection techniques from experience and literature

The very first step in inventory management will always be manual for the retailer. Unless products on a shelf are counted automatically by some hardware, the retailer will still have to do some inventory management. Therefore, a “live connection” in this research is considered the connection between the platform and an existing inventory management system by, for example, an API specifically supporting an ecommerce platform (e.g., Woocommerce, Lightspeed, Shopify, etc.). Here the retailer already manages their own inventories. An Application Programming Interface (API) connection is a set of functions and procedures allowing the creation of applications that access the features or data of an operating system, application, or other service.<sup>2</sup>

A delivery platform, such as Peddler, has no say in a retailer’s inventory replenishment strategy, giving their relation a Vendor Managed Inventory-style (Sari,2007). According to (Sari,2007), a Vendor Managed Inventory-style does not work well where demand uncertainty is high. To alleviate this problem, a focus is required on sharing demand statistics and sales overviews with the retailers to lower the demand uncertainty. This collaboration between two parties is a great driver for innovation (Graf et al., 2021). An information exchange of predicting sales volumes for specific products/categories by Peddler and communicating lead-times and inventory levels by the retailer increases the ability to withstand demand variability (Graf et al., 2021), (Cachon, 2000). To support demand prediction, POS system Lightspeed offers many resources on demand information. For example: holiday trends report, black Friday to cyber-Monday guides, marketing webinars, etc. (Lightspeed, 2021).

Compensating for inventory inaccuracies is always possible. This may be done through fixes, such as increasing safety stock, manually resetting inventory records after a long time of no sale or even a constant automatic decrease in inventories (Delaunay et al., 2007). However, these are not solutions, no technique to get real-time inventory updates, but rather techniques to deal with errors in inventory management.

Conditions at each company or firm are unique and include many different features and limitations (Ziukov, 2015). This means the variability in each situation asks for variability in solutions.

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<sup>2</sup> Application Programming Interface (n.d.) In Oxford Advanced Learner’s Dictionary online. Retrieved on 14/03/2022 from <https://www.oxfordlearnersdictionaries.com/definition/english/api?q=api>

As said by (Popa, 2012), sharing data effectively and efficiently is reliant on access to precise data definitions by all partners, data accuracy and agreement on the process used to support the exchange of data between partners.

Other platforms which onboard the inventories of retailers are POS systems and e-commerce platforms. There simple options are offered such as product-per-product input (WooCommerce, 11-2021), (Kumar, 2021) or csv file importers (WooCommerce, 10-2021).

There are several options when dealing with automatic updates. The first options should create a platform with the purpose of making manual inventory updates as easy as possible. In other words, this means creating a retailer environment where their products on can be added, changed, deleted, and maintained in various ways, such as:

- A fully equipped per-product adding and editing feature. Select a single product from the product selection that requires change and edit the product featured. This also requires a feature to add a single product at a time.
- An option to upload and update products in batches. An upload environment which reads the data from a, by the retailer, supplied document and creates or updates products and their prices and stock accordingly. Inventories of retailers are replenished when an order is placed at its suppliers. The data for this is can often be found on the suppliers invoices. Many retailers use a Point of Sales system for their inventory management. This contains the entire product selection of the retailer and the prices and stocks thereof.

A second approach would be the integration with the retailers own inventory management system. Many retailers have existing inventory management systems and integration options can be build with each retailer's e-commerce platform, POS system, or cash register system. For the retailers without any digital means for inventory management the option remains to adopt this. Possibility lies for retailers to improve their own stores with a proper inventory system, opening up options of integration.

Lastly, retailers tend to miss the motivation to manually update inventories or account for demand variability. A similar platform, Deliveroo, has created an oboarding guide (Deliveroo, 2021), with all information relevant to prospective and current retailers. Placing more responsibility in the hands of the retailer, in hopes that the potential consequences will make them active partners instead of passive. Options to enlighten partners of their own influence are:

- Sharing product and category demand reports or dashboards to respective retailers (Lightspeed, 2021).
- Creating a guide page explaining: a) how this platform works; b) how to register & set-up; c) what are the fees and payment procedures; d) ranking tips and warnings; e) existing POS integrations. (Deliveroo, 2021)
- Establishing a clear ranking algorithm based on order acceptance time and refunds

## 2.2 – Establishing the final techniques

Due to the big differences between the inventory management of the unintegrated stores, the techniques will be varying from simple to big changes, and can be applied to either a selection or all types of unintegrated stores. The techniques will be presented in two parts: five techniques for the inventory update process itself, and five additional supporting techniques.

### 2.2.1 - Techniques for inventory updates

In this section, the five techniques for the process of updating inventories of unintegrated stores are described. The first two techniques are already in use at Peddler while the last three are fully new.

#### *Merchant Portal*

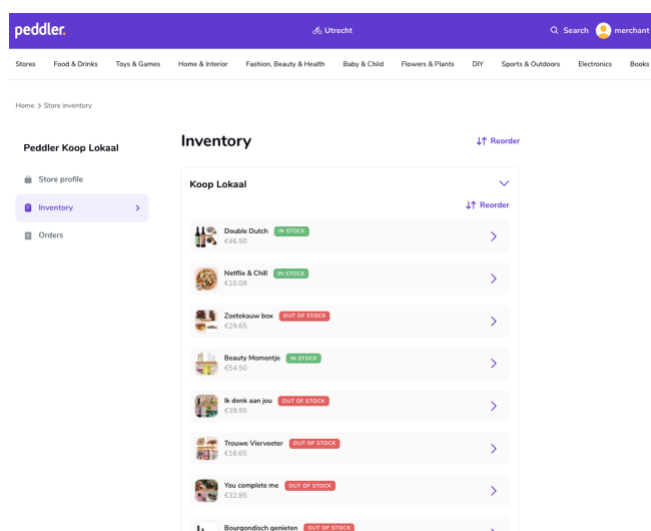


Figure 4 - Initial Merchant portal: product overview

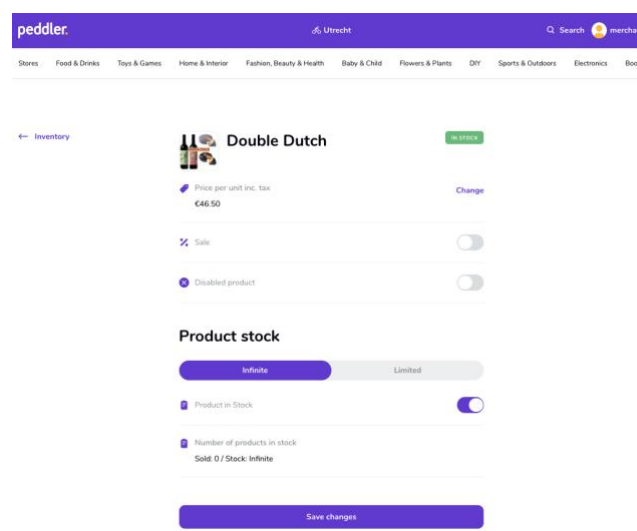


Figure 5 - Initial Merchant portal: Edit page

Figure 4 and 5 illustrate the existing merchant portal, which is relatively simple. Under inventory the full list of products is gathered, expandable per category (see figure 4), and these categories can be re-ordered. One-by-one the products can be opened and the price, and stock level can be edited (see figure 5). All connected stores have access to this page. No products can be added to the front-end merchant portal. Neither can images, descriptions, brands, etc. be edited here. The portal only allows price and stock updates.



### Live Excel sheet

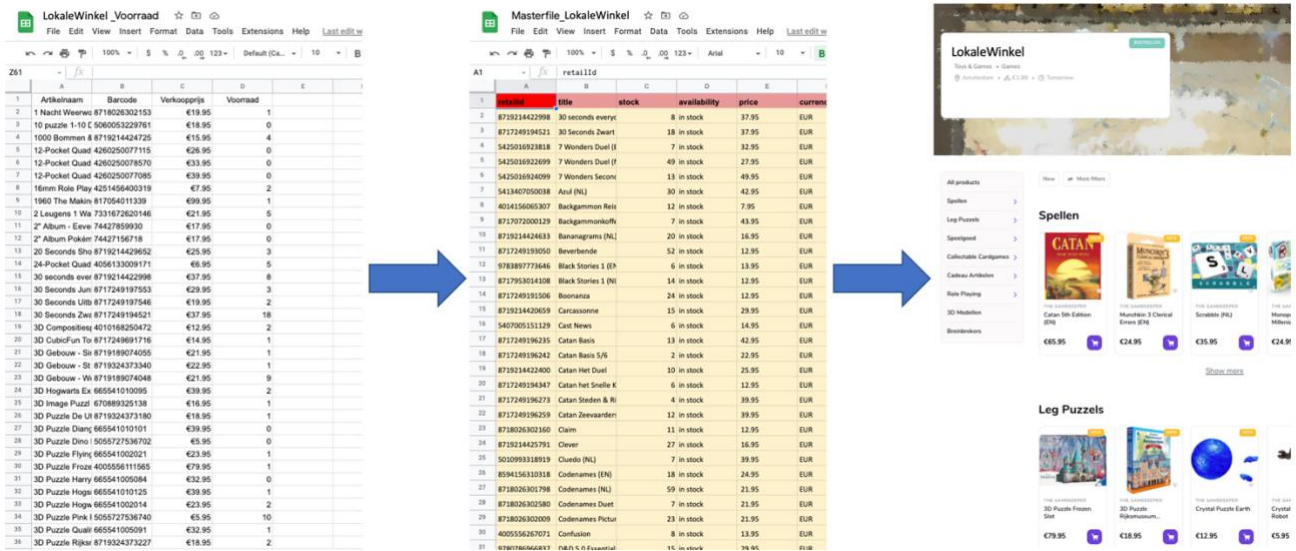


Figure 6 - The three parts of an Excel Live sheet

To give stores some more freedom, the company creates live in Excel Sheets, shown in Figure 6. The left table in figure 6 is shared with the store, and it contains retail ID's (barcodes), product names, prices, and stock levels (one product per row). The store can change the values of the prices and stock levels. This sheet is converted in the sheet in the middle of Figure 6, with the purpose of putting the data in proper formatting, and enriching the product data with images, descriptions, categories, and brands. This middle sheet allows the synchronization with the Peddler platform every 24 hours. The result is shown in the image on the right-hand side of Figure 6, which depicts a portion of the web shop, showing products images, description, price etc.

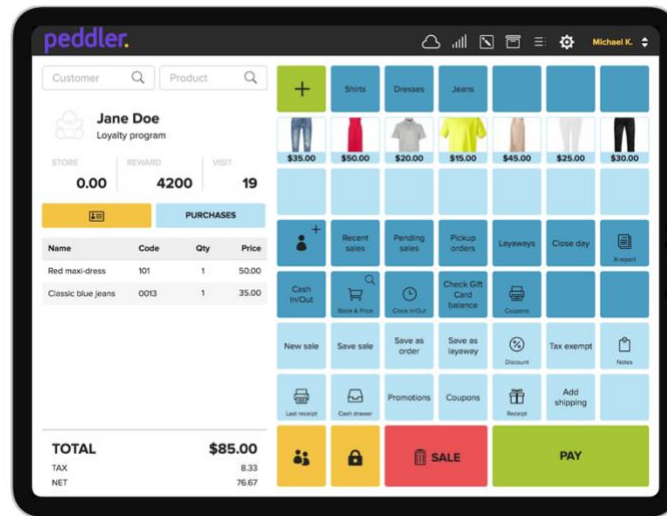
***Upload portal: POS Export***

*Figure 7 - The four steps of the POS export upload*

Stores that have an up-to-date POS system or web shop, for which no integration exists, have a lot of potential. All the information is available, and the missing part is only the connection between the data in their system and the Peddler platform. This technique entails an upload page on the merchant portal where the retailer can upload their POS export. As depicted in figure 7, the retailer exports the overview from their POS system and drags or uploads it to the upload portal in their browser. This upload platform can identify three main product variables: the retail ID, the sales price, and the stock level.

This solution may include an add-on robot program that automatically exports the POS every 24 hours and sends it to a specific email address. All documents received on this address are automatically uploaded to the platform and properly processed. By giving the automatic email subject to connect it to the proper store and by configuring the received exports in advance, the platform becomes the automatic integration with the POS system, thus removing the need to collaborate with all the specific POS systems separately.



*New POS system: Peddler POS**Figure 9 - Peddler POS example interface*

We have already concluded that optimally a store has a direct integration with its POS system or web shop. This way all the inventory changes are captured within this system and Peddler has an integration with this system to always be fully synchronised on the necessary stock changes. This technique is not to have Peddler build the POS themselves, but to start with a collaboration or partnership with an existing POS company. This could be a small start-up POS company which is a free system, or a bigger POS company which offers a free version. As portrayed in figure 9, the system can be very simple. An interface with the product selection, and options to edit, add, and remove products is plenty.

### **2.2.2 – Additional supporting techniques**

The second section of techniques are to support the process of updating inventories of unintegrated stores. None of these techniques exist yet within the Peddler process.

#### ***Tablet***

A possible solution is to place a tablet on the store's counter. This gives retailers a physical attention point to their online store on Peddler and the orders they receive there. Currently, all orders are received through e-mail (and optionally an SMS) message. Since this message can only be sent to one email address and one phone number it is difficult for stores with multiple employees to keep an eye on the Peddler orders. A tablet in combination with the Peddler's application could offer retailers a more centralized point of attention to incoming Peddler orders and, maybe more importantly, an easy access point to update prices and stocks on Peddler.

#### ***Demand forecasting per category***

Most unintegrated retailers on Peddler have no previous experience online. Therefore, opening their store to this market is uncharted territory for many. A technique to support them is to send updates on the demand expected in the upcoming period in a newsletter-style demand forecast for each main category of Peddler. This would be based on historical data collected on Peddler, and stores would only get the forecast for the category related to the products of their.

#### ***Store metrics dashboard***

Besides sales data, Peddler collects data on customer behavior. If Peddler shares this data with the stores, they could get insight on how customers shop on Peddler. Examples of these metrics are: filled baskets versus paid orders, what sub-categories get most clicks, and what search terms customers use. Such insights can prepare retailers better for the different demands online. And if retailers are better prepared it can lead them to have more correct safety stocks, and thereby less refunds due to out-of-stocks. In combination with insight should come support. Because the knowledge that something is wrong with a retailers' online store is not enough to lead to progress. Therefore, in combination with this dashboard comes the separation off the store support part of the helpdesk, allowing a direct contact with the account manager of each corresponding retailer. This direct contact with a person who can improve the store directly may speed up and improve the quality of the stores. To motivate retailers to improve their store and do something with the metrics, the ranking of their products can be based on the aforementioned metrics.

### ***Guide page***

When joining Peddler, each new store finds itself in an entire new system of processes, such as accepting and preparing orders, doing a (partial) refund, editing products, etc. Understandably, stores might need repeated explanation of those processes before able to perform them individually. This leads stores to passively let go of the processes until they go wrong. Currently, the only way to get an explanation on such processes is to contact the Peddler helpdesk. Providing a guide page in the merchant portal may help retailers learn about the processes, helping them to avoid eventual problems. The page should contain simple step-by-step guides supported by video material, such as screen recordings of the actions. The goal of this technique is to offer an easy-access support system, providing a more accessible way to be reminded of daily Peddler processes.

### ***Launch day test order***

Finally, a technique about the finalization of the onboarding process is proposed. The onboarding process of Peddler is the period between the time a retailer agrees to join Peddler with the Sales department and the point in which the store is live on Peddler. Currently, the onboarding process is finalized by sending a “Your store is Live!” mail. This mail informs the retailer that their store has gone live on Peddler and explains the general processes. After this, there is no other communication. A store must simply wait until their first order, which can take somewhere between a day to a month. This technique is providing an additional step of care for a new retailer, by visiting the store at the end of the onboarding process, gathering the involved personnel, and doing a test order and demonstration of the merchant portal. The purpose of this technique is to make the retailer feel more involved and active in Peddler, hopefully leading to more preparedness and activeness in the future.

### Chapter 3 – Description of the Key Performance Indicators

This chapter describes and provides the initial measurement of the key performance indicators. These measure the techniques based on company data, literature research, and qualitative research.

#### 3.1 – Contextualization of KPIs through a Goal Model

Figure 10 shows the dependencies between the four actors relevant to this research: the retailer, the POS systems, the Peddler employees, and the Mollie payments company. The dependencies are modelled in goal models according to the i\* language (Dalpiaz et al., 2016). By showing the dependencies between the actors and the personal goals of each, it portrays where the focus of the KPIs should lie.

In Figure 10, the dependencies for the connected and unconnected retailers are split, because the unconnected retailers have no POS system between them and Peddler. The model shows that there are more dependencies between the unconnected retailer and the Peddler employees than between any other actors. This shows the time and effort intensiveness between the two actors.

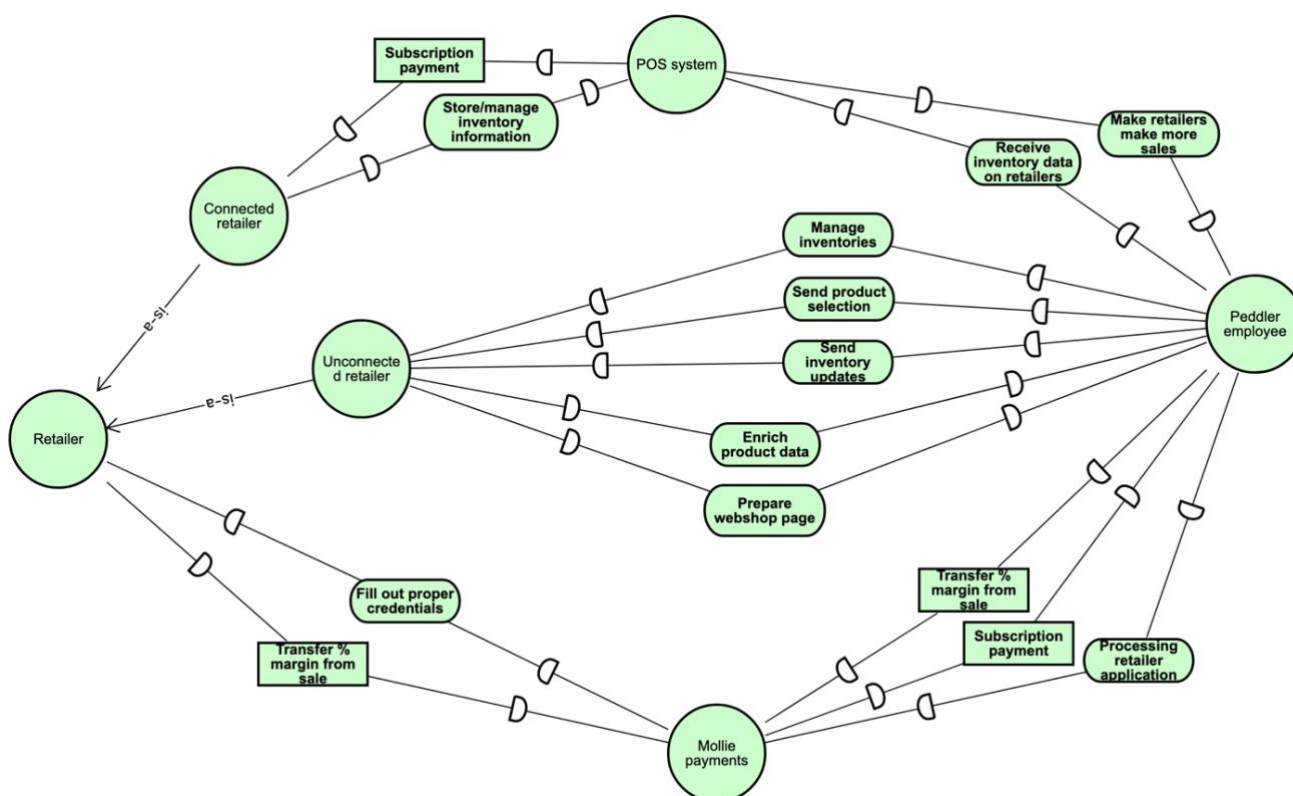


Figure 10 – Strategic dependence model (given by i\* language)

For the two main actors, the local retailers and the Peddler employees, the goals that the KPIs represent are shown in Figure 11 and 12. Starting with the local retailer in Figure 11, the five goals labelled G1 until G5 are the core goals for this actor. Strategically these goals need to be met in order to do successful online sales. G1, G2 and G3 are about efficiency, for these the steps in the techniques need to have a short total time and cost little effort. G4 focusses on the financial aspect of the technique because the technique needs to assure a high quality but affordable process. Financial goals and KPIs limit the possibilities of other goals and is therefore



essential to finding the optimal solution. Lastly, G5 is about whether the technique is a likeable solution.

Essential in finding a successful technique is whether the user wants to adopt it, therefore a key goal is finding a likeable solution based on the first impression of the actor.

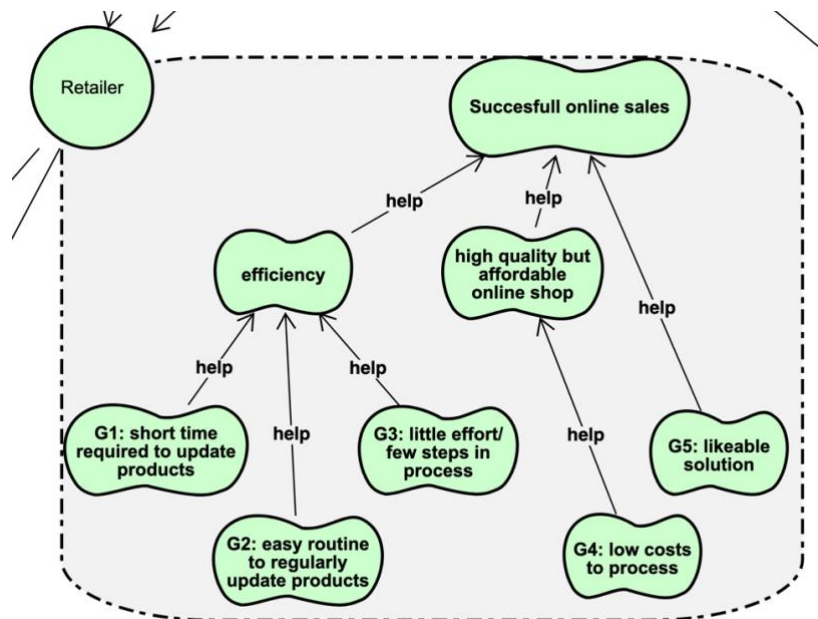


Figure 11 - Strategic rational model for the retailer

Then for the Peddler employees, seven goals are modelled in Figure 12. Here, G1 until G7 represent the goals on which the KPIs of section 3.2 based. G3, G4, G5, and G7 are similar to the goals of the retailers. G3 and G4 focus of efficiency, G5 on low costs and G7 on first impressions. Besides this, G1 and G2 focus on the platform goal to minimize refunds. Many refunds are bad for sales numbers and company image. G6 is the specific goal of Peddler to have as little retailers as possible reject the platform.

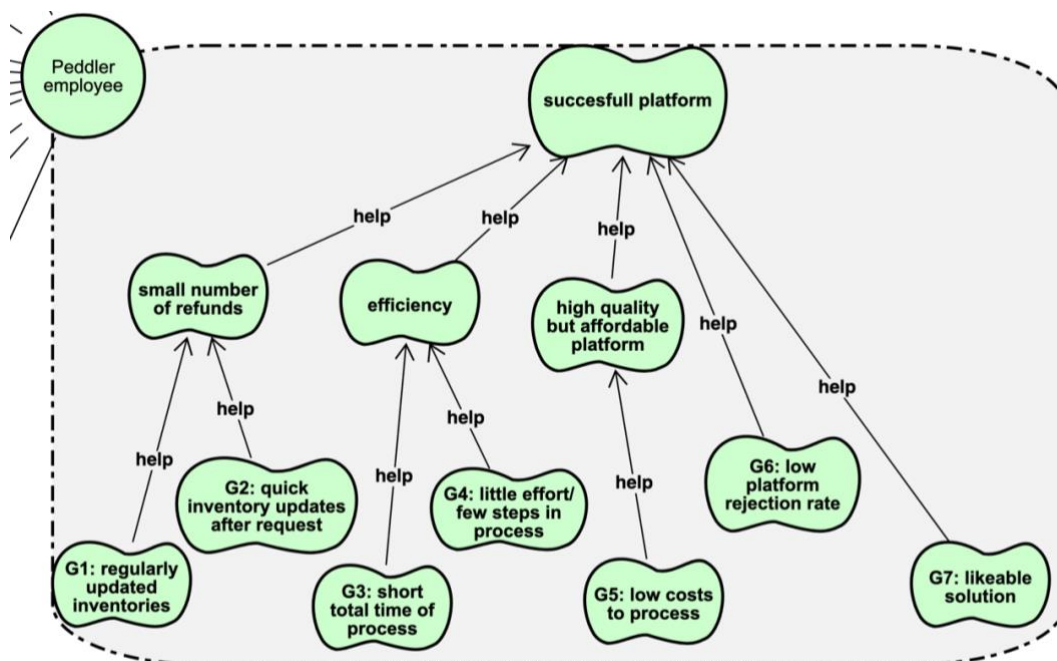


Figure 12 - Strategic rational model for the Peddler employee



### 3.2 – Establishing the Key Performance Indicators

In this work, norm and reality are assessed according to various Key Performance Indicators (KPI), which are ways of measuring a company's progress towards the goals it is trying to achieve. These KPIs support the evaluation of the techniques proposed in this thesis. One or a selection of those techniques will be the goal, this goal is called the method. The KPIs are as follows:

<b>Name</b>	<b>Description</b>	<b>Calculation method</b>	<b>Collection method</b>
<i>Platform rejection rate</i> (See G6 in Figure 12)	From all approached retailers some decide to join, and others do not for various reasons. This reasons why retailers rejected the platform are evaluated and compared.	$\frac{\text{all approached retailers of type } x \text{ in a period}}{\text{type } x \text{ retailers that reject in a period for reason } y}$	Initial measurement through company data. Results are measured by replacing initial values with data of techniques chosen by interviewees.
<i>Average inventory update time</i> (See G2 in Figure 12)	The average hours since an inventory update. It represents for each feed type the average time it has been since an update.	Table where the number of hours recorded for all stores over 30-days, are first averaged per retailer and then summed per feed type. All summed represent the KPI.	Initial measurement done through company data. Results are measured by exchanging the hours with those of the technique, for the cases the technique can be applied to.
<i>Regularity of inventory updates</i> (See G1 in Figure 12)	The average number of updates for a retailer with a certain feed type. It represents how many updates can, on average, be expected in a month.	Table where the number of updates over a 30-day period are counted per retailer, and then summed per feed type. All values summed represent the KPI.	Initial measurement through company data. Results are measured by replacing the numbers for those applicable to the technique.

Table 4 - Company data based KPIs

For the KPIs based on company data, the following three situations are compared:

- The current situation of retailers that are connected through direct integration, for example through and API connection with their Point-of-Sale (POS) systems.
- The current situation of retailers without direct integration.
- The situation after one of the proposed techniques is applied to the relevant unintegrated retailers.

<b>Name</b>	<b>Description</b>	<b>Calculation method</b>	<b>Collection method</b>
<i>Experienced effort Peddler employee or retailer</i>			
<i>Emotional / first impression</i> (See G5 in Figure 11 and G7 in Figure 12)	Represents the employees' gut feeling when offered a given technique. First thoughts and feelings will give insight on how motivated the actor is to work with the technique.	Yes/No/Maybe, first impression, first choice.	Fully gathered during the interviews.
<i>Physical effort</i> (See G3 in Figure 11 and G4 in Figure 12)	Represents how much effort the employees physically spend while executing a technique. It focuses on the number and difficulty level of steps to be taken.	Specific traits and level of effort. No effort – barely – neutral – slight – too much effort.	Fully gathered during the interviews.
<i>Expected benefits</i> (See G5 in Figure 11 and G7 in Figure 12)	Features that are expected from this technique.	Main points the participants require from this technique.	Fully gathered during the interviews.

Table 5 - Interview based KPIs

<i>Name</i>	<i>Description</i>	<i>Calculation method</i>	<i>Collection method</i>
<i>Effort Peddler employee or retailer</i>			
<i>Financial cost</i> (See G4 in Figure 11 and G5 in Figure 12)	Represent how much a technique costs for the company, excluding labour.	Willingness to pay scaled 1 to 5 by interviewee.	Exact number. A cost estimation will be made based on the prices of software, hardware, etc.
<i>Time-consuming</i> (See G1 in Figure 11 and G2 in Figure 12)	Average time spent handling the technique.	Scaled 1 to 5 by interviewee.	Comparison of current and solution techniques. Gathered during literature research.

Table 6 - Research based KPIs

The KPIs were created based on information gathered during conversation with retailers and with the Peddler's division responsible for cancelling orders, besides some experiences shared by other employees.

### 3.3 – Initial measurement of data- and literature based KPI's

After the KPIs are established, an initial measurement can be done for the initial version of the processes.

These do not coincide with the techniques in section 2.2 because most do not exist at the start of this research.

#### 3.3.1 – Initial measurement of the KPI's based on company data

##### *Platform rejection rate*

The company tracks the stage and past contact with a store in HubSpot. For the three cities, Amsterdam, Den Haag, and Rotterdam, the total number of stores approached is shown in table 7. Besides that, the table shows the numbers of stores that rejected the platform, and those that did join. Peddler is also active in Utrecht but the data for this city is incomplete on HubSpot.

	<i>Total approached</i>	<i>Accepted</i>	<i>In progress</i>	<i>Rejected</i>
<i>Amsterdam</i>	309	169 (54.7 %)	54 (17.5 %)	86 (27.8 %)
<i>Den Haag</i>	113	42 (37.2 %)	40 (35.4 %)	31 (27.4 %)
<i>Rotterdam</i>	154	14 (9.1 %)	78 (50.6 %)	62 (40.3 %)

Table 7 – Platform rejection numbers

Of those stores that rejected the platform, table 8 depicts the division of reasons for not joining Peddler. The cities Amsterdam and Rotterdam were already (mostly) onboarded on Peddler by the time this research was started at the company. Therefore the number of stores for which the reason of rejection is unknown is higher than for Rotterdam.

	<i>Amsterdam</i>	<i>Den Haag</i>	<i>Rotterdam</i>
<i>Total Rejected</i>	86	31	62
<i>Not interested</i>	32	4	36
<i>Too much effort</i>	12	2	12
<i>Focus elsewhere</i>	2	0	1
<i>Closed</i>	7	2	1
<i>Unreachable</i>	8	0	4
<i>Commission too high</i>	1	0	1
<i>Unknown</i>	24	23	6

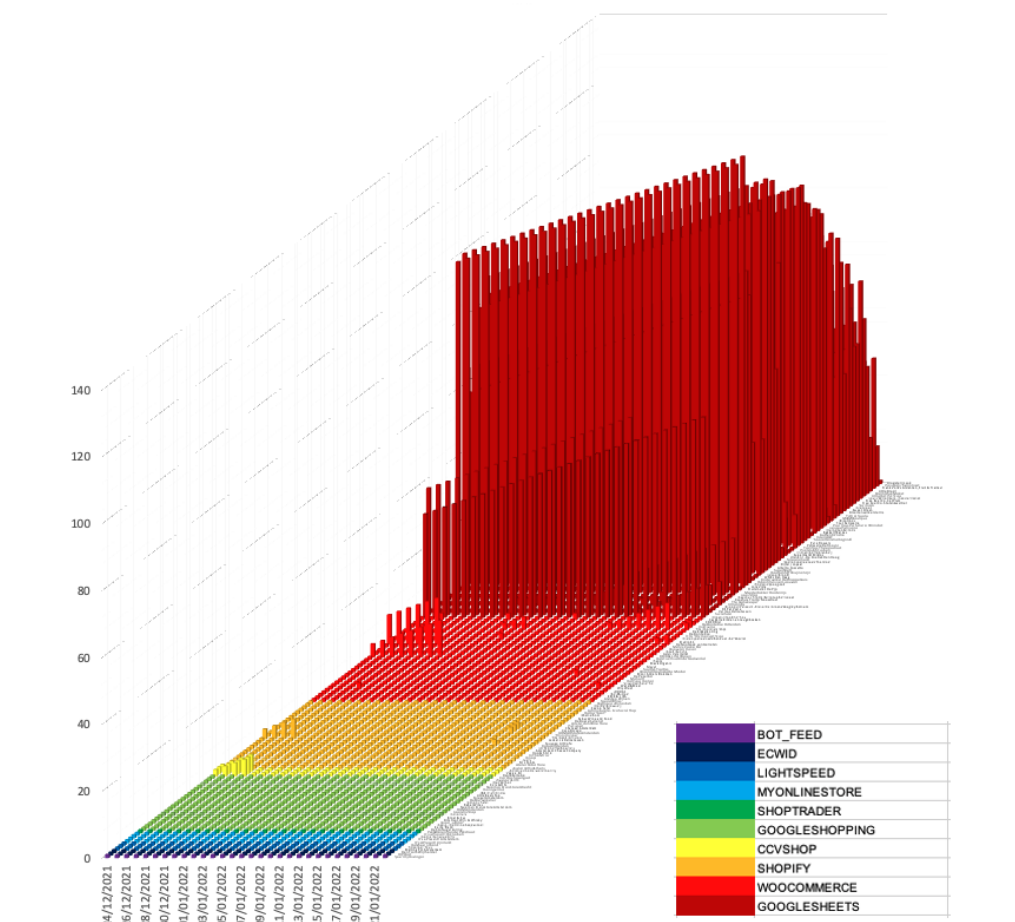
Table 8 – Rejections per reason

Not being interested in a platform such as Peddler is a fair reason and is something Peddler has no control over, this is also the main reason, within the current cities, to reject Peddler. The second place is important, since “too much effort” can be solved by the techniques in this research. The techniques which would simplify the process of joining the platform, would give at least 26 stores a bigger chance of joining the platform.

### *Overview of feed types*

The graph in figure 13 shows the general state of both this and the next KPI. Figure 13 shows the number of days since the last inventory update. The X-axis is the date, the data was extracted for 31 consecutive days. The Y-axis shows the number of days since the last update. The Z-axis depicts the specific store names, these are purposely not readable for privacy reasons. More importantly here are the colours, as shown in the legend, each colour represents a feed type. This distinction puts emphasis on the difference between the integrations. In this research “GoogleSheets” is referred to as unintegrated, all other feed types are integrated.

From this figure we can already conclude that the unintegrated feed type is performing very poorly, compared to the integrated feed. The upcoming KPIs will go into more detail on this.



*Figure 13 – Configuration updates per feed type*

### *Average inventory update time*

For this KPI, the focus is on the following aspects of Figure 13: translating the number of days into number of hours, and calculating the monthly average waiting time per retailer. These averages are summed per feed type, of which the results are visible in table 9. To show relativity, the number of retailers per feed type is given. For the values of the unintegrated feed type, a division is made between the stores with a live Excel sheet and those without.

When applying the techniques, the values of the stores that the technique can be applied to are replaced, resulting in a new total average time since an inventory update.

	<i>Number of retailers</i>	<i>Total hours since last update</i>
<i>BOT_FEED</i>	1	24
<i>ECWID</i>	2	48
<i>LIGHTSPEED</i>	3	72
<i>MYONLINESTORE</i>	4	96
<i>SHOPTRADER</i>	1	24
<i>GOOGLESHOPPING</i>	22	528
<i>CCVSHOP</i>	3	96
<i>SHOPIFY</i>	27	662,4
<i>WOOCOMMERCE</i>	34	945,6
<i>GOOGLESHEETS</i>	55	59.524,8

*Table 9 - Initial measurement of the average inventory update time*

Amongst the 55 stores connected through Google Sheets, there are 10 stores who have the second technique of section 2.2.1 implemented. The live Excel sheet offers them easier acces to price and stock changes, therefore the hours are disproportionate to those without acces to their Excel sheet. The 10 out of 55 retailers are only responsible for 247,2 out of the 59.524,8 hours.

In the recorded month, all stores were waiting for a total of 62.020,8 hours. Optimally, this could have been only 3648 hours, if all 152 retailers were updated every 24 hours.

### *Regularity of inventory updates*

For this KPI, the focus is on the following aspects of Figure 13. By counting the times it has been 1 day since an update, the number of updates per store are counted. These are then summed per feed type and depicted in table 10 as the total number of updates in a 30-day period. Again, for relativity the number of stores per feed type are shown in the second column. As is the division between the stores with a live Excel sheet and those without. When applying the techniques, the values of the stores that the technique can be applied to are replaced. Resulting in a new total number of updates.

	<i>Number of retailers</i>	<i>Total number of updates in a 30-day period</i>
<i>BOT_FEED</i>	1	30
<i>ECWID</i>	2	60
<i>LIGHTSPEED</i>	3	90
<i>MYONLINESTORE</i>	4	120

<i>SHOPTRADER</i>	1	30
<i>GOOGLESHOPPING</i>	22	660
<i>CCVSHOP</i>	3	78
<i>SHOPIFY</i>	27	802
<i>WOOCOMMERCE</i>	34	984
<i>GOOGLESHEETS</i>	55	363

*Table 10 - Initial measurement of the regularity of inventory updates*

The 10 out of 55 retailers that are connected with a live Excel Sheet are responsible for 294 out of the 363 updates. Leaving those without acces with 69 updates divided over 45 retailers.

In the recorded month, all stores were updated a total of 3217 times. Optimally, this could have been 4560 times, if all 152 considered retailers were updated all 30 days.

### **3.3.2 – Initial measurement of the KPI’s based on research**

This paragraph presents the initial measurement of the KPIs, which will later be compared with the technique that will replace it. The initial situation for unintegrated stores is slightly unstructured because there exists no fit solution method for it yet. Depending on the store the product data is collected through scanning the store manually, exporting a product overview from their POS system, or asking the retailer to create a document with product data themselves. This variety echoes through in the maintenance stage of unintegrated stores. The only option for retailers here is the existing merchant portal, and 10 out of the unintegrated stores use an Excel live sheet. However, since the Excel live sheet is (fairly) new and has not been considered for all existing or potential retailers, it will be treated as a new method and is not considered for the initial measurement. Some of the stores who have proper POS systems without a direct integration, intermittently send their POS export manually via e-mail.

#### ***Financial cost***

Here, the costs regarding building the technique are presented. Labour is considered in the “time-consuming” KPI, therefore not considered here. Neither is the cost of consequences such as refunds.

Initially there are two techniques to update your inventory:

1. *Updating inventory through the initial merchant portal.*
2. *Emailing a POS export.*

There are no maintenance costs associated with any of these techniques. In other words, the maintenance cost for each of them is “0” (zero).

#### ***Time-consuming***

1. *Updating inventory through the initial merchant portal.*

As described in the first technique of section 2.2.1, the way inventory updates are done here is by manually clicking on a product and changing the value of stock, one-by-one. It takes about 20 seconds to change the stock level of one, given that the product is already found in the list page and the new stock level value is

readily available. On average, an unintegrated store on Peddler has 820 products, ranging from 5 to 7460 products. Meaning that it takes 4.56 hours to change one feature of all 820 products.

## 2. *Emailing a POS export.*

For the retailer, depending on the POS system and the number of products in that system, exporting the overview can take from 5 to 10 minutes, and sending the e-mail would take 3 minutes. The Peddler employee then must download the export from their mail which could take up to 5 minutes, process it in the import sheet which can take from 10 to 15 minutes, and uploading that updated import sheet to the website takes 5 to 15 minutes. All depending on the size of the export and the complicatedness of the import sheet. Waiting on the requested export by the Peddler employee is not included in this KPI and neither is waiting on the Peddler employee to check their mailbox and start processing the update. In total, this leads to a total of 8-13 minutes for retailers and 20-35 minutes for the Peddler employee.

### 3.3.3 – Scoring of the interview results per KPI

Table 11 clarifies how a KPI result should be read, whether it is a good measurement or not. These arguments are used in chapter 5 to decide what techniques will be part of the final method.

<i>KPIs</i>	<i>Evaluation limits</i>
<i>FIRST IMPRESSION</i>	Yes $\geq$ 10 → <b>Good</b> Maybe > Yes + No OR No + Maybe > Yes → <b>Medium</b> No > Maybe & No > Yes → <b>Bad</b>
<i>PHYSICAL EFFORT</i>	None → <b>Good</b> Slight → <b>Medium</b> A lot → <b>Bad</b>
<i>EXPECTED BENEFITS</i>	Passed → <b>Good</b> Some or mostly passed → <b>Medium</b> Not passed → <b>Bad</b>
<i>FINANCIAL COST</i>	None → <b>Good</b> Some voluntary costs → <b>Medium</b> Mandatory costs → <b>Bad</b>
<i>TIME-CONSUMING</i>	X < 20 → <b>Good</b> 20 < X < 40 → <b>Medium</b> X > 40 → <b>Bad</b>
<i>PLATFORM REJECTION RATE</i>	Section 1: X > 8.67(1/3 of 26)      Section 2: X > 6.0 % → <b>Good</b> 8.67 < X < 7                              6.0 % < X < 4.0 % → <b>Medium</b> X < 7    X < 4.0 %                              → <b>Bad</b>
<i>AVERAGE INVENTORY UPDATE TIME</i>	Good at 40% improvement: $((\text{current}(62020) - \text{initial}(3648)) * 0.6) + 3648 = 32834$ X < 32834 → <b>Good</b> 32834 < X < 42834 → <b>Medium</b> X > 42834 → <b>Bad</b>
<i>REGULARITY OF INVENTORY UPDATES</i>	Good at 50% improvement: $((\text{optimal}(4560) - \text{initial}(3217)) * 0.5) + 3217 = 3888.5$ X > 3888.5 → <b>Good</b> 3888.5 < X < 3552.8 → <b>Medium</b> X < 3552.8 → <b>Bad</b>

Table 11 – The passing arguments for each KPI

## Chapter 4 – Evaluation of the techniques

This chapter evaluates all KPIs per technique, divided in two sections. The evaluation is established by the qualitative research performed at the company and its retailers. Section 4.1 clarifies on the set-up and structure of the qualitative research before the techniques are evaluated in sections 4.2 and 4.3.

### 4.1 – Set-up and structure of the interviews

The qualitative study for this research has a semi-structured design, based on some initial questions used for comparison among participants' answers, while also allowing the participants to elaborate on various topics. To get both perspectives, two types of participants were invited. Firstly, the employees of Peddler from the operations, sales, and management departments. Secondly, retailers who have joined the Peddler platform, from various store categories and cities.

The participants were invited per email and called a week after to confirm and further explain the research. This resulted in 15 interviews total, of which 7 with Peddler employees and 8 with retailers. Table 12 and 13 show overviews of the Peddler employees and retailers, respectively.

Participant #	Department
Participant 1	Operations
Participant 2	Operations
Participant 3	Operations
Participant 4	Sales
Participant 5	Sales
Participant 6	Management
Participant 7	Management

*Table 13 – Participating Peddler employees*

Participant #	Store Type	City
Participant 8	Liquor store	Den Haag
Participant 9	Grocery store 1	Amsterdam
Participant 10	Hardware store 1	Amsterdam
Participant 11	Drugstore	Den Haag
Participant 12	Toy store	Utrecht
Participant 13	Hardware store 2	Amsterdam
Participant 14	Grocery store 2	Utrecht
Participant 15	Delicacy store	Amsterdam

*Table 12 - Participating retailers*

For the interviews a PowerPoint presentation was created to give a visual representation of the techniques to support the questions. The slides coincide with the imagery in section 2.2, and the descriptions in that same section were used to explain the technique to the participants. After the presentation, the questions were asked to the interview's participants, technique per technique. The interviews resulted in roughly 9.5 hours of audio recording, which were immediately transcribed for anonymity and future analysis.

After conducting all interviews, a data analysis phase was performed to organize the transcribed interviews, classifying them per each discussed inventory update technique. This way, all data regarding each technique could be separately analysed, and all relevant KPIs could be measured per technique and per participant. The results and conclusions from this can be found in sections 4.2 and 4.3. The final method is presented in chapter 5, accompanied by a BPMN model of the process and mock-ups of the chosen technique(s).

## 4.2 – Section 1 – Techniques for inventory updates

### 4.2.1 – Merchant Portal

From the interviews with all participants became clear that this existing technique needed much improvement. The main points are that the expected benefits are not met. The current merchant portal is overall deemed as a good start with many missing parts.

The scoring of the KPIs is based on the premises of improving the merchant portal. Based on the interviews, an unintegrated store will start using the improved Merchant Portal when they have a maximum of 400 products on Peddler. For retailers with more products, the merchant portal is still too much effort. Amongst the 55 unintegrated retailers, 37 retailers have under 400 hundred products, and the average number of products for them is 150 products per retailer.

<b>KPI</b>	<b>Results</b>
<i>Experienced effort Peddler employee or retailer</i>	
<i>Emotional / first impression</i>	3 said “No” 10 said “Not in the current state” – 10 2 said “Yes”
<i>Physical effort</i>	Too time intensive and not user friendly
<i>Expected benefits</i>	Change stock and prices. Add and position products. Guarantee quality and uniformity. Perform like direct integration. Moving/adding/changing categories.
<i>Financial cost</i>	No hardware nor software costs with this technique.
<i>Time-consuming</i>	With implementation of the updates mentioned below, the time to edit any aspect of a single product should take 5 seconds. For an average of 150 this is 12.5 minutes.
<i>Platform rejection rate</i>	The 26 stores that rejected the platform due to too much effort are not expected to change their mind solely on an upgraded merchant portal. While this KPI does lower the effort to do stock and price updates, the sales team indicated that the selling point of the entire platform to new retailers will not be affected enough by the changes within.
<i>Average inventory update time</i>	37 out of the 55 unintegrated stores have under 400 products on Peddler. Using the merchant portal for changes whenever needed is considered optimal, thus the inventory update time is changed to every 24 hours. Resulting in 22864,8 hours.
<i>Regularity of inventory updates</i>	With 37 retailers now doing updates optimally, we consider them updating all 30-days. This results in 4082 updates.

*Table 14 – Evaluation of KPIs for the merchant portal*

The points of improvement are listed here: edit descriptions and images, add new products and categories, change the order of products and categories, include a search bar, change the product view (list view or squares), perform mass actions, apply quality checks (warnings to retailers when applying changes, notifications for employees after a change is made), perform quick changes in product overview (product name, price, and stock level), and fix known errors. Chapter 5 contains a mock-up of the optimization of the Merchant Portal, taking these points of improvement into account.



### 4.2.2 – Live Excel sheet

This technique was only familiar to one participating retailer. This validates treating the Excel live sheet as a new technique. The main points are that this is a great first step and the familiarity of a program such as Excel leads to more willingness to use the technique. However, it feels unprofessional to share a plain document and the unconstrained cells make the technique error prone.

Based on the interviews, an unintegrated store will start using the live Excel Sheet when they have a maximum of 700 products on Peddler. For retailers with more products, the live Excel Sheet is still too much effort. Amongst the 55 unintegrated retailers, 40 retailers have under 700 hundred products, and the average number of products for them is 170 products per retailer.

<b>KPI</b>	<b>Result</b>
<i>Experienced effort Peddler employee or retailer</i>	
<i>Emotional / first impression</i>	4 said “No” 4 said “Fine for time being” 7 said “Yes”
<i>Physical effort</i>	Slight effort, error prone.
<i>Expected benefits</i>	Good for medium sized stores. Unprofessional and limited to text in cells.
<i>Financial cost</i>	No hardware nor software costs with this technique.
<i>Time-consuming</i>	The time to edit any aspect of a single product should take 3 seconds. (Excluding searching for the product). For an average of 170 products this is 8.5 minutes.
<i>Platform rejection rate</i>	During the interviews two out of the seven stores who were unfamiliar with this technique, requested for this sheet to be made for them right away. Assuming a 2/7 rate amongst the 26 stores that rejected the platform due to too much effort, leads to an estimated 7.5 stores joining the platform.
<i>Average inventory update time</i>	40 out of the 55 unintegrated stores have under 700 products on Peddler. The Excel live sheet is synchronised with the platform every 24 hours, thus the inventory update time for these retailers is changed to every 24 hours. Resulting in 19690 hours.
<i>Regularity of inventory updates</i>	With 40 retailers now doing updates optimally, we consider them updating all 30-days. This results in 4153 updates.

Table 15 – Evaluation of KPIs for the live Excel sheet

In conclusion, this technique is great “for the time being”. It is not a perfect solution but functionally enough to give retailers with more products a better tool compared to the Merchant Portal. More than anything, these interviews showed that the effort for a retailer needs to be as low as possible, otherwise the inventories will simply not be updated.

### 4.2.3 – Upload portal: POS Export

Since this technique was an entire new concept for all Peddler employees and retailers the replies had a higher variance. This technique is also limited by only being applicable to retailers with an up-to-date POS system that can make an export. The main points are that this technique could not be closer to a direct integration without the actual integration. The export contains all required data, for all products, as up to date as the retailers own POS system.

<b>KPI</b>	<b>Result</b>
<i>Experienced effort Peddler employee or retailer</i>	
<i>Emotional / first impression</i>	5 said “I don’t know, I have no POS system” 10 said “Yes”
<i>Physical effort</i>	No effort. Physical limitations: up-to-date exportable POS system.
<i>Expected benefits</i>	Perfect for retailers who are suited. Used to create product selection. Categories are difficult. Quality checks required with much automation. Easy sale.
<i>Financial cost</i>	No hardware nor software costs with this technique. Since the required POS system is already available at the retailers.
<i>Time-consuming</i>	Retailer: depending on the POS system and the number of products in that system, exporting the overview can take from 5 to 10 minutes, and uploading would take 2 minutes. Peddler employee: first time set-up can take up-to 20 minutes, but once set-up the employee does nothing.
<i>Platform rejection rate</i>	During the interviews three out of the eight stores had a workable POS and would use this. Assuming a 3/8 rate amongst the 26 stores that rejected the platform due to too much effort, leads to an estimated 9.75 stores joining the platform.
<i>Average inventory update time</i>	Taking the 3/8 rate for the 55 unintegrated stores that are already connected to the platform, 20 out of the 55 unintegrated stores would fit the technique. Using the upload platform with POS exports is considered optimal, thus the inventory update time is changed to every 24 hours. Resulting in 40.855,4 hours.
<i>Regularity of inventory updates</i>	With 40 retailers now doing updates optimally, we consider them updating all 30-days. This results in 3685 updates.

Table 16 – Evaluation of KPIs for the Upload platform: POS export

In conclusion, this technique has high potential for the selection of stores it can be applied to. Starting with manually uploaded exports for inventory and price updates, this can be expanded by using the retail IDs in the exports to create the product selection. And it could even be automated by implementing a robot program on the retailers’ computer that exports and uploads the file every 24 hours.

#### 4.2.4 – Upload portal: Order lists

This technique is a variation on the previous POS export technique. Since that technique is limited to retailers with an up-to-date and exportable POS system, a big group of retailers is not covered. Order lists are not limited by an inventory system; thus, this technique could be applied to all types of unintegrated stores.

<b>KPI</b>	<b>Result</b>
<i>Experienced effort Peddler employee or retailer</i>	
<i>Emotional / first impression</i>	3 said “No” 5 said “only with few suppliers” 7 said “Yes, but only for creating a new store, not for price or stock updates”
<i>Physical effort</i>	No effort. Not for inventory updates
<i>Expected benefits</i>	Order lists only have costs prices, but margin can be put on cost prices: per product, per supplier or per category. Contains article numbers instead of product barcodes, which risks duplicate IDs. Requires quality checks.
<i>Financial cost</i>	No hardware nor software costs with this technique.
<i>Time-consuming</i>	Retailer: receives order lists in mail. Exporting from mail and would take 5 minutes. Peddler employee: first time set-up can take up-to 20 minutes. Once set-up the employee does nothing.
<i>Platform rejection rate</i>	The interviews conclude that this technique is better fit to create the product selection, rather than use it for inventory updates. This research is not focussed on creating the product selection. Therefore, it is not possible to measure this KPI. Considering maintenance, the conclusion would be that none of the 26 stores would join the platform for this reason.
<i>Average inventory update time</i>	The interviews conclude that this technique is better fit to create the product selection, rather than use it for maintenance. This research is not focussed on creating the product selection. Therefore, it is not possible to measure this KPI.
<i>Regularity of inventory updates</i>	The interviews conclude that this technique is better fit to create the product selection, rather than use it for maintenance. This research is not focussed on creating the product selection. Therefore, it is not possible to measure this KPI.

Table 17 – Evaluation of KPIs for the Upload platform: Order lists

This technique is not a good fit for updating the inventories. However, the research did show that this technique can be used by all types of stores that get their order lists from suppliers digitally, to start building their product selection. By uploading the order lists over time, more products are added to the platform by recognizing what article numbers are not on the platform yet. As a result, product data is enriched, and the product is added. A big advantage of order lists is that the products on it are always new, unlike the accumulated old products in a POS system.

#### 4.2.5 – New POS system: Peddler POS

There will always be the leftover group that have no inventory management at all. There is nothing to export, copy, download or extract data on prices or stock levels. As explained in section 2.2.1, a new and free POS system can be offered to the retailers. The retailer can use this for daily sales in the store, but it also has a direct integration with Peddler.

<b>KPI</b>	<b>Result</b>
<i>Experienced effort Peddler employee or retailer</i>	
<i>Emotional / first impression</i>	2 said “No” 7 said “depends**” 6 said “Yes” ** Three participants are worried about fresh produce because they need a scale, and four participants thought this would only work for stores who currently have no inventory management.
<i>Physical effort</i>	Slight effort. It depends greatly on features of the POS system. Set-up by Peddler, no extra effort. The already created import sheet only needs to be uploaded to the free POS system.
<i>Expected benefits</i>	Cooperation with existing POS company saves time and system maintenance. Fully integrated and free system is a plus for both parties. Basic version is an inventory management system. Option to extend by cooperating with a payment method company and offer payment services. Other paid extension options for the retailers include a pin device or a scanner.
<i>Financial cost</i>	For the retailer: the basic version has no costs. Extensions vary in cost. For Peddler: a good collaboration would result in no costs.
<i>Time-consuming</i>	Maintenance of inventories in the POS system depends on the features. A requirement is that it is at least as fast as the existing merchant portal, which takes 12.5 minutes for all changes.
<i>Platform rejection rate</i>	During the interviews five out of the eight retailers did not have a workable POS and would use this. Assuming a 5/8 rate amongst the 26 stores that rejected the platform due to too much effort, leads to an estimated 16.25 stores joining the platform.
<i>Average inventory update time</i>	The POS system will be similar in maintenance to the merchant portal. Therefore, out of the 37 stores considered there, 5/8 assumed start working with a new POS system. This means, 23 out of the 55 unintegrated stores. Using the Peddler POS for changes whenever needed is considered optimal, thus the inventory update time is changed to every 24 hours. Resulting in 37680,6 hours.
<i>Regularity of inventory updates</i>	With 23 retailers now doing updates optimally, we consider them updating all 30-days. This results in 3755 updates.

Table 18 – Evaluation of KPIs for Peddler POS

In conclusion, this technique is adequate for retailers who have nothing, but could also be for retailers who have an expensive POS system. The technique’s free system is mostly just an inventory system, for which extensions can be purchased such as a payment system, and a product scanner. Integration with fresh produce scales is essential, since retailers with weighted products are a big part of the unintegrated stores category.

### 4.3 – Section 2 – Techniques supporting the process

Techniques supporting the processes of the five techniques are presented in section 4.2. Therefore, their scoring on the KPIs is calculated as a bonus on either one specific technique. Or when applicable to all, just as a bonus value. This bonus is calculated by taking the percentage of retailers who would use the technique and dividing this by 10. If 50% of participating retailers would use a technique, the bonus is 5%.

#### 4.3.1 – Tablet

The goal of this technique is to have a physical attention point in the store. This physical reminder should trigger the retailer to be more active in the processes of Peddler. Primarily, regarding price and stock updates, however the incoming orders will also be more centralized.

<b>KPI</b>	<b>Result</b>
<i>Experienced effort Peddler employee or retailer</i>	
<i>Emotional / first impression</i>	2 said “No” 13 said “Yes”
<i>Physical effort</i>	No effort.
<i>Expected benefits</i>	Two purposes: add/edit products and receive/process orders. Label printer combo is essential. Deposit or one-time-fee.
<i>Financial cost</i>	No software costs with this technique. The hardware is the tablet itself would around 100 euros. There is potential in bulk discounts.
<i>Time-consuming</i>	A tablet lowers the time by making inventory update more accessible and portable. This lowers the time required for any process.
<i>Platform rejection rate</i>	The tablet is primarily to support the upcoming Peddler application. This application contains the merchant portal. Six out of eight participating retailers would accept and use a tablet right away. This gives a 7.5% bonus. Applying to the merchant portal this is still 0.
<i>Average inventory update time</i>	Applying the 7.5% to the merchant portals’ 22864,8 hours, gives 24579.66 hours.
<i>Regularity of inventory updates</i>	Applying the 7.5% to the merchant portals’ 4082 updates, gives 4388.15 updates.

*Table 19 - Evaluation of KPIs for the tablet*

In conclusion, the tablet requires the finished application and with that the optimized merchant portal. With the tablet, a label printer is required. For an incoming order the label is printed, this leads to a uniform labelling system. The label will contain the pick-up and delivery address and names, plus a QR code to scan by the deliverer checking whether it is the correct package and guide them to the delivery address.

### 4.3.2 – Demand forecasting per category

As explained in section 2.2.2, most unintegrated stores have no experience online. The goal of this technique is to offer this insight in the online demand of a store on Peddler. The main points are that a newsletter format is not preferred by anyone. The interest vanished when the technique hinted towards a newsletter, and all participating retailers' reactions to this technique varied from "yes-, no-, maybe I will read it. But I will not do anything with it...".

<b>KPI</b>	<b>Result</b>
<i>Experienced effort Peddler employee or retailer</i>	
<i>Emotional / first impression</i>	6 said "No" 4 said "Unsure" 5 said "Yes"
<i>Physical effort</i>	Retailers: no effort (only becomes useful when insight is used for inventory management, this costs slight effort) Peddler employees: setting up mail structure costs slight effort, afterwards it can be sent automatically and be fed with data from Qlik <sup>3</sup> .
<i>Expected benefits</i>	Unknown online market. Insight on demand for own category. Transparent. Newsletter will likely not be opened. Implement in merchant portal.
<i>Financial cost</i>	No hardware nor software costs with this technique.
<i>Time-consuming</i>	Retailers: reading the forecast takes 5 minutes, acting on it depends on how much inventory needs to be adjusted. Peddler employees: setting up the mail structure costs a one-time 4 hours sit to set-up the metrics in Qlik, connect these with the e-mail, and prepare the contact list and planning. Maintenance entails updating contact list when necessary, 2 minutes.
<i>Platform rejection rate</i>	The demand forecast can be added to all techniques of section 1. Two out of eight participating retailers would accept and use the demand forecast right away. This gives a 2.5% bonus.
<i>Average inventory update time</i>	2.5% bonus.
<i>Regularity of inventory updates</i>	2.5% bonus.

Table 20 - Evaluation of KPIs for the demand forecasting per category

The KPIs reflect the aversion to newsletters in combination with the belief that a retailer already knows the demand for their products, even if they have never sold a product online. From the interviews with the Peddler employees, the resulting conclusion is that the demand forecast should be part of the application. Here the forecast is a notification, which is accepted better than a newsletter, and some suggested the idea to integrate the forecast with the dashboard (see section 4.3.3).

<sup>3</sup> <https://www.qlik.com/us/>

### 4.3.3 – Store metrics dashboard

With the similar purpose of bringing insight to the retailer as the previous technique, this technique focusses on the performance of the store itself. The main points are that this is much better received than the demand forecasting and that almost all retailers had some, if not a lot of interest in these metrics.

<b>KPI</b>	<b>Result</b>
<i>Experienced effort Peddler employee or retailer</i>	
<i>Emotional / first impression</i>	2 said “No” 1 said “Maybe, only in the beginning” 12 said “Yes”
<i>Physical effort</i>	Retailers: no effort (only becomes useful when insight is used for inventory management, this costs slight effort) Peddler employees: setting up metrics dashboard costs slight effort, afterwards it is updated automatically with data from Qlik <sup>3</sup> .
<i>Expected benefits</i>	The following metrics would be available for the retailers: number of products sold this time last year, clicking behaviour, search terms, unfinished purchases rate. Dashboard will offer substantiation of using the metrics for ranking. Extra would be a place for suggestions from customers to the retailer.
<i>Financial cost</i>	No hardware nor software costs with this technique.
<i>Time-consuming</i>	Retailers: checking the metrics takes 5 minutes, acting on it depends on how much inventory needs to be adjusted. Peddler employees: setting up metrics dashboard costs a one-time 4 hours sit to set-up the metrics in Qlik and to connect these with the dashboard. No maintenance.
<i>Platform rejection rate</i>	The store metrics dashboard can be added to all techniques of section 1. Six and a half (1 x “maybe”) out of eight participating retailers would accept and use the demand forecast right away. This gives an 8.13% bonus.
<i>Average inventory update time</i>	8.13% bonus.
<i>Regularity of inventory updates</i>	8.13% bonus.

Table 21 - Evaluation of KPIs for the store metrics dashboard

In conclusion, the retailers are interested in this technique due to the potential insight in a wide variety of metrics, such as, best/worst sold items and categories over the last month and compared to the same-time last year, search terms within the online store on Peddler and within entire category of store, abandoned baskets with types of products, and general clicking behaviour on store page. Later, the metrics can be used to calculate the ranking of a retailer on Peddler. It offers the store insight on their ranking on Peddler, thus where their products are placed within a certain category and allows the retailer to improve their online store based on the insight. Another conclusion from the interviews was that with this insight and the motivation a retailer will get to make changes, there should be a better support system. This would be done by splitting off the operations’ part of the helpdesk. The operations division deals with creating and updating Peddler stores, therefor direct contact with them improves the guidance.

### 4.3.4 – Guide page

The goal of this technique is to explain all Peddler processes in a simple and accessible manner, offering retailers a centralized place to find all information. The main points here are that both the collection and the individual guide must be found easily, and each process is explained simply, clearly, and shortly, accompanied by a video lasting a maximum of 60 seconds.

<b>KPI</b>	<b>Result</b>
<i>Experienced effort Peddler employee or retailer</i>	
<i>Emotional / first impression</i>	2 said “No” 3 said “Maybe” 10 said “Yes”
<i>Physical effort</i>	Peddler employees: setting up guides is a big job, a lot of effort. Maintenance is slight effort to update guides over time. Retailers: slight effort. Less than current alternative, which is calling the helpdesk.
<i>Expected benefits</i>	Easily accessible on website. Videos required (screen recordings), max 60 seconds. Easy access to helpdesk for more help. Include a “Meet the team”. A guide for each single functionality, clearly structured. Search bar.
<i>Financial cost</i>	No hardware nor software costs with this technique.
<i>Time-consuming</i>	Retailers: searching, reading, and applying a guide should take 15 minutes maximum. Peddler employees: setting up the guides can take 15 to 20 hours, including ideation, text writing, video recording and implementation on website. Maintenance takes 5 minutes per update.
<i>Platform rejection rate</i>	The guide pages can be added to all techniques of section 1. Five and a half (3 x “maybe”) out of eight participating retailers would accept and use the demand forecast right away. This gives an 6.88 % bonus.
<i>Average inventory update time</i>	6.88 % bonus.
<i>Regularity of inventory updates</i>	6.88 % bonus.

Table 22 - Evaluation of KPIs for the guide pages

One of the “expected benefits” that returned multiple times throughout the interviews, was easy access to more help when the guides are not enough or missing a piece. This can be achieved by splitting off the helpdesk (see section 4.3.3). The contact person within the operations’ team is linked to the account of the retailer. When the retailer is going through a guide or is searching for one, the phone number, email address, and potentially a direct chat function, should be available on the same screen.



### 4.3.5 – Launch day test order

The last technique is for the last part of the onboarding process. The goal here is to create a clear finalization of this introduction and launch period, so the retailer feels activated to start selling and promoting their new online store. The main points here are that the process needs a clear finish line: Launch Day. Besides, many stores think that the use of the system will naturally happen once the orders come, but they are often not prepared when the offers start coming.

<b>KPI</b>	<b>Result</b>
<i>Experienced effort Peddler employee or retailer</i>	
<i>Emotional / first impression</i>	2 said “maybe, calling is enough” 13 said “Yes”
<i>Physical effort</i>	Peddler employees: visiting store, doing test order, high effort. This will hopefully lead to less problems later on, diminishing the effort in the long run. Retailers: slight effort. Set 20 minutes aside in one day to go through Peddler processes.
<i>Expected benefits</i>	Launch day. Peddler window sticker & packaging material delivered. Smart planning since traveling is very time intensive. Video form to re-watch and share with team. Fuels personal contact with retailers, very important. Budget for standard first order by Peddler.
<i>Financial cost</i>	No hardware nor software costs with this technique.
<i>Time-consuming</i>	Retailers: the launch day takes 20 to 30 minutes. Peddler employees: traveling to the store can take up to 1,5 hours with the current cities. This can get higher when expanding to more cities. The workshop itself takes 20 to 30 minutes.
<i>Platform rejection rate</i>	The launch day test order can be added to all techniques of section 1. Seven (2 x “maybe”) out of eight participating retailers would accept and use the demand forecast right away. This gives an 8.75 % bonus.
<i>Average inventory update time</i>	8.75 % bonus.
<i>Regularity of inventory updates</i>	8.75 % bonus.

Table 23 - Evaluation of KPIs for the launch day test order

In conclusion, the stores on Peddler love personal attention and an opportunity to set their store in the centre of attention. However, the sentiment “I do not need it” returns more often than the number of times Peddler employees have experienced that the retailer does not understand after all. Of course, there is a high variance in the actual digital skills of all retailers and their perception thereof, as is for all people. Therefore, the workshop will not be essential to understand the processes for all retailers and can be used as a moment of personal attention with the retailer to build a stronger partnership.

## Chapter 5 – The final method

After evaluating all the techniques in chapter 4, chapter 5 presents a final method to be used for inventory update at Peddler. By comparing the KPIs and applying the argumentations for using or not a particular technique, the final selection of techniques is defined in section 5.1. Next, a detailed description and visualization of the techniques is presented in section 5.2. And lastly, section 5.3 models the process of the selected techniques using a BPMN model.

### 5.1 – Conclusion of all KPI's

Table 24 summarizes the KPI results of chapter 4, to offer a comparison among the techniques. The columns represent the techniques of both section 1 and section 2, and the rows represent each key performance indicator. The colours indicate the passing or not of a KPI based on the arguments in table 13 of section 3.3.3. Based on this table, two techniques have been excluded from the final method: Upload portal: Order lists (see section 4.2.4) and Demand Forecasting (see section 4.3.2). These techniques are not strong enough when compared to the other techniques. The order lists should refrain from price and stock updates but can be applied in the first stage of the onboarding process to create the product selection. Demand forecasting in itself is currently not wanted by retailers in the form of a newsletter. The demand forecast can be split up into metrics and added as a feature to the store metrics dashboard.

All other techniques scored well on all KPIs. Especially, the merchant portal, upload portal: pos export, tablet, store metrics dashboard, guide pages, and launch day are essential in the final method. The first impression KPI is essential here, since many “yes” responses lead to effective implementation. For example, when the Guide Pages are chosen and the live Excel Sheet is not, because even though the live Excel Sheet performed better overall than the Guide Pages, participants were much more hesitant to say yes to it.

Peddler POS scores only average and is therefore not considered in the final. This method must become a project in itself to allow retailers to make a more educated estimation. Lastly, the excel live sheet is considered a good solution only “for the time being”. Thus, in the final method the excel live sheet will be implemented as a part of the merchant portal. This allows to keep the familiar lay-out of the Excel live Sheet, but merges it into a controlled environment to get rid of its error proneness.

The techniques in section 1 lie at the core of the final method, varying in application, amongst the different states of inventory management. Referring back to figure 1, four states are categorized: an up-to-date POS without integration and a good export, an up-to-date POS without integration and a bad export, a not up-to-date POS system, and no POS system. This is the basis of choosing a path in the onboarding process. In section 5.2 the chosen techniques are explained in detail and visually. In section 5.3 the process of the final method is depicted in a business process model.

	Merchant Portal	Live Excel Sheet	Upload Portal: Pos Export	Upload Portal: Order Lists	Peddler Pos	Tablet	Demand Forecasting	Store Metrics Dashboard	Guide Pages	Launch Day
<b>First Impression</b> (No/ Maybe/ Yes)	3 / 10 / 2 **	4 / 4 / 7	0 / 5 / 10	3 / 5 / 7	2 / 7 / 6	2 / 0 / 13	6 / 4 / 5	2 / 1 / 12	2 / 3 / 10	0 / 2 / 13
<b>Physical Effort</b>	Too high Not user friendly**	Slight Error prone	None Limited to POS systems	No effort Not for inventory updates.	Slight	None	None Effort starts with making changes.	None Effort starts with making changes.	Slight	Slight
<b>Expected Benefits</b>	Not passed**	Mostly passed	Passed	None passed	Passed	Passed	Some passed	Passed	Passed	Passed
<b>Financial Cost</b>	None	None	None	None	None with paid extensions	Buy ±100. Either deposit, split or buy tablet.	None	None	None	None
<b>Time-Consuming</b> (Retailers/ Employees)	12.5 minutes for all changes/ none	8.5 minutes for all changes/ none	7 to 12 minutes for all products / Once 20 min.	5 minutes for list selection/ Once 20 minutes	Maximum of 12.5 minutes for all changes/ none	Negative compared to walking to desktop.	5 minutes reading/ set-up 4hrs, change 2min	5 minutes reading/ Once set-up 4 hrs	15 minutes/ once 15 to 20 hours, change 5min	20 to 30 minutes/ travel + 20 to 30 min.
<b>Platform Rejection Rate</b>	0 out of 26	7,5 out of 26	9.8 out of 26	N.A.	16.25 out of 26	+ 7.5 %	+ 2.5 %	+ 8.13%	+ 6.88 %	+ 8.75 %
<b>Average Inventory Update Time</b> (In Hours)	22.864,8	19.690	40.855,4	N.A.	37.680,6	+ 7.5 %	+ 2.5 %	+ 8.13%	+ 6.88 %	+ 8.75 %
<b>Regularity Of Inventory Updates</b> (In Updates)	4082	4153	3685	N.A.	3755	+ 7.5 %	+ 2.5 %	+ 8.13%	+ 6.88 %	+ 8.75 %

Table 24 - Summarized overview of KPIs per technique

**Green = Good**  
**Yellow/orange = Average**  
**Red = Bad**

\*\* the top three KPIs of the merchant portal are first impressions of the initial situation.

## 5.2 – Selected techniques

This section describes the techniques of the final method in detail. Each important feature of the technique is accompanied by a visual representation. The interactive mock-up can be found here: [shorturl.at/twA48](https://shorturl.at/twA48).

### The optimized merchant portal

The optimization of the merchant portal is focussed on editing and creating products one-by-one. The platform is optimized on the higher overview level, and on the detailed product level. On the overview level, the following features are added: a search bar for product names, the ability to change the product view, and the option to select multiple products and perform mass actions on them. On the product level, the following features are added: possibility to add a product and edit the name, price, stock level, description, image, and categories.

Figure 14 shows the product overview with the above mentioned features in the compact view. This compact view allows for the mass actions. Select the products on the left and choose the action to be performed on them; either a percent or absolute value change in stock or price by clicking the “Change this selection” button. For example, a supplier changed its prices with 5% and the retailer decides that this price change must also be reflected in their own prices. The products bought at this supplier are selected and all prices are increased by 5%.

The screenshot shows the Peddler merchant portal interface. At the top, there is a purple header with the Peddler logo, the location 'Utrecht', and a search bar. Below the header, there is a navigation menu with categories like Stores, Food & Drinks, Toys & Games, Home & Interior, Fashion, Beauty & Health, Baby & Child, Flowers & Plants, DIY, Pets, and Books. The main content area shows the 'Inventory' section for 'Peddler Koop Lokaal'. On the left, there is a sidebar with options: Store profile, Inventory (selected), Orders, and New Products. The main inventory list is titled 'Cadeau pakketten' and contains a table of products with checkboxes for selection. A 'Change this selection' button is located at the top right of the product list.

Product ID	Product Name	Selection
8710853065065	Honzukuri Shiro Miso 500Gr	<input type="checkbox"/>
4901002141714	S&B Aka Instant Japanese Miso Soup (30gr)	<input checked="" type="checkbox"/>
4901002141721	S&B Japanese Instant Shiro Miso Soup 30G	<input type="checkbox"/>
8851613101378	Aroy-D Coconut Milk UHT 250ml	<input type="checkbox"/>
8851613101385	Aroy-D Coconut Milk UHT 500ml	<input type="checkbox"/>
8886303210504	Uht Natural Coconut Cream Kara 500 ml	<input checked="" type="checkbox"/>
8886303210207	Kara Coconut Cream (200ml)	<input type="checkbox"/>
8710161007238	Cocosolie Biologisch	<input checked="" type="checkbox"/>
8710161007290	Cocosmelk	<input checked="" type="checkbox"/>
8710161007252	Cocosmelk Biologisch	<input type="checkbox"/>
8710161007283	Cocosmelk	<input type="checkbox"/>
8710161007269	Cocoscreme Santen	<input type="checkbox"/>
8411026014919	Ferrer Tapas Salsa Brava Saus Pikant 320 gr	<input type="checkbox"/>
8710161010641	Sambal Udang	<input type="checkbox"/>
8710161002608	Sambal Tomaat	<input checked="" type="checkbox"/>
8718719365663	Sambal Trassi	<input type="checkbox"/>
8718719365762	Sambal Badjak Hot	<input checked="" type="checkbox"/>

Figure 14 - Compact view to mass actions on multiple products

Figure 15 shows the product overview in the extended view. Here, quick changes can be made to the price, stock level, and name of the products by clicking on the value. The views are switched by clicking the purple slide button at the top right.

The screenshot shows the Peddler web application interface. At the top, there is a purple header with the Peddler logo, the location 'Utrecht', and a search bar with a 'merchant' profile icon. Below the header is a navigation menu with categories: Stores, Food & Drinks, Toys & Games, Home & Interior, Fashion, Beauty & Health, Baby & Child, Flowers & Plants, DIY, Pets, and Books. The main content area shows the 'Store profile' for 'Peddler Koop Lokaal'. On the left, there is a sidebar with options: Store profile, Inventory (selected), Orders, and New Products. The main section is titled 'Inventory' and has two tabs: 'Overview' (selected) and 'Bulk Update'. Below the tabs, there is a list of 'Cadeau pakketten' (Gift packages) with the following items:

Product Name	Status	Quantity	Price	Action
Vegan box	IN STOCK	12	€32.00	>
Heerlijk thuis	IN STOCK	12	€32.00	>
Familie avondje thuis	IN STOCK	12	€32.00	>
Bewust bezig	IN STOCK	12	€32.00	>
Bourgondisch genieten	IN STOCK	12	€32.00	>
You complete me	IN STOCK	12	€32.00	>

Figure 15 - Extended view to do quick changes on single products

From the extended view the retailer can go to the place where categories can be edited and added (see Figure 16), by clicking the icon on the top right (up- and downward arrows). Here, the retailer can re-order the categories and add new ones by clicking on the plus (“+”) icon.

The screenshot shows the 'Edit Categories' page in the Peddler web application. The header and navigation menu are the same as in Figure 15. The main section is titled 'Edit Categories' and has two icons on the top right: a plus sign (+) and a double-headed arrow (↕). Below the title, there is a list of categories with toggle switches and reorder icons (three dots):

- Cadeau Pakketten (toggle on)
- Feestdagen pakketten (toggle on, 18+)
- Thema pakketten (toggle on)
- Cookies (toggle on)
  - Chocolate cookies (toggle on)
  - Gluten vrije cookies (toggle on)
- Cakes (toggle on)

Figure 16 - Page to edit and add new categories

Each product row in the extended view (see Figure 15) has a right-facing arrow at the right end of the bar. By clicking this, the retailer goes to the editing page of that single product (see Figure 17).

Figure 17 - Page to edit the details of an existing product

Lastly, new products can be added one-by-one in the “New Products” tab on the left (see Figure 18). The interface of adding a product is almost identical to the interface where an existing product is edited.

Figure 18 - Page where a new product can be created

## The upload portal: POS exports

The upload portal specifically for POS exports is depicted in Figure 19. The interface is kept as simple as possible for the retailer and support buttons are available at each step.

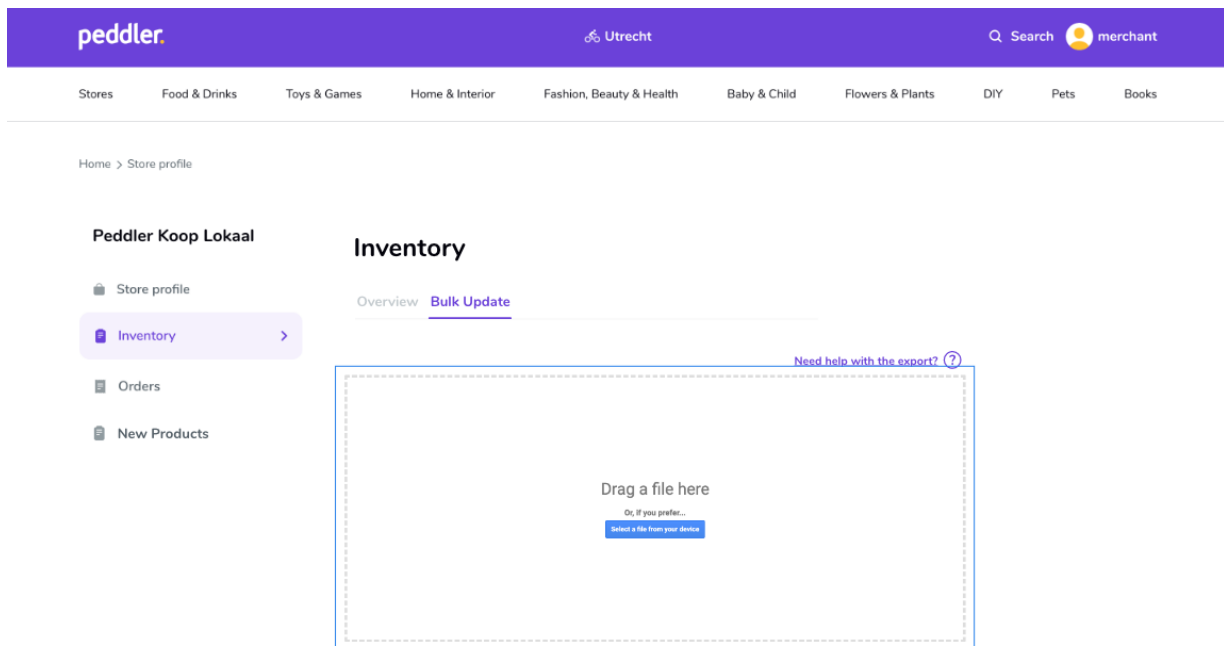


Figure 19 - Upload page for POS exports to do inventory updates

Once uploaded the retailer has an overview of the recognized data. A preset list of “to-be excluded retail IDs” automatically checks off the corresponding products (see Figure 20). When the “confirm” button is clicked, only the unchecked products are used to update the products on Peddler.

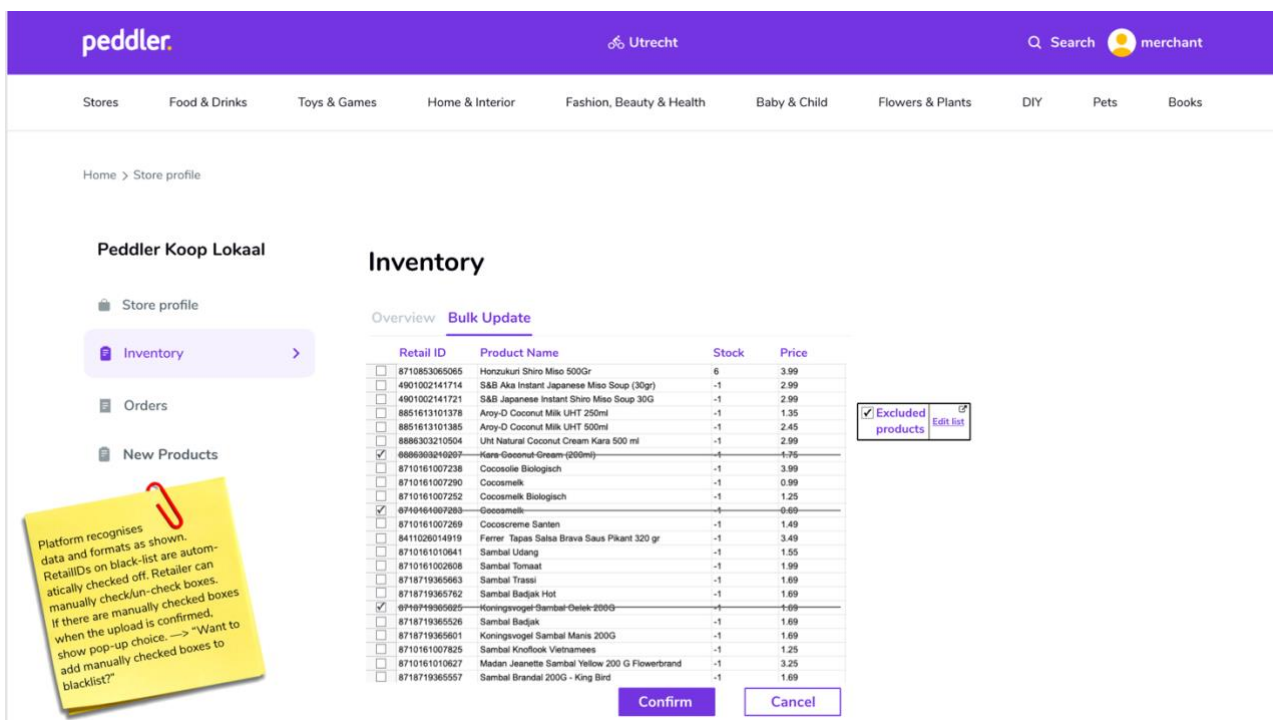


Figure 20 - Selection procedure for excluded products

## The tablet

The tablet will be a low budget and brandless piece of hardware. The tablet has two main requirements: allowing the retailer to receive customizable notifications and being connected to a label printer. The notifications coming from the application when an order is placed will differ from notifications about system updates or Peddler news. The sound must be clear in noisy stores from a distance, but customizable by the retailer to find a good fit in their store (see Figure 21). Regarding the label printer, a great example is depicted in Figure 19 shown Takeaway.com tablet with a built-in label printer. A separate label printer will also be sufficient.



Figure 21 – Visualization of tablet

## The store metrics dashboard

The store metrics dashboard will be found in its own tab in the merchant portal. The metrics are chosen by Peddler and the data shown on them is only that of the retailer itself. An interface example is shown in Figure 22. Important here is the access to the helpdesk. Specially for retailers, a link to the accountmanager will be located on the right bottom of the screen. By clicking this link, the retailer gets in direct contact with a Peddler employee of the operations department assigned to them. The phone number, e-mail address, and direct chat function should also be available.

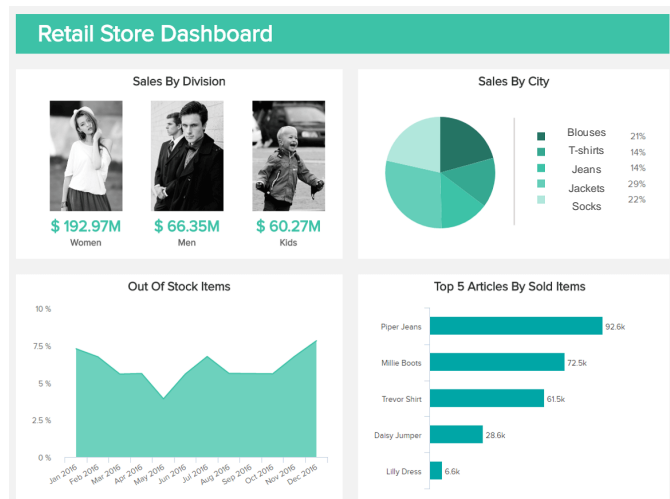


Figure 22 - Mock-up of metrics dashboard



## The guide pages

The guide pages can be found on the Peddler website itself, a retailer does not have to be logged in for this. The web page is linked at the bottom of each page on the website, in the footer. The support page centres around a big search bar. Below this, the “most searched” guides are found. The page is kept simple and easy to navigate. Each guide has a shareable link, useful for Peddler employees to quickly get in contact with a retailer with a specific question. Each guide is accompanied by a video.

When logged in, the customer or retailer always has a purple “help” button in the right bottom corner of the page (the button can be seen in Figure 23). After clicking on the button, a pop-up column appears on the right side of the screen (see Figure 24). This bar contains the helpdesk opening times, a search bar for the guide pages, a top three most used/searched guide pages, and access to personal support. This last feature both shows contact options for the general helpdesk and the account manager contact for retailers.

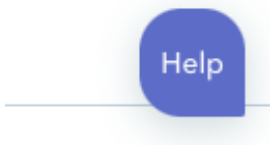


Figure 23 - "Help" button located on the right bottom of each webpage

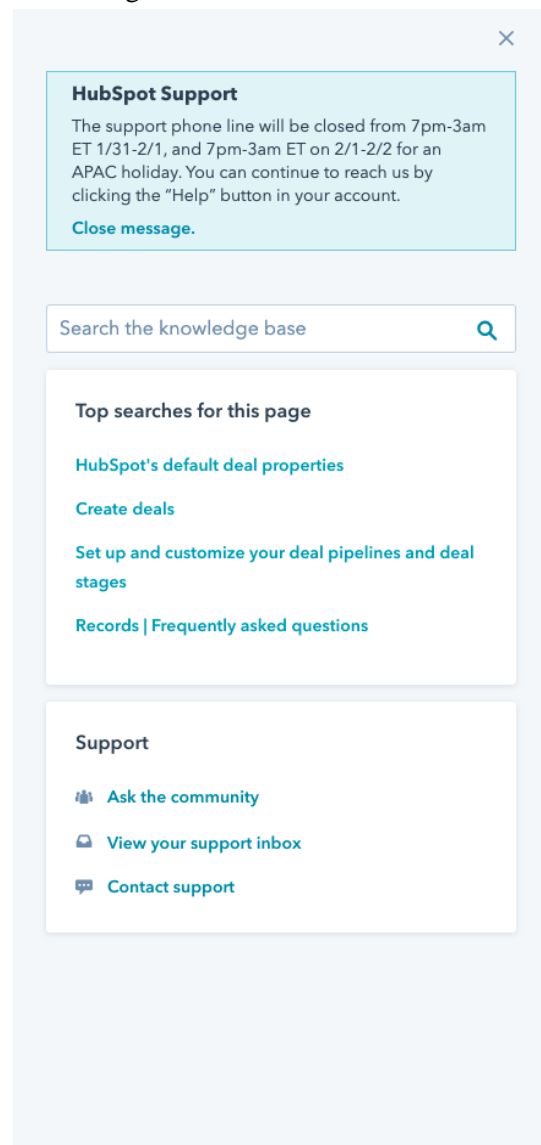


Figure 24 - Pop-up on right side of the screen after clicking the "Help" button

### The launch day

The store goes live immediately when the retailer accepts their online test store. When the store goes live on Peddler, the retailer receives an e-mail with an introduction text, three guides, and an invitation to plan the launch day. The introduction text welcomes the retailer to their online shop on Peddler and introduces the other service Peddler offers, i.e. the delivery service. Three guides are: 1) how to process a new order; 2) how to do a (partial) refund; 3) how to change the opening times. Lastly, the e-mail contains a suggested date for the launch day.

At the planned moment, a Peddler employee visits the store where they explain the process to the owner and the relevant other employees. The launch day consists of:

- Walkthrough the merchant portal, focussing both on the product selection and where the orders are managed.
- Go through a test order. Let the retailer accept an in-stock order, but also do a refund.
- Introduce promotion option. First explain what Peddler does to promote the store and its products with Google Ads, then explain the power of sharing the collaboration with Peddler on Social Media. A nice addition is to link the Peddler store on their own website.
- Deliver the packaging materials. If the store requested bags or other packaging material from Peddler, this is the moment to handover the first batch. As depicted in Figure 26, Thuisbezorgd has paper bags. The bags can be customized to be “Peddler x Retailer”, this motivates retailers to use the packaging material with their own sales as well. (This part is optional).
- A link is shared to a video explained the same things as during the launch day. This introduction video can be shared with the retailers co-workers.

The launch day takes roughly 30 minutes and the retailer is fully prepared from here to start. When leaving, the “Peddler: we deliver” sticker can be put on the store window (with consent of course). This window sticker will be like the sticker in Figure 25.



Figure 25 - Thuisbezorgd packaging material



Figure 26 - Thuisbezorgd window sticker

### 5.3 – Business Process Model of final method

The final method is depicted in a BPMN model in Figures 27, 28, and 29. The final method is split into a) approaching a new store (Figure 27), and b) updating an existing store (Figure 28 and 29).

Starting with approaching a new store, a first evaluation will be done based on the profile of the store. Does the retailer have an up-to-date POS system or web shop with integration, an up-to-date POS system or web shop without integration, or none of the above. From here the establishment of the product selection is performed in different ways, but all lead to confirming the prices and products with the retailer because the retailer will always have the last say about whether the product selection is good to go live or not.

The second part is updating an existing stores. This part is the focus of this research since it deals with doing inventory updates. The first part is essential in setting up the stores for the updates. The three profiles from the first part are split up here. There is no model for retailers with an up-to-date POS system or web shop with integration since these are the integrates stores, all updates are done automatically. Figure 28 is the process of a store with an up-to-date POS system or web shop without integration, in this case the inventory and price updates are done through POS export files. Figure 29 is the process of a store with no usefull POS system or webshop. In this case the retailer must to the updates through the optimized merchant portal.

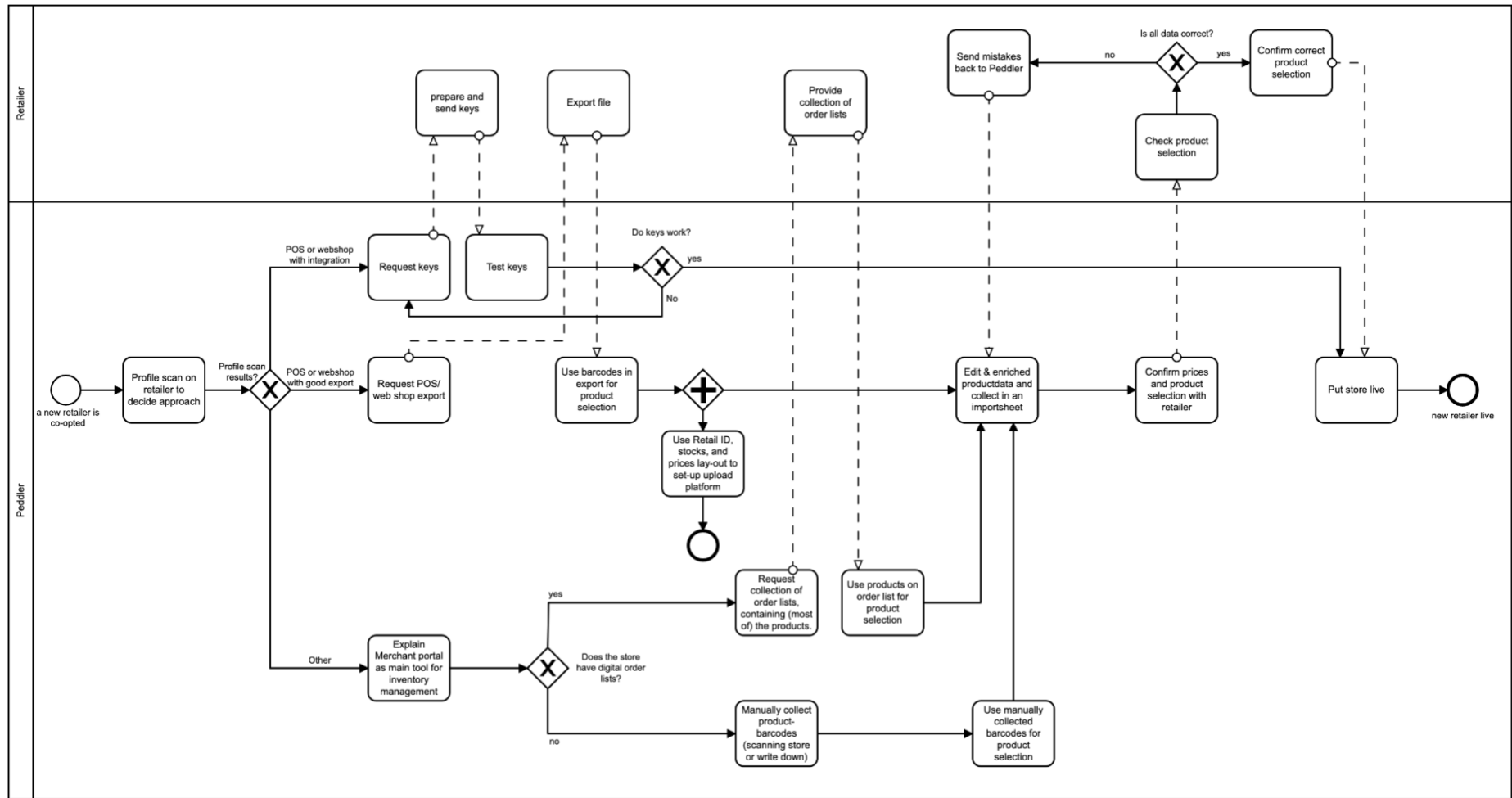


Figure 27 – BPMN for approaching a new store

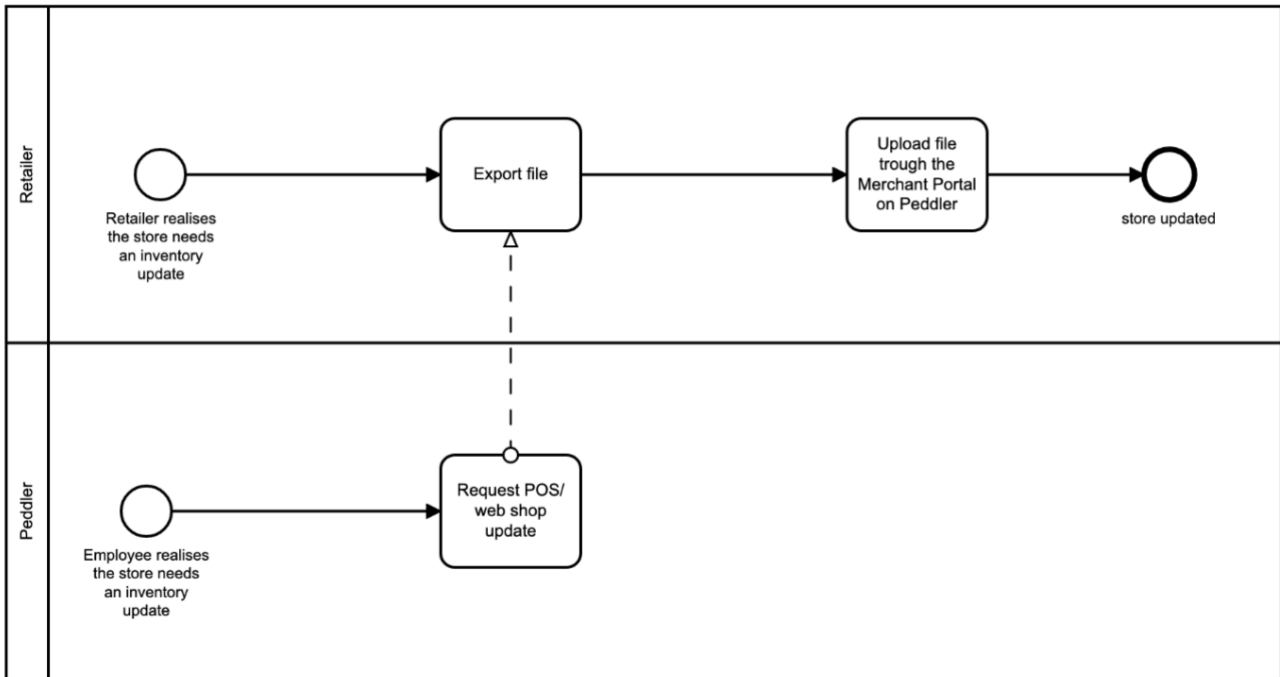


Figure 28 – BPMN for updating a store: POS or web shop with good export

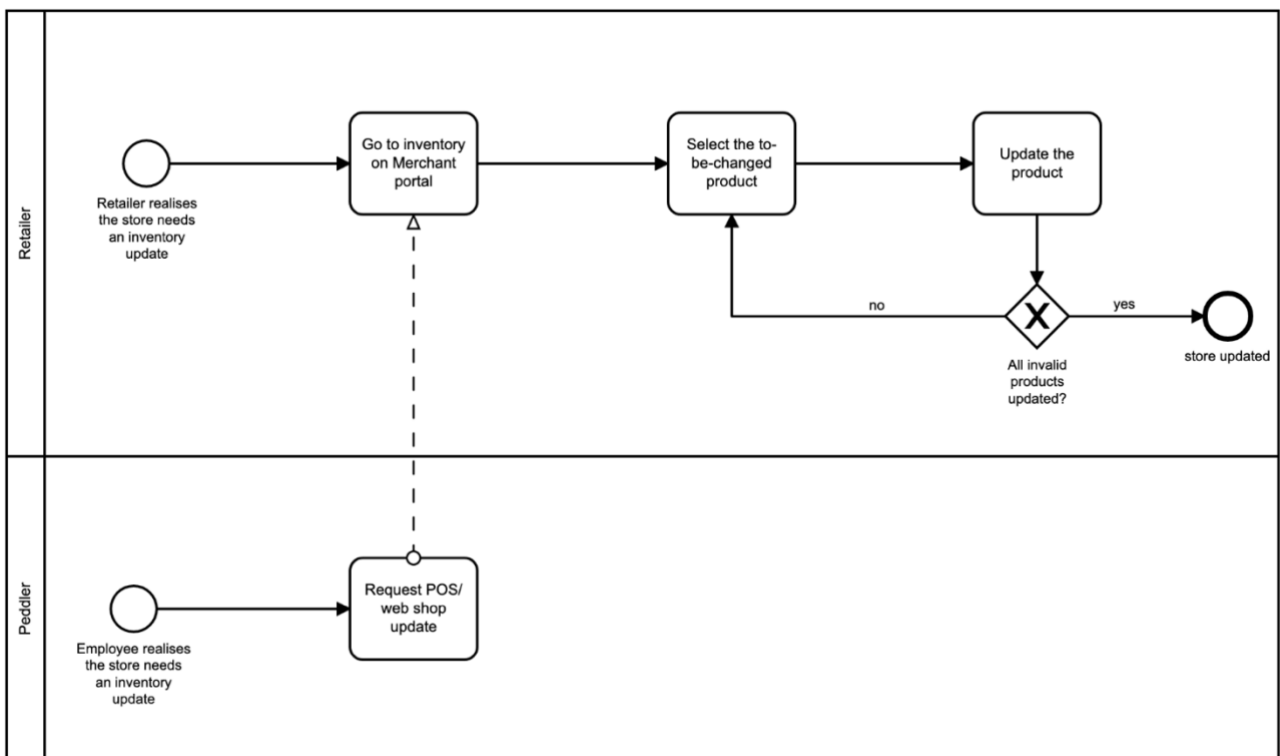


Figure 29 – BPMN for updating a store: Other

## **Chapter 6 – Discussion, and recommendations**

The final chapter provides the discussion, the recommendations for implementing the final method, and further research. Section 6.1 the main findings and limitations to this research are discussed, and section 6.2 comprises of recommendations on the implementation of the separate techniques and the final method, and what aspects of the research can be further analysed.

### **6.1 – Conclusion: main findings and limitations**

This research aimed to solve the one of the biggest problems in this companies' growing sector. The problem of manual and tedious inventory updates for retailers without a direct integration on a digital marketplace such as Peddler. A retailer who agrees to join such platform already has its own physical store and the processes around it in order. Therefore, the biggest enemy of a retailer accepting to expand with Peddler is the effort this might take. The qualitative research conducted here confirmed that double work and more effort are heavy weights in the decision to join Peddler, and especially the time taken to maintain the online stores' inventory and prices. Due to this effort, the excitement of a new platform fades quicker than the revenues come in the beginning. Because of this, the retailers have lost interest to learn how to deal with the tedious extra work.

For unintegrated stores, the most essential step is to provide the optimized merchant portal as described in section 5.2. The extra tools around this are often "nice, but not the highest priority". This leads to implementing only two out of the five techniques of section 2.2.1 reaching the final method. Optimizing and supporting the existing process was concluded to be essential, with one exception being the POS exports. The retailers who are viable for this technique are known to have their systems in order and are only missing the integration on Peddler's part. A quick and bulk update solution is easy for both the retailers and the Peddler employees.

For the techniques supporting the process, it ended up being essential that the technique would alleviate the effort while being interesting to use or have access to, such as the tablet and the guides. Or the techniques needed to add to the personal support and guidance, which is a key value in the Peddler methodology, such as the store metrics with the split helpdesk feature, and the launch day.

The limitations to this research are in two fronts. First, there is a limitation with the sample group of retailers, with eight interviewees the research is strongly supported and it is clear what the retailers need. However interviewing more retailers would always be better to get a clearer view of the opinions on how to approach the retailers' needs exactly. Expanding the retailers' sample group was limited by the willingness of retailers to join this research due to time limitations, and more specifically due to the changing covid restrictions during this research. Due to stricter restrictions the interviews were postponed and the week the interviews were planned all shops were allowed to open up fully again, leading four retailers to cancel their interview in the last minute.

The second limitation surrounded the implementation and execution of the proposed method. By the end of this research, the implementation has started and is warmly welcomed by the company, but the execution and evaluation for the retailers has not been reached. Therefore it can not be part of this research.

## **6.2 – Recommendations and further research**

For future research and the recommendation for the implementation of the final method, the implementation and execution mentioned in the conclusion should be tracked closely. The processes should be evaluated by both Peddler and the retailers to get the optimal implementation of the final method.

More specifically, the optimization of the merchant portal should be implemented as a beta version. This version should be tested amongst a group of connected retailers, trusted to give an honest review. Based on this, potential changes can be implemented before the new merchant portal goes live.

The Peddler POS technique requires more research. Specific research into all existing POS systems should be performed; small to large, existing partnerships to unknown, etc. Based on this, a proposal can be written for a select number of options, which are proposed to Peddler. Depending on their evaluation, one or more options are explored further for potential partnerships.

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