

Optimizing the delivery of merchandise products to
restaurants after purchase at Takeaway.com

BACHELOR THESIS FOR INDUSTRIAL ENGINEERING MANAGEMENT

Preface

This report is the result of my internship at the Partner Services department at Takeaway.com. For the past three months I researched optimization of the delivery process of merchandise products to restaurant owners. In my time at Takeaway.com I gained a lot of knowledge and it gave me the opportunity to apply my skills in practice.

First of all, I would like to thank Bert-Jan van Mook for giving me the opportunity to perform my research at the Partner Services department and his guidance throughout the project. I would also thank the complete Partner Services department in Enschede for providing me with all the information I needed, especially Joren Kuil and Femke Feenstra for providing all the information and their reviewing of my research. I also would like to thank the employees of DTK for their cooperation during this project.

Next to the people at Takeaway.com, I would like to thank my supervisor from the University of Twente, Hans Heerkens, for his valuable feedback and guidance throughout this project. Secondly, I would like to thank my second supervisor, Peter Schuur, for his valuable feedback on my report.

Eric Blaauboer

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Management summary

Takeaway.com is the leading online food delivery marketplace in Continental Europe, connecting consumers and restaurants through its platforms in 10 European countries and Vietnam. To increase brand visibility, Takeaway.com started to sell and give away merchandise products with their name and logo to the restaurants. At this moment, Takeaway.com offers a wide selection (80) of products that restaurants can choose from.

In the last few years, the demand for merchandise products increased. Due to a growing demand, some part of the delivery process of merchandise became unclear. The responsible department, Partner Services, wanted to know what the process flows were in the current situation and how these processes could be improved. Based on this a project was set up to investigate the process flows and possible improvements.

To investigate the process flows a study of the current situation in the Netherlands has been carried out. Next to this study of the current situation, Key Performance Indicators (KPIs) have been set up to measure the performance in the current situation. The first step in this set-up was to carry out a literature study to find suitable KPIs. As all logistic steps in the delivery process are carried out by a third logistic party (3LP), it was decided to take two different perspectives in the literature study, (1) a supply chain point of view and (2) a point of view that helped measuring the performance of 3LP. The second step was discussing the results of the literature study with manager and employees of Partner Services, to investigate if they could come up with additional indicators.

After investigating the current process flows and setting up KPIs, measurement has taken place to assess the current performance. This has been done by analyzing data from the software pack Store-Vision and by examining Excel sheets set up by the Supply Chain Coordinator of Partner Services.

From the measurement it was concluded that performance of Customer Response time and On-time delivery was lower than desired. Where Customer response time should be on 4 working days for order with personalized products, on 2 working days for order without personalized products and on 2 working days for disposable orders, they were respectively on 4.9, 3.9 and 3.5 working days. This caused that On-time performance was on 35% instead of the desired 85%.

Further investigating displayed that this low percentage could be traced back to poor performance of the 3LP, DTK. The performance of the order picking process was with 78% not at the desired level of 98% and should be adjusted to achieve the desired overall performance level.

By investigating the order process and interviewing employees, issues were exposed, and the underlying causes have been exposed. Most of the issues could be traced back to late delivery and delivery of incorrect products.

The report ends with the following recommended solutions:

- Improving the performance of the 3LP, DTK, would have the greatest impact on the delivery performance. One of the aspects that should be improved is the picking process. Further research will be needed to investigate how this could be done.

- To get more control on the performance of DTK, a reassessment of the SLAs is recommended. Switching from agreement on the moment of shipping to agreement of delivery moment, increases the grip on the performance of DTK.
- Offer restaurants an option to choose a window for delivery. This decreases the percentage of orders that could not be delivered due to the fact that no one is present to accept the order. This solution will cause an increase in the initial costs, but as this would result in a lower amount of order returned due to the fact that the restaurant owners is not present, this will increase the overall performance.
- Use another software pack for tracking of packages. In the current situation, tracking orders is difficult and time consuming. Together with extra notifications in case of disruptions this would improve the delivery performance. At this moment the used software pack, Store-Vision, does not have any notification options, so an investment in another software pack is a logical option. Which pack this should be, should be further investigated.
- Introduce a KPI dashboard. Exporting and processing data in the current situation is time consuming and complicated. A dashboard should provide real-time data for the Partner Operational Manager, which would help him in making the right decisions.

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1 Introduction

This chapter describes the background of the project about the improvement of the delivery of merchandise products sold by Takeaway.com. The first section consists of a short introduction of the organization and of the specific department where this project was conducted. After introducing the company, the reasons for this project are explained and the research goals are presented. In the sections after that, the stakeholders are presented, and the proposed deliverables of the study are given.

1.1 Takeaway.com

Takeaway.com is the leading online food delivery marketplace in Continental Europe, connecting consumers and restaurants through its platforms in 10 European countries and Vietnam, where Takeaway.com started a joint venture in 2013. Figure 1 shows the market map of Takeaway.com.

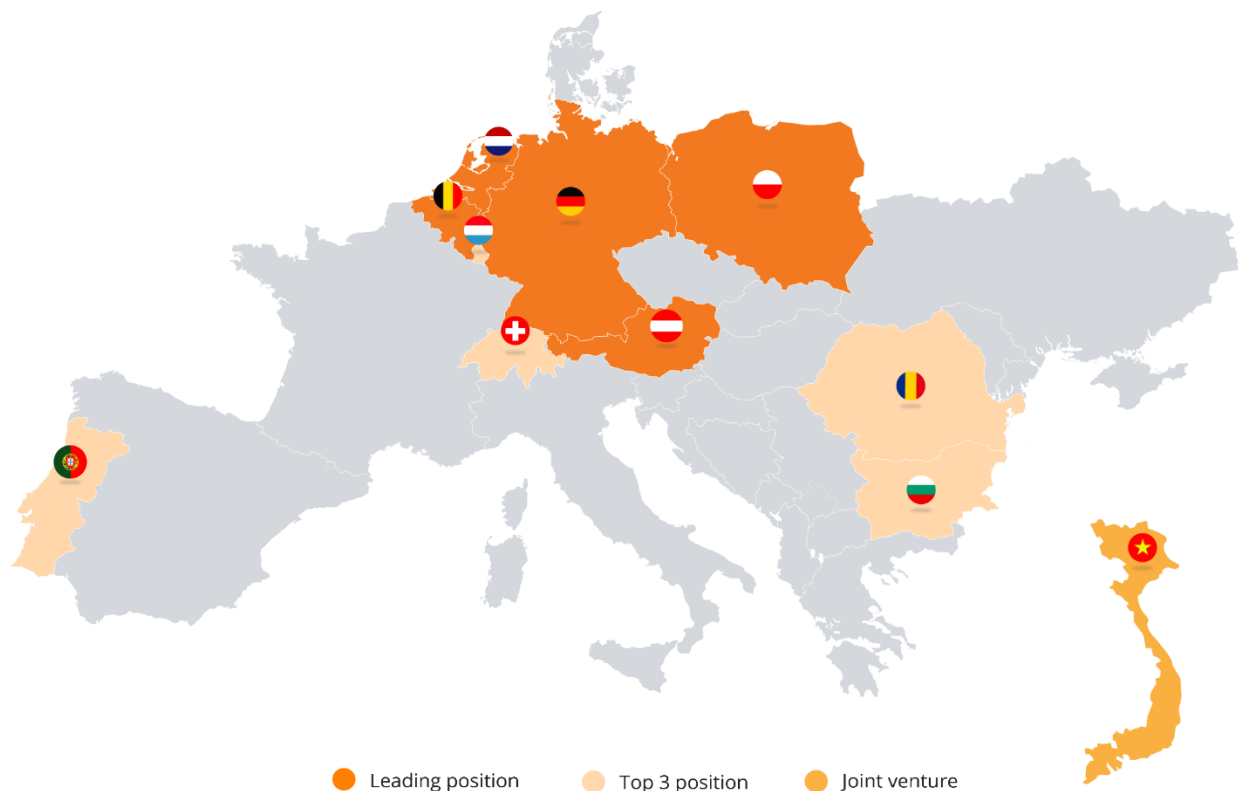


Figure 1 - Market map (source: <https://corporate.takeaway.com/>)

The company launched in 2000 as one of the first food delivery websites of its kind and it has been growing ever since. Customers can choose from a wide range of restaurants in their area for the delivery of food. Takeaway.com ensures that the order placed by the customer arrives at the chosen restaurant. After that, employees of the restaurant will prepare and deliver the order to the customer. Since 2016, Takeaway.com also provides a delivery service for the food of restaurants in some regions.

To increase brand visibility, Takeaway.com started to sell and give away merchandise products with their name and logo to the restaurants. At this moment, restaurants can choose up to 80 different products that are needed for the delivery of food. Examples of these products are pizza boxes, bags, scooter helmets, and clothing like shirts, jackets and raincoats. Within Takeaway.com there is a department, the

Partner Services department, that is responsible for the purchase, sale, storage, and distribution of the merchandise products. The products are imported from all over the world and shipped to a depot in Hengelo before they are delivered to the restaurant owners. The storage and distribution are done by a third party, De Tassenkoning Groep BV in Hengelo (DTK)).

1.2 Partner Services department

As mentioned in the previous section, the Partner Services department is, among other responsibilities, responsible for the purchase, sale, storage, and distribution of the merchandise department. The department is divided into four main divisions with each a specific task. The divisions are: Marketing, Operational, Projects and Partnerships. The Operational division is responsible for the storage and distribution of the merchandise. Heading this division is Partner Operational Manager Bert-Jan van Mook.

1.3 Reasons for this research

In the last few years, the demand for the merchandise products increased for a couple of reasons: the number of active restaurants on the platform increased, the variety of products increased, Takeaway.com focused more on products via new go-to-market channels, the competitive landscape is changing, introduction of new market trends and it became part of strategy to increase brand visibility.

Due to the increase of this demand, the Partner Services department was founded in 2016. The main goal of this department was to make partner restaurants more successful on the platform. In just over 18 months the department grew from 2 fte to 40+ fte with people active in 9 countries. Due to this rapid growth, processes could not scale as fast to keep up with the growth.

One of the things that became unclear is the amount of time it takes for merchandise products to arrive at the restaurant owner after they have been ordered on the website of Takeaway.com. At the start of the project, it was unclear what the process flow is in general and what the possible improvements are. The Partner Services department would like to investigate the possible improvements in this process, and this is the main focus of this project.

1.4 Project goal

The goal of this project is to address the following problem:

“Optimize the delivery of merchandise products to restaurants after purchase.”

1.5 Problem approach

At the start of the project there was no clear definition of the problem. Takeaway.com received complaints from restaurant owners and when the data was checked they got the feeling that not everything went as intended. Since it is not clear whether there is a real problem, the first step of the approach is to analyze and map the delivery process in general. After this an indication of the desired level of performance is made and a check is performed if the current situation really differs from the desired level of performance. To establish the desired level of performance a literature review to find Key Performance Indicators (KPIs) was performed. These KPIs provide a clear image of what should be measured. Establishing these KPIs is done in two ways. At first, indicators are set up from literature to see which KPIs are normally used in the delivery of products in a Business to Business (B2B) situation. The KPIs found in the literature are used to create interviews, which were conducted with employees of the

operational division to choose the right indicators. The chosen indicators are the foundation of the performance measurement.

The following step in the approach is investigating the current situation. This is done in two ways: performing a study on the hard data and conducting interviews with employees of the operational division. The combination of these two studies indicates if there are indeed problems that should be addressed.

After establishing if there are problems that need to be solved, the third step in this project is locating possible improvements and how these improvements can be realized. Locating these problems is done by a literature review, by discussing the situation with employees of the Partner Services department and by observing the process itself.

The last step in the approach is the composition of a set of possible solutions for the found issues. These solutions are found by a study of literature, by creative thinking and by identifying solutions that employees have already thought of.

1.6 Project scope

Due to the large number of countries, the great number of different products and the limited time of ten weeks, this project will focus on the process of delivery in the Netherlands. In the Netherlands, there are approximately 80 products that restaurants can order. In the process of some of the products, e-bikes, scooters, and beach flags, there is an extra party in play for the delivery or the production. These extra parties would overcomplicate the process. For this reason, these products are left out of the scope. The outcome however, could be replicated for all other products and introduced in other countries.

In this project, the reason why and how restaurant owners purchase merchandise products from Takeaway.com is left out. This project focuses mainly on how the orders are handled after restaurants purchased the products of Takeaway.com. Figure 2 shows the process of purchasing and delivery of merchandise products at this moment. The parts where possible improvements are investigated are colored orange.

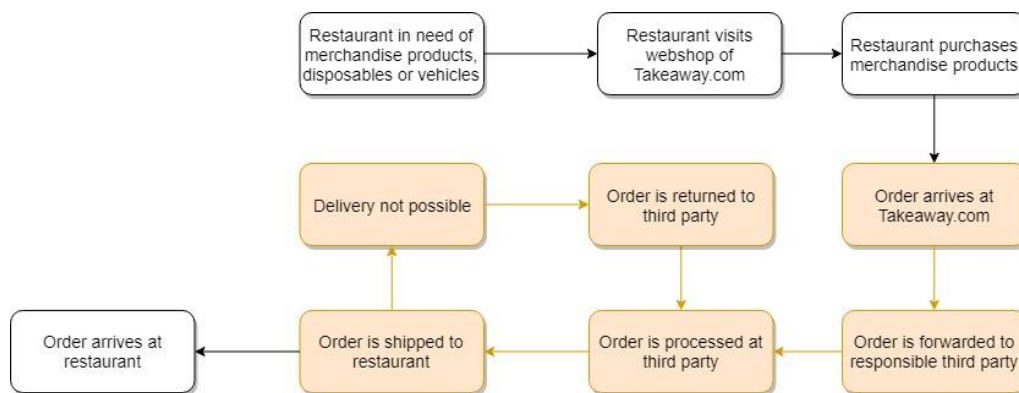


Figure 2 - Project scope

1.7 Stakeholders

The main stakeholders in this process are Takeaway.com, DTK and the restaurant owners.

1.7.1 Takeaway.com

As previously stated, the operational division is responsible for the storage and distribution of merchandise products within Takeaway.com. At the start of this project, there was a gut feeling that operations could be improved, and the Partner Operational Manager would like to know where improvement of the operations in the delivery of merchandise products to restaurant owners would be. By improving operations, costs are expected to go down and the service level is expected to go up. A side effect of this project is that the delivery process will be mapped, and the transparency of this process increases.

1.7.2 DTK

As the main storage and delivery partner of Takeaway.com, DTK is an important stakeholder in this project. All products sold in European countries are stored in the storage of DTK and afterwards shipped all around Europe. Since all storage and delivery processes are completed by this party, they could play a major part in improving the delivery process. For Takeaway.com, DTK has appointed two main contacts, Aleksandra Koopmans at the office of DTK and Pascal Borghuis in the storage facility of DTK. Pascal handles the day to day businesses for the storage and delivery of products of Takeaway.com, so he could be affected the most within DTK by this project.

1.7.3 Restaurant owners

The restaurant owners are one of the stakeholders that do not play an active part in this project, but they might notice changes made after this project. If the project concludes that there are improvement points that could be addressed, and they are addressed properly, the delivery process will improve. This means that restaurants would receive their purchased merchandise earlier.

1.8 Deliverables

There are a couple of main deliverables at the end of this project. The first deliverable will be an analysis of the delivery process and the structure of this process. Part of this deliverable are instructions to find the used data. The second and main deliverable of this project are recommendations on how the delivery process of merchandise products can be improved.

2 Current processes

This chapter gives an in-depth description of the processes that are studied. The first section states products offered at the web shop for restaurant owners. The second section provides information on how the order is handled after the restaurant places the order. The third section dives further into how the order is handled after the third logistic party, De Tassenkoning Groep BV (DTK), receives the order. The fourth section describes the last step in the delivery process, the shipment to the restaurant by the delivery party DPD Nederland BV (DPD). The last section gives more information about logistic agreements between Takeaway.com and DTK.

2.1 Products

Before the order process can be explained, a short description of the different products is provided in this section. These different groups of products are handled in a different way by the logistic party, DTK, depending on possible extra actions. Restaurant can order a wide range of products on the web shop of Takeaway.com. These products can be divided into 2 different groups: disposables and merchandise products. The merchandise products are categorized in three groups: non-personalized products, personalized products and vehicles. The following sections provide a better understanding around the categorization of all products.

2.1.1 Disposables

Disposables are products that can be used only once and will be thrown out after usage. Examples of disposables are paper bags, napkins, and pizza boxes. Figure 3 shows examples of the disposables.



Figure 3 - Disposables

2.1.2 Merchandise products

Unlike the disposables, merchandise products can be used more than once. The merchandise products in the web shop of Takeaway.com range from clothing, such as shirts and jackets, to delivery vehicles. There are three different product categories: (1) Non-personalized products, (2) Personalized products and (3) Vehicles. The differences between the merchandise product categories are discussed below.

2.1.2.1 Non-personalized products

The most common products for every restaurant are merchandise products without personalization. Examples of products are t-shirts, jackets, and stickers. All these products are without the name of the restaurant that buys the products. Figure 4 shows examples of the Non- personalized products.



Figure 4 - Non-personalized products

2.1.2.2 Personalized products

Personalized products are products with the name of the restaurant that orders the products. Restaurant owners can give up to 25 characters that will be printed on the ordered products. Examples of these products are stickers, t-shirts, jackets, and hoodies. The chosen text is checked by an employee of the Partners Services department to make sure that no bad language is shown on Takeaway.com merchandise products. Figure 5 shows an example of the personalized products.



Figure 5 - Personalized products



Figure 6 – Beach flag

Beach Flags are a special kind of personalized product. They are vertical flags with the name of the restaurant on it. These flags are designed by the Takeaway.com design department. Since the extra production step complicates the whole delivery process of this product group, I decided to leave this product group out of this project. Figure 6 shows an example of the beach flag.

2.1.2.3 Vehicles

Restaurant owners can buy or lease 2 types of vehicles on the web shop of Takeaway.com: scooters and e-bikes. Both kind of vehicles are delivered by another party than all other products, so I decided to leave these products this complete product group out of this project. Figure 7 shows examples of the vehicles.



Figure 7 - Vehicles

2.2 Order process

Before the performance of the order process can be established it is needed to understand the current processes. This section gives an outline of the order process from the moment a restaurant owner places a merchandise order. The process is discussed with all the actions done by the different actors within the process. The following sections provide a more in-depth point of view of the main steps in the delivery. Figure 8 on page 9 gives a schematic view of the order process.

The first step in the order process is that the restaurant owner visits the web shop and places an order with the products they desire. After placing the order, the order arrives in the back-end of the web shop. This triggers an automatic email to the restaurant owner with the message that the order is being processed. The web shop performs a check if the order amount is above €150,-. This check is done to check whether the restaurant owner is able to purchase the products.

If the order amount is below €150,-, the order is automatically forwarded to the inventory and order software pack of DTK, Store-Vision. This triggers an automatic email to the restaurant owner that the order is confirmed. If the order amount is above €150,- the web shop sends an automatic message through the Takeaway.com management system, TMS, to the Partner Services assistant (PSA), an employee of the operational division, that checks if the order can be paid with the online payments that the restaurant owner weekly receives from orders at Takeaway.com. If it can be paid with these payments, the PSA verifies the order in TMS, after which the web shop forwards the order to Store-Vision. This triggers an automatic email to the restaurant owner that the order is confirmed. If the payment cannot be paid by the online payments, the PSA calls the restaurant owner to discuss the situation. This contact may have two results, (1) the order is ok and is verified in TMS, after which the web shop forwards the order to Store-Vision or (2) the order is not ok and the PSA cancels the order completely.

Employees of DTK check Store-Vision daily at 12:00 for new orders. When they arrive, an employee prints the orders, picks all of the products from the warehouse and packs them into boxes. Further details regarding the picking process are described in section 2.3. After completing packing an order into a box, the employee prints a label for the delivery company, DPD, which triggers an automatic message to DPD that there is an order ready to be picked up. DPD picks up all the available boxes at the end of the day. This triggers an email to the restaurant owner with the message that the order is handed over to the delivery service and a track and trace code. Further details regarding the delivery process are described in section 2.4.

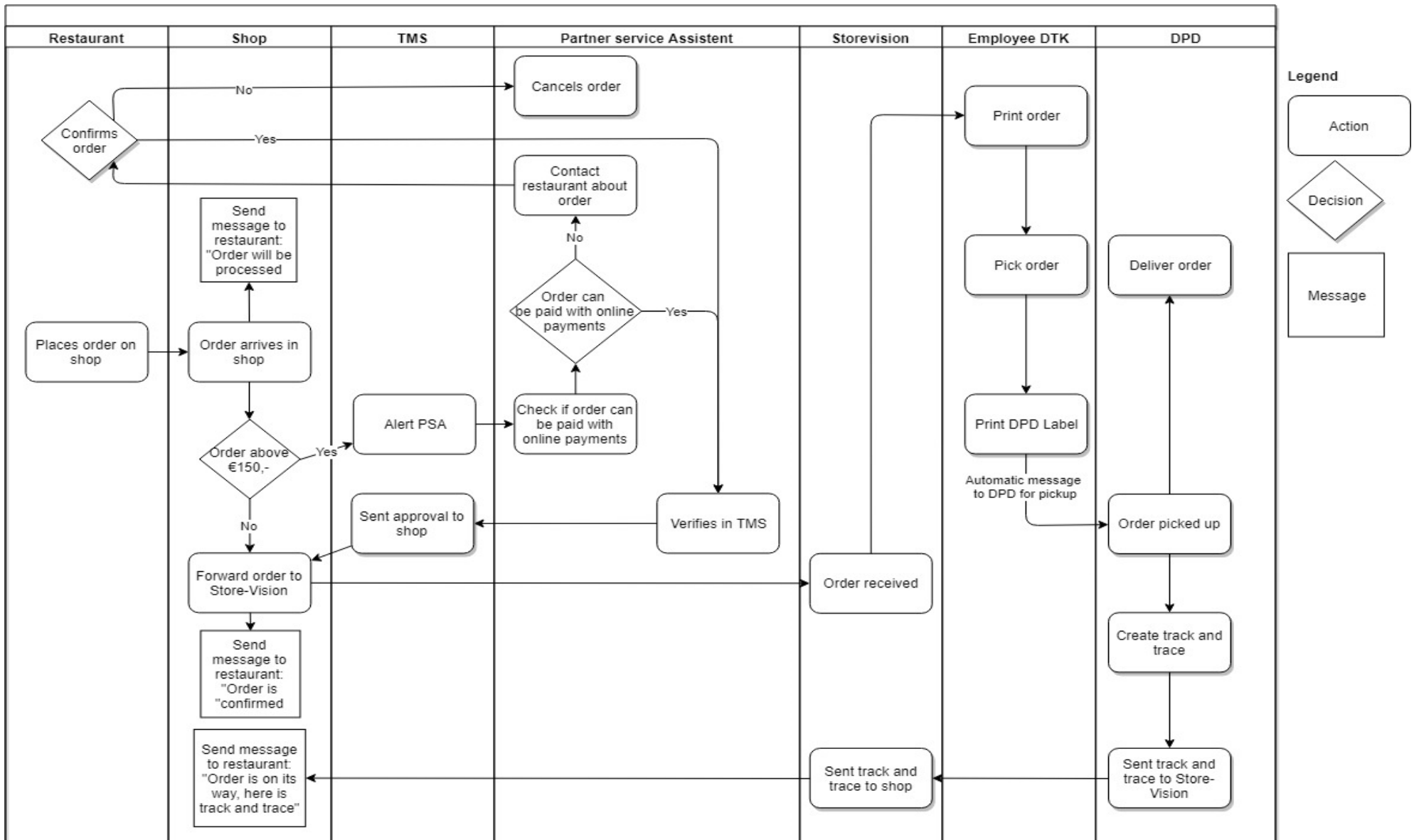


Figure 8 - Order process

2.3 Order picking process

Where the previous section gives a global overview of the whole process, this section gives a more in-depth point of view of the order picking process. As this process is a major process in the order process, improvements in this process cause major improvement in the overall performance. The in-depth point of view provides a better understanding of the process, which makes it easier to come up with possible improvements.

Mentioned before are the three different product groups that are discussed in this project: (1) disposables, (2) non-personalized products and (3) personalized products. To simplify handling, DTK divides the three different product groups into two categories. This is done due to the fact that the different categories are handled in different ways. The disposables belong to category 1 and the non-personalized and personalized products belong to category 2. Figure 9 on page 12 provides a schematic overview of the order picking process.

The first step in this process is the check if there are products from multiple categories in the order from the restaurant owner. If there are only products from one supplier there is only one packing list printed. An order with products from two different suppliers is split into two different packing lists. One for category 1 and one for category 2.

2.3.1 Category 1

For orders with only products from category 1, pre-packed box(es) with disposables is/are picked, after which the shipping label(s) are printed and added to the box(es). The pre-packed boxes are at the maximum weight and dimensions that a delivery person can carry. Printing of the shipping label(s) triggers an automatic message to the delivery party, DPD. DPD arrives every workday at 17:00 at DTK to pick up all packed boxes with shipping label(s).

2.3.2 Category 2

Orders with only products from category 2 are checked on what kind of product groups are included. Orders with only non-personalized products are picked and packed right away. After packing all the products, the shipping label(s) is/are printed and added to the box(es). This again triggers an automatic message to DPD.

Due to the fact that personalized products have to be printed especially for the ordering restaurant owner, orders with personalized products take extra time. Orders with only personalized products are produced in a couple of days by another company and delivered in packages that contain the personalized products of multiple orders. The personalized products are picked from these packages and packed into the right box(es) for delivery. Shipping labels are printed and added to the box(es). Which triggers an automatic message to DPD.

Orders with a combination of non-personalized products and personalized products are not shipped before all of the personalized products of the order are completely personalized. This means that all of the products are picked after the personalized products arrive in at the storage facility of DTK. When they arrive, all of the products are picked from the warehouse and packed into box(es) with shipping labels printed. The printing of the labels triggers an automatic message to DPD, to make them aware of how many packages they have to pick up that day.

The reason that non-personalized products and personalized products are delivered together, is that this decreases confusion for the restaurant owners. They see the order as one order and not as two orders. If they first receive the non-personalized products, they might ask why the personalized products did not arrive with the first delivery. By delivering all the products together, they receive just one package. Another reason behind this choice is that the personalized products are almost always just one sticker, that has to be shipped in a box. Just one box for one sticker causes extra delivery costs. Combining the products in one box decreases the overall delivery costs.

2.3.3 Categories 1&2

If an order contains products from categories 1 and 2, two printed different packing lists are printed. Both packing lists are seen as two different orders and handled in the way stated above. The reason for splitting the order is that the products from category 1 contain the disposables. As restaurant owners have the tendency to order disposables when they are almost out of them, they need them as quickly as possible. If the restaurant owner has to wait a couple of day for the personalized products to be produced, the owner might be short of the disposables in their restaurant. As disposables are needed for delivery, it is great importance that these products are delivered as soon as possible. So, the products are shipped separately.

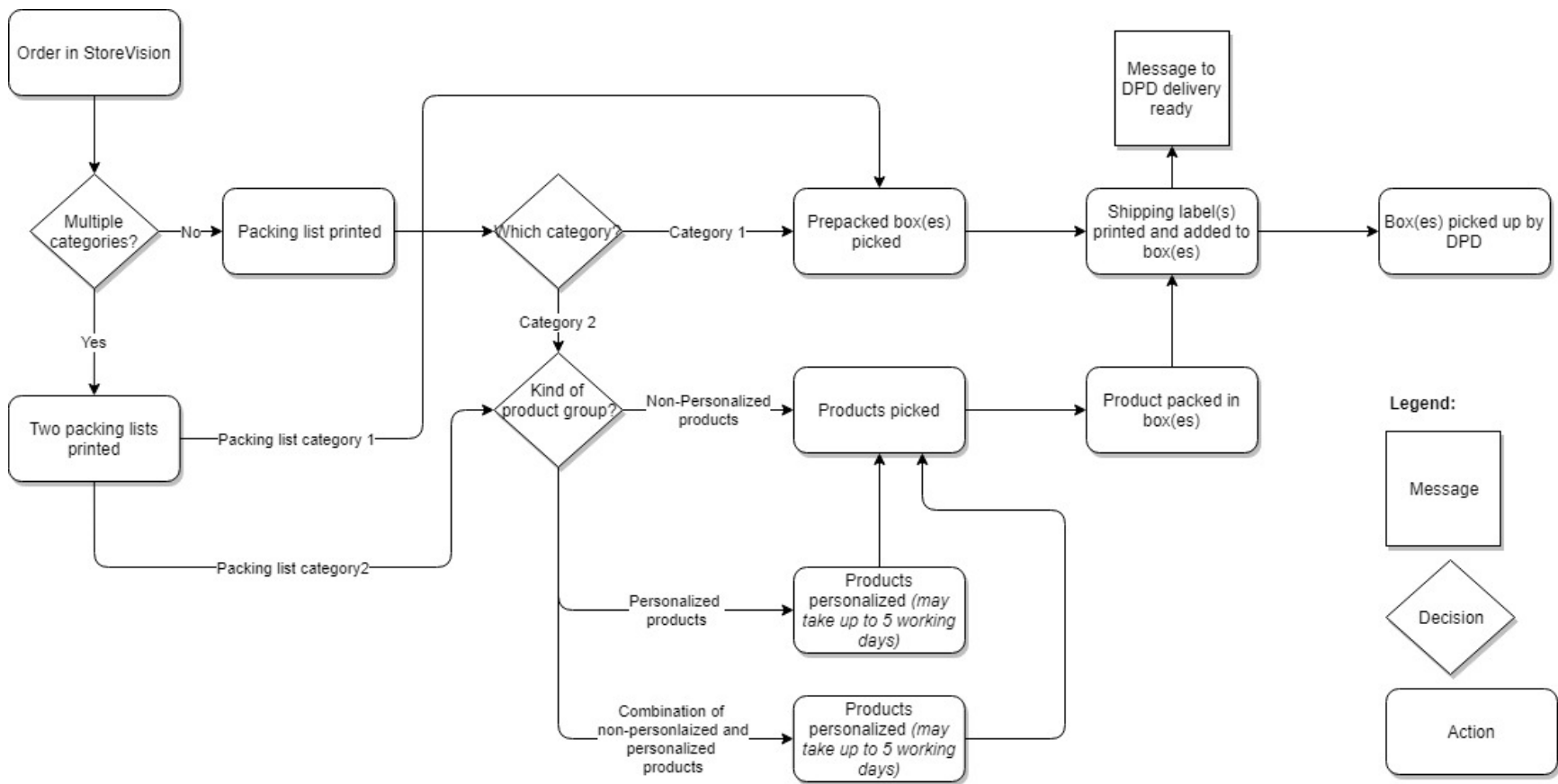


Figure 9 - Order picking process

2.4 Shipment process

After picking the order the following step is to ship the order to the restaurant owner. To give more insight into this process and come up with logical recommendations, this section describes the shipment process. The shipment process is a process that is outsourced to DPD by DTK. Figure 10 on page 14 gives a schematic overview of the shipment process.

This process starts when DPD picks up the order at DTK. At this moment the restaurant receives an email with a track and trace code. The order is brought to a DPD hub where all deliveries are gathered. After which a delivery driver picks up the delivery and performs a first delivery attempt. If the driver is able to drop off the order, the process is finished.

If the DPD driver is unable to deliver the package, due to the fact that no one is at the place of delivery or in case of a wrong address, the order returns at the hub. If possible, the driver leaves a note at the place of delivery for the restaurant owner with a message that they missed the delivery. The next day, another delivery attempt is done by a DPD driver. If the driver is able to drop off the order, the process is finished.

If delivery is not possible for a second time, a note with the message: "Your package will be delivered to a pick-up point" is left when possible, and the order returns to the hub. The next day, the order is brought to a DPD pick-up point. If the order is picked up, the process is finished.

If the order is not picked up within 5 working days, the order is brought back to DTK by DPD. DTK informs Takeaway.com that the order could not be delivered. The Partner Services assistant calls the restaurant to see if a new delivery is possible. If this is possible, the shipment process is started again. If this is not possible, the products go back into the storage and the order is canceled.

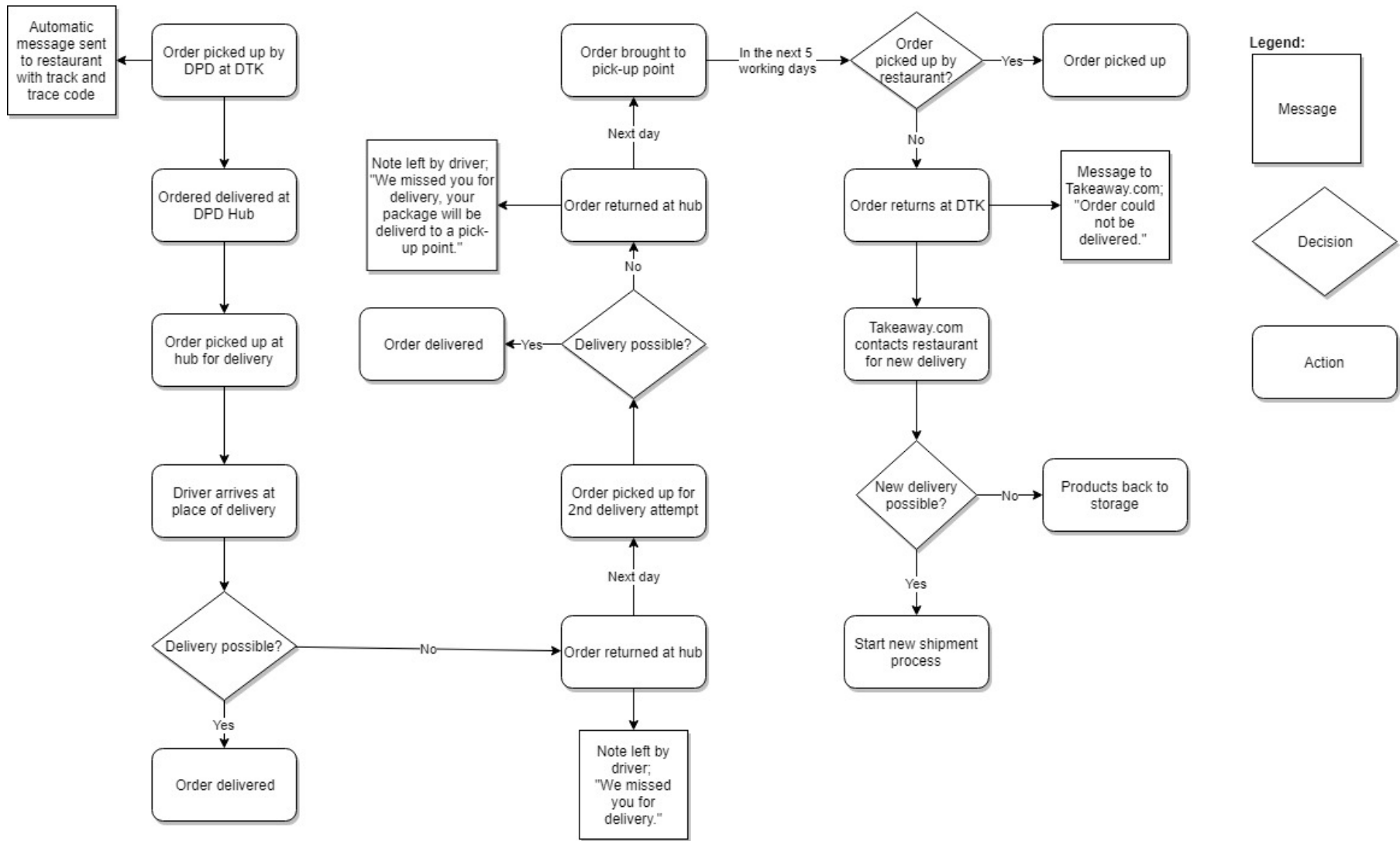


Figure 10 - Delivery process

2.5 Service level agreements

After the delivery processes have been described, this section describes the Service Level Agreements (SLAs), concerning the delivery processes, between Takeaway.com and DTK. These agreements have an impact on choosing the right performance indicators in the next section.

2.5.1 Store-Vision

All orders must be automatically uploaded in the software pack Store-Vision. Orders provided in another way than Store-Vision will not be handled. When orders are uploaded in Store-Vision, the inventory will be automatically updated to provide up to date inventory information. The reason behind this agreement is this provides smoother communication regarding the orders between Takeaway.com and DTK. Providing orders in multiple ways could create unnecessary confusion about the orders that must be handled.

2.5.2 Parcel Shipment

All of the parcels are to be shipped with the same logistics company, DPD. In the past DTK hired multiple companies for this process, but after an evaluation in February 2017 DTK stated that DPD would be a better fit for the service they wanted to provide. Another reason for choosing DPD is the ability to change the delivery address up to 5 days after the first delivery attempt.

2.5.3 Shipment frequency

Up to February 2017, DPD shipped parcels for Takeaway.com every Monday and Thursday. From February this changed to shipment on a daily basis. As stated in section 2.3, there are different agreements regarding the different product groups. For the shipments agreements three different kind of shipments can be distinguished. Disposable shipments, shipments without personalized products, and shipments with personalized products. The reason behind these agreements are to provide faster delivery.

All shipments with disposables uploaded in Store-Vision before 12:00 will be handed over to DPD at 17:00 the same working day, regardless whether there are other products in the complete order. Shipments with disposables uploaded after 12:00 will be handed over to DPD the next working day no later than 17:00.

Shipments without personalized orders are handled in a way that is similar to the way that disposables shipments are handled. This means that orders uploaded in Store-Vision before 12:00 will be handed over to DPD at 17:00 the same working day. Shipments ordered after 12:00 will be handed over to DPD the next working day no later than 17:00.

Since shipments with personalized products need some production time, there is a more flexible agreement for these shipments. Shipments with personalized products must be handed over to DPD within 5 working days.

2.5.4 Expected delivery

Every restaurant owner that places an order, will receive an email with the time-window of the expected delivery. This agreement is set up to provide information for the restaurant owner that placed an order at the web shop of Takeaway.com.

2.5.5 Undelivered orders

All orders that could not be delivered within two delivery attempts are returned at the storage facility of DTK. The undelivered orders will be gathered once every work day and an overview of the orders is sent to Takeaway.com. Takeaway.com checks whether the information is complete, adds extra information where needed, and returns the lists with orders to DTK. DTK make sure that the undelivered orders are sent again to the restaurant owners. An example of reasons for undelivered orders are that no one is present to accept the order.

3 Performance indicators

This chapter provides information about the establishment of the desired KPIs. The first section provides two views on performance indicators in this situation, (1) a supply chain view and (2) a view on performance of third party logistic parties. The second section dives into Takeaway.com's view on how they would prefer performance be measured. The last section concludes with an overview of the chosen Key Performance Indicators and the desired level of these indicators. As both points of view consider a logistic process, there may be some similarities between the found indicators. In the conclusion of this chapter, the chosen indicators will be presented and the overlap will be avoided as much as possible

3.1 Literature

As Kaplan (1990) stated: "No measures, no improvement" it can be concluded that before any improvements can be made, measurement has to be done. Measuring performance is vital for making the right decisions within every company. This performance can be measured in performance indicators, but every business has its own set of indicators that give insight in their core business. The main indicators are represented as Key Performance Indicators (KPIs). The first step within this project is to establish the KPIs for the logistics part of the Partner Services department.

3.1.1 Supply chain performance

As the delivery of goods can be seen as a part of the supply chain a supply chain performance view was taken for the literature study. There are multiple articles around the measurement of performance in a supply chain. In many of these articles the authors form a comprehensive framework with performance indicators throughout the complete supply chain. As this project focuses mainly on the delivery of goods, the logistical parts of these frameworks are a good basis for the KPIs needed.

3.1.1.1 Time based performance indicators

Gunasekaran, Patel, and McGaughey (2004), Chan (2003), and Beamon (1999) all state time-based performance indicators in their frameworks for the performance measurement of the delivery in supply chains. The leading indicator they all mention is the time needed for the delivery of the products, called the delivery time. The delivery time is a logical indicator that can easily be measured in days. However, Chan (1989) mentions this indicator as part of an umbrella term, the Customer Response Time (CRT). This is the time needed for the order to arrive after it has been ordered by the customer. This CRT can be divided into the reaction time, the manufacturing time and the delivery time. Where the reaction time relates to the time needed for accepting and processing the order after it has been placed by the customer, the manufacturing time relates to the time needed for the manufacturing of the order, and the delivery time relates to the time that is needed for the delivery of the order to the customer.

Chan (2003) states that this customer response time is typical for every kind of industry and that it gives a direct impression on what the level of the delivery service of a company is. Stewart (1995) states that the improvement of lead times such as the customer response time could cause an increase in delivery performance. Due to these facts the CRT seems a logical performance indicator for this project. This indicator can be split into three aspects: (1) the reaction time, (2) the manufacturing time, and (3) the delivery time.

3.1.1.2 Service based performance indicators

Next to time-based indicators there are indicators that cannot be measured in time, but regard to a level of service. One of those indicators is on-time delivery. This relates to the fact whether perfect delivery has

taken place. Christopher (1999) describes this on-time delivery as a combination of order completeness and delivery reliability. This on-time delivery can be measured in a percentage of the total orders that have been delivered on-time and without any defects or missing products. A decrease in this percentage causes an increase in the delivery performance in general. The empirical study under British companies from a wide range of industries of Gunasekaran et al. (2004) shows that the on-time delivery of goods is deemed as highly important. Due to this fact on-time delivery is a logical performance indicator.

A third service performance indicator is the flexibility of delivery systems to meet particular customer needs. This relates to the options of customer to choose the time of delivery, the mode of delivery, and the place of delivery. Novich (1990) states that high flexibility in these options could sway customers to place orders. An empirical study of Gunasekaran et al. (2004) shows that flexibility is deemed highly important by respondents. This indicator can be split into three parts: time of delivery, mode of delivery, and the place of the delivery. To measure flexibility of delivery systems performance there is a score from 0 to 3. For every one of the three options, (1) time of delivery, (2) mode of delivery and (3) place of delivery, a point can be scored.

3.1.1.3 Conclusion

From the previous sections we can form a list of performance indicators that are of interest for this project. Table 1 shows the indicators found in literature with a supply chain view.

INDICATOR	MEASURED IN
CUSTOMER RESPONSE TIME	Days
- REACTION TIME	Hours
- MANUFACTURING TIME	Days
- DELIVERY TIME	Days
ON TIME DELIVERY	% of total
FLEXIBILITY OF DELIVERY SYSTEMS	Score from 0 to 3 depending on underlying indicators
- TIME OF DELIVERY	Available or not available
- MODE OF DELIVERY	Available or not available
- PLACE OF DELIVERY	Available or not available

Table 1 - Logistics performance indicators from a supply chain view

3.1.2 3LP performance indicators

Since Takeaway.com’s logistics services are executed by a third party, it is decided to also take a point of view on measurement of performance of Third Logistic Parties (3LP). The found performance indicators were used to assess the match between the current 3LP and Takeaway.com. As this project focuses on the delivery part of logistics, the focus of this literature study was on the logistic part of the performance of 3LP.

3.1.2.1 Logistic performance indicators

As the main activity of 3LP are around logistic services, it is not surprising that the performance indicators some similarities with logistic performance indicators in a normal supply chain. Spencer, Rogers, and Daugherty (1994), Domingues, Reis, and Macário (2015) and Krauth, Moonen, and Popova (2005) discussed performance indicators for 3LP and state indicators that are mentioned in the previous sections, such as on time performance, correctness of orders and completeness of orders. From the survey of Spencer et al. (1994) became clear that the on-time performance was deemed as the most important. Liu and Lyons (2011) performed a similar survey under businesses and after almost 20 year on-time delivery

still was deemed as the most important operational indicator. Due to these facts, the on-time delivery is a valuable indicator for this project. Liu and Lyons (2011) also stated that accurate and undamaged delivery is of big importance for the measurement of performance of 3LPs. This can best be expressed in the percentage of orders that arrives correct and complete.

3.1.2.2 Service performance indicators

Next to the above mentioned logistic indicators there are indicators that focus more on the services that a 3LP offers. This gives us the opportunity to establish whether the activities of the 3LP add value to the delivery process. Spencer et al. (1994) and Krauth et al. (2005) show that indicators that are deemed important include the transparency of the processes within the 3LP, the level of communication, the willingness to customize service to the customer and early notification of disruptions.

Stank et al. (1996) concluded that higher levels of communication between the 3LP and their customer provides higher performance. A high level of communication ensures an improved view of the processes and provides more information regarding delivery of orders. The level of communication can be measured in the amount of time it takes for the 3LP to react on questions from their customer.

A customer of a 3LP would like to be informed as soon as possible if any disruptions arise. This gives the customer the opportunity to act and inform their own client if this disruption causes any delay in the delivery of the ordered goods. This means that 3LPs that notify their customers early in case of disruptions score better on this indicator. The performance of this indicator can be measured in the time it takes the 3LP to notify their customer of a disruption.

3.1.2.3 Conclusion

From the previous sections we can derive a list of indicators for performance measurement of 3LPs. Table 2 shows the list of indicators that can be used to measure the logistics performance of a 3LP

INDICATOR	MEASURED IN
ON-TIME PERFORMANCE	% of total orders on-time delivered
INCORRECTNESS OF ORDER	% of total orders delivered with errors or damages
COMPLETENESS OF ORDER	% of total orders delivered complete
LEVEL OF COMMUNICATION	% of mails answered on time
EARLY NOTIFICATION OF DISRUPTION	Hours

Table 2 - Logistic performance indicators from a 3LP view

3.2 Takeaway.com

In the previous section, possible KPIs derived from written sources are discussed. These KPIs are established for a general view on the performance of elements of a complete supply chain and they can differ from the view of a specific company. This difference in view could originate from a difference in objective and goals.

To establish what KPIs are important for Takeaway.com semi structured interviews were conducted with employees from the operational division of the Partner Services department. The questions for these interviews can be found in appendix A. The reason that semi-structured interviews are chosen, is to give the interviewee the possibility to offer a lot of information, but it also gives the interviewer the opportunity to steer the conversation. The first question asked was what their view was on what important factors for the delivery are and what indicators should be used for the measurement of performance. After an open discussion about the indicators, the indicators found from the literature to

give them a broader view and to see if they had other indicators in mind for the measurement of performance. All of the indicators mentioned in the interviews were already found in the literature. There were however, some issues that could be causes of bad performance of delivery. These causes will be discussed in chapter 5, were all issues will be discussed.

3.3 Conclusion KPIs

As stated in the introduction of this chapter, this last section is established to provide an overview of the chosen KPIs with the desired levels. The build-up of this chapter contains two points of view, a supply chain point of view to measure the performance of Takeaway.com in general and a point of view on performance of 3LPs to assess the performance of the responsible third party, DTK. This is done to provide a full overview on the performance of delivery. Table 3 and Table 4 on page 22 give an overview of the chosen performance indicators.

3.3.1 Supply chain performance indicators

To assess the performance of the delivery of the merchandise products, some indicators found in literature were adjusted to achieve a better fit for the situation. This section describes how the supply chain performance indicators are used in the situation and the desired level of the given indicators.

3.3.1.1 CRT

The main indicator found in both the literature and stated in the interviews was the time needed for the delivery called the CRT. This CRT can be split into 3 parts: (1) reaction time, (2) manufacturing time, and (3) delivery time. The reaction time is the time needed for Takeaway.com to acknowledge and accept the order, which is done by the Partner Services Assistants, Milou Potgieter and Paula de Greef. In section 2.3 is stated that orders can be handled differently based upon the contents. This also has its consequences for the manufacturing time of the orders. Where personalized products require a manufacturing action, orders with only deliverables and/or non-personalized products require no manufacturing before shipping, which reduces their manufacturing time to zero. This means that the total CRT of orders with only deliverables and/or non-personalized products should be lower than orders with personalized products. The last part of the CRT is the delivery time of the orders from the storage facility to the restaurant owner. The Partner Operational Manager stated in the interviews that he aims to achieve a CRT of 2 working days for orders with only deliverables and/or non-personalized items and 4 working days for orders with personalized items.

3.3.1.2 On-time delivery

On-time delivery can be measured in the percentage of orders that is delivered within the stated times mentioned above. The Partner Operational Manager stated in the interviews that he aims to achieve an on-time delivery percentage of above 85%. A higher on-time delivery percentage means a better service towards restaurant owners. A low on-time delivery percentage would affect the above-mentioned CRT as CRT would increase when the on-time delivery decreases.

3.3.1.3 Flexibility of delivery systems

Flexibility of delivery systems is a good indicator for the service offered to restaurant owners as this indicates how well Takeaway.com adjusts its services to the wishes of the restaurant owners. Flexibility can be split into three different indicators: (1) time of delivery, (2) mode of delivery, and (3) place of delivery. As the flexibility of delivery is based on its underlying indicators, (1) time of delivery, (2) mode of delivery and (3) place of delivery, it is expressed in a scale from 0 to 3 based on the scores of the three

underlying indicators. Higher flexibility results in a better service towards the restaurant owners. The Partner Operational Manager believes that a high score on flexibility would improve overall performance and wishes to see a score of at least 2 at this indicator by scoring on both place and time of delivery. A high flexibility could also increase on-time delivery as this increases the chances that restaurant owners are at the place of delivery when the order is delivered.

3.3.2 3LP performance indicators

As almost all logistic services are carried out by a third party, it was decided to assess their performance more in depth to see if there is a good match between Takeaway.com and DTK. This section describes how the 3LP performance indicators are used in the situation and the desired level of the given indicators.

3.3.2.1 On-time performance

In the literature on 3LP, on-time performance of delivery was mentioned as one of the performance indicators. Since there are no SLAs regarding delivery time, it is hard to measure how DTK performs regarding on-time delivery. However, there is an agreement regarding pick-up time. For the measurement of performance of DTK, it was decided to change the measurement of on-time performance from the delivery moment of the order to the moment of handing over the order to DPD. The Partner Operational Manager stated that the minimum score of this performance indicator should be 98%. This means that 98% of all orders should be shipped within the working days mentioned in the SLAs.

3.3.2.2 Damaged orders and incompleteness of orders

As both the correctness of the order and the completeness of the order address whether order are delivered without damaged, missing, or wrong products, I decided to adjust both indicators. I changed the indicators to damaged orders, a percentage of the total orders that arrive damaged at the restaurant due to damages during transport, and the incompleteness of orders, a percentage of the total orders that arrive incomplete or with incorrect products due to mistakes at DTK. The Partner Operational Manager stated that he wishes to see both indicators reduced to zero.

3.3.2.3 Level of communication

The level of communication between the Takeaway.com and DTK is an important indicator on how well the fit is between both parties. The level of communication cannot easily be expressed in numbers, but the way of answering emails from Takeaway.com gives a little insight. The level of communication is expressed percentage of emails that is answered on time. The Partner Operational Manager considers every email answered within a working day as answered on time. Emails answered after this working day are considered late and emails answered after a full working week are considered very late. The Partner Operational Manager stated that he wishes that all emails are answered within the desired timespan of a working day.

3.3.2.4 Early notification of disruption

When Takeaway.com receives early notifications of disruptions they can inform the restaurant owners soon if the disruptions cause any delays. Therefore, early notifications are a sign of good service towards Takeaway.com. This indicator can be measured in the time it takes DTK to notify Takeaway.com of any disruptions in the delivery. The Partner Operational manager considers a notification later than 2 working days after supposed delivery as too late and wishes that 100% of disruptions are notified on-time.

INDICATORS	MEASURED IN
CUSTOMER RESPONSE TIME	Days
- REACTION TIME	Hours
- MANUFACTURING TIME	Days
- DELIVERY TIME	Days
ON TIME DELIVERY	% of total
FLEXIBILITY OF DELIVERY SYSTEMS	Score from 0 to 3 depending on underlying indicators
- TIME OF DELIVERY	Available or not available
- MODE OF DELIVERY	Available or not available
- PLACE OF DELIVERY	Available or not available

Table 3 - Chosen performance indicators from a supply chain view

INDICATORS	MEASURED IN
ON-TIME PERFORMANCE	% of total orders on-time shipped
DAMAGED ORDERS	% of total orders delivered with damages
INCOMPLETENESS OF ORDER	% of total orders delivered with errors
LEVEL OF COMMUNICATION	% of mails answered within a working day
EARLY NOTIFICATION OF DISRUPTION	% of disruptions notified within 2 working days

Table 4 - Chosen performance indicators for 3LPs

4 Current performance

After establishing the KPIs for performance in the previous chapter, this chapter will assess the current performance of the delivery process. In the first section the supply chain view will be taken to assess the overall performance of the delivery process. After this, the performance of the 3LP, DTK, will be measured to see whether there is a good match between Takeaway.com and DTK.

4.1 Data gathering

To get insight into the overall performance and the performance of DTK, data was gathered from multiple sources. The main source of data was the software pack Store-Vision, where, among other data, data regarding placed orders is gathered. Examples of information gathered from Store-Vision are: order date, delivery date, and the products in the orders. The delivery date in Store-Vision is the delivery date provided by the track&trace link of DPD. Due to the fact that DPD reuses track&trace links every six months, it was decided to measure performance indicators regarding these links from the first of January 2018 until the end of May 2018. Gathering this data cost a significant amount of time, due to the fact that a lot of steps had to be taken to process the data in a way that it could be used for measuring KPIs. These steps can be found in appendix B. Processing this data showed that a part of the data was missing. In 33% of all orders in 2018 the actual delivery date was not mentioned in the software pack Store-Vision. Inspecting these orders did not give any reason why these particular orders had no actual delivery date. Due to the fact that 33% had no actual delivery date, a lot of valuable data was missing and there was no complete image of the performance. The remaining 67% of the data was used for the performance measurement. Next to missing data another problem that arose was that the software pack Store-Vision reacted very slow. Loading and exporting data took a considerable amount of time, which delayed the whole process.

Another source of information was the email of the Takeaway.com's Dutch Partner Services department. To gather all complaints regarding the delivery process, all email correspondence between the Partner Services department and DPD was checked. Since October 2017 all contact regarding complaints between the Partner Services department and DPD has taken place through this email account. Due to this fact, it was decided to measure the performance regarding complaints from October 2017 until the end of May 2018.

A third way of gathering data where the excel sheets produced by the Supply Chain Coordinator, Joren Kuil. One of the things that the Supply Chain Coordinator keeps track of is all undelivered orders. In his sheets he differentiates all undelivered orders based on country and reason. These sheets provide valuable information regarding the amount of undelivered orders and how long it takes before they are mentioned by DTK to Takeaway.com.

The last way of gathering data regarding performance was conducting interviews with employees of the Partner Services department. By conducting semi-structured interviews, valuable information concerning the less numerical indicators was gathered, such as the service-based indicators. Interview questions can be found in Appendix A.

4.2 Overall performance

To provide insight in the overall performance of the delivery process the different KPIs from the supply chain view will be addressed. The data used for this measurement is collected in two ways. Hard data is

collected from the software pack Store-Vision. Further information is gathered by conducting interviews with several employees of the Partner Services department.

4.2.1 Customer response time

In section 2.2 the order process was described to provide insight into how this process takes place. For the measurement of CRT, the entire order process as described in section 2.2 must be completed. The required data for this indicator was gathered by exporting the essential information for the last five months from Store-Vision.

CRT was measured by the elapsed time from the moment of ordering until the moment of delivery. In the section 2.3, all orders are split into three different groups depending on the different products that are present in the order. This resulted in the following average response times:

- Orders with personalized products: 4.9 working days
- Order without personalized products: 3.9 working days
- Orders with disposables: 3.5 working days.

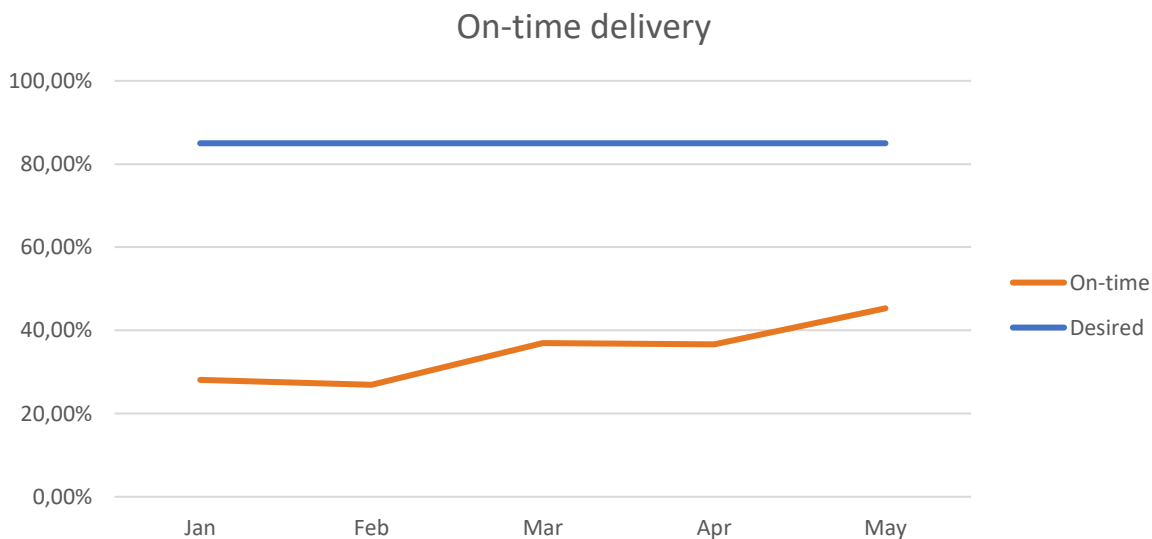
In the previous chapter is stated that the Partner Operational Manager desires response times of the following level:

- Orders with personalized products: 4 working days
- Order without personalized products: 2 working days
- Orders with disposables: 2 working days.

The measured averages are higher than the Partner Operational Managers expressed desires. This means that this process is not functioning as desired and it should be improved.

4.2.2 On-time delivery

The percentage of on-time deliveries according to desired CRT is 35%. This means that 65% of the orders arrive at the restaurant owners too late. Graph 1 shows the development of on-time delivery over time. There is some improvement in the last five months, but the desired percentage of 85% for on-time delivery is much higher than the level reached at this moment.



Graph 1 - On-time delivery performance

4.2.3 Flexibility of delivery systems

Delivery of merchandise by Takeaway.com is not very flexible at this moment. Restaurant owners cannot choose a time of delivery or a mode of delivery. They can however, choose a place of delivery but practice shows that they almost never choose another place for delivery than their own restaurant. This results in a score of 1 where 3 is possible. As the Partner Operational Manager stated that he desired a level of 2 at this indicator, an improvement should be made.

4.3 DTK performance

To get insight into the performance of DTK, indicators mentioned in section 3.3 were used. All hard data on this part was gathered by exporting data from Store-Vision. Other sources of data were the email box with emails to DTK and interviews with both employees of the Partner Services department.

4.3.1 On-time performance

On-time performance was determined based on whether they met the SLAs stated in section 2.5. The required data for this indicator was gathered by exporting the essential information of the last 5 months from Store-Vision. Determining on-time performance is done by calculating the difference between the time of ordering and the time of packing.

As there are different SLAs per product group there is a different on-time performance for these groups. The percentages of on-time delivery in 2018 is 78% for all products and the following for the separate groups:

- Orders with personalized product: 91,0%
- Orders without personalized product: 75,5%
- Orders with disposables: 79,3%

Graph 2, Graph 3 and Graph 4 on page 28 provide a schematic overview of on-time performance in 2018 per month. The graphs show an improvement in the last few months for the orders with personalized products and the orders with disposables. Orders without personalized products are not handled as well as the other two but seem to improve in May. This however, is caused by out of stock products which resulted in a lot of orders without an actual delivery date in Store-Vision. This corrupted data paints a more positive picture than the actual on-time delivery should be.

In the previous chapter is stated that the Partner Operational Manager desires on time performance of 98%. This percentage is much higher than the percentages realized at this moment, which means that an improvement should be made.

4.3.2 Damaged orders

The total amount of damaged orders from October 2017 until May 2018 is three, which results in a total of 0,04%. The Partner Operational Manager stated that he wanted this percentage down to zero percent. This however seems impossible to do, due to the fact that not everything can be performed perfectly as human errors and circumstances beyond control could occur. For now, it is advised to keep an eye on any more orders that arrive damaged, because it could turn out that these damaged orders are just stand-alone incidents.

4.3.3 Incompleteness of orders

The total amount of incomplete or incorrect orders from October 2017 until May 2018 is 42, which results in a total of 0,79%. The Partner Operational Manager stated that the amount of incomplete or incorrect orders should be zero. At this moment this indicator is above its desired level and it should be decreased.

4.3.4 Level of communication

By analyzing all email correspondence between Takeaway.com and DTK, the level communication of DTK was measured. In only 39% percent of emails, Takeaway.com received an answer on time. 14% of emails was answered late, 3% was answered very late and in 12% of all email correspondence, Takeaway.com had to send a reminder to receive a late answer. In 32% of emails Takeaway.com did not receive an answer at all. Since the Partner Operational Manager stated that he desired that every email should be answered within a working day, it can be stated that the current level of communication is not what it should be, and it should be improved.

4.3.5 Early notification of disruption

Right now, there is no notification given when disruptions arise. Takeaway.com has to wait for restaurant owners to complain about incorrect or late orders before they know something went incorrectly. This causes orders to be forgotten at DTK, which results in very long delivery times. Due to the fact that no notifications are given, the score on this indicator is below its desired level.

4.4 Conclusion

As shown in Table 5 and Table 6 on page 27, none of the indicators is at the desired level in the current situation. This makes clear that improvements should be made in the way of working to reach the desired level of performance. Where and how these improvements can be made, are discussed in the following chapters, but as some indicator levels are harder to reach, it is wise to prioritize the indicators based on what should be fixed first or what could be a quick fix that causes a great improvement.

In the following chapter is stated that one of the biggest complaint of restaurant owners is late delivery, which shows itself in low levels of on-time performance and a long CRT. As on-time performance of the 3LP influences both CRT and on-time delivery, it is wise to improve this indicator as soon as possible.

The desired level of flexibility of delivery systems could easily be reached by just improving one part of the indicator, the time of delivery. How this can be reached and why this is not offered yet will be discussed in the following chapter.

Both level of communication by DTK and early notification of disruption by DTK are indicators regarding actions that are not yet in the SLA but are desired by the Partner Operational Manager. Improving one or both indicators will have a positive effect on the service towards restaurant owners. Due to the fact that this could be reached by introducing a level of communication and notifications of disruptions in the SLAs, it is wise to deal with these indicators quickly.

As both damaged orders and incompleteness of orders differ not much from the desired level, these indicators do not have a high priority to be fixed at this moment.

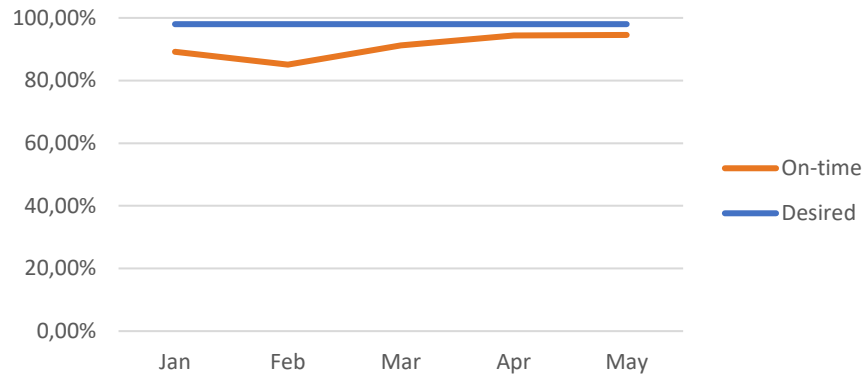
INDICATOR	DESIRED LEVEL	CURRENT LEVEL
CUSTOMER RESPONSE TIME		
- ORDERS WITH PERSONALIZED PRODUCTS	4 working days	4.9 working days
- ORDERS WITH PERSONALIZED PRODUCTS	2 working days	3.9 working days
- ORDERS WITH DISPOSABLE PRODUCTS	2 working days	3.5 working days
ON TIME DELIVERY	85%	35%
FLEXIBILITY OF DELIVERY SYSTEMS	2	1
- TIME OF DELIVERY	1	0
- MODE OF DELIVERY	0	0
- PLACE OF DELIVERY	1	1

Table 5 - Desired and current level of indicators of from a supply chain view

INDICATORS	DESIRED LEVEL	CURRENT LEVEL
ON-TIME PERFORMANCE	98%	78%
DAMAGED ORDERS	0%	0.04%
INCOMPLETENESS OF ORDER	0%	0.17%
LEVEL OF COMMUNICATION	100% Within 24 hours	39%
EARLY NOTIFICATION OF DISRUPTION	Within a working day	Non-existing

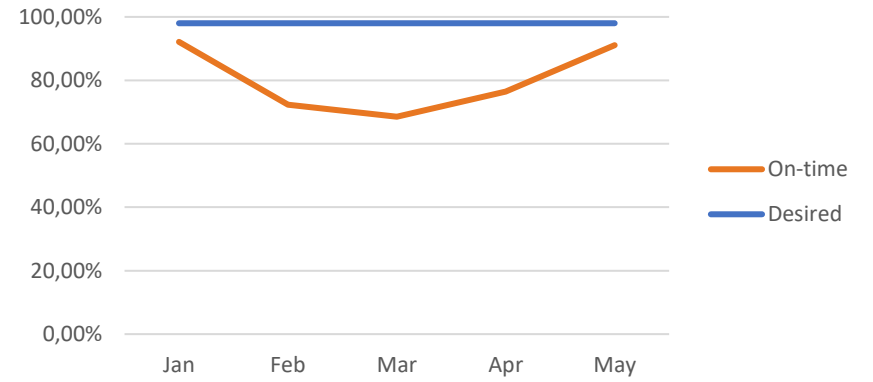
Table 6 - Desired and current level of indicators for 3LP

On-time performance



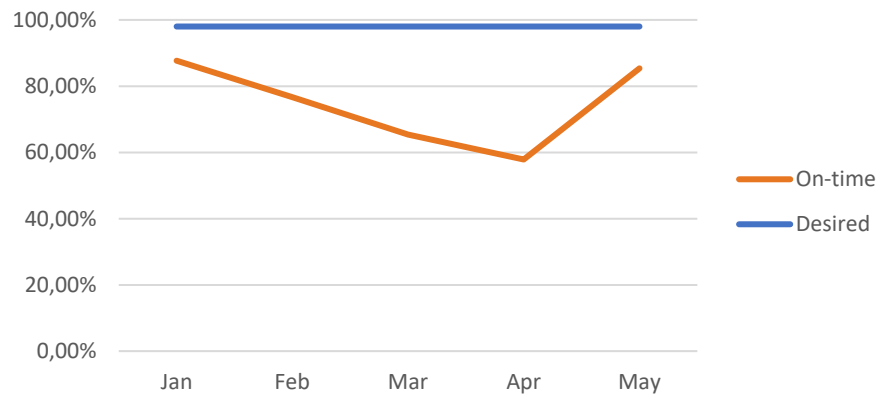
Graph 3 - On-time performance for orders with personalized products

On-time performance



Graph 4 - On-time performance for orders with disposable products

On-time performance



Graph 2 - On-time performance for orders without personalized products

5 Issues

Now that the results are established, this chapter dives further in the issues that causes low performance stated in the previous chapter. To create a better overview of the issues, a so called “probleemkluwen”, or problem cluster in English, was created. The following sections give a better understanding around the core problems in this problem cluster.

5.1 Problem cluster

To get a better understanding of the problems that lead to low performance on some of the indicators a problem cluster was created. Information regarding the underlying was gathered by reviewing received complaints, reviewing sheets made by the Supply Chain Coordinator regarding undelivered orders, discussing the process flows with employees of Takeaway.com and by reviewing papers regarding logistic processes. Figure 11 on page 30 provides an overview of problem cluster. The following sections dive deeper into the underlying causes of the problem cluster. Causes that are not discussed due to the fact that they are too small, are not stated in the problem cluster.

In the interviews with the Partner Operational Manager stood out that this project was set up due to a high number of complaints they received. The underlying reason for these complaints is a low level of service regarding the delivery of merchandise. This translated to the low levels of the KPIs stated in the previous chapter.

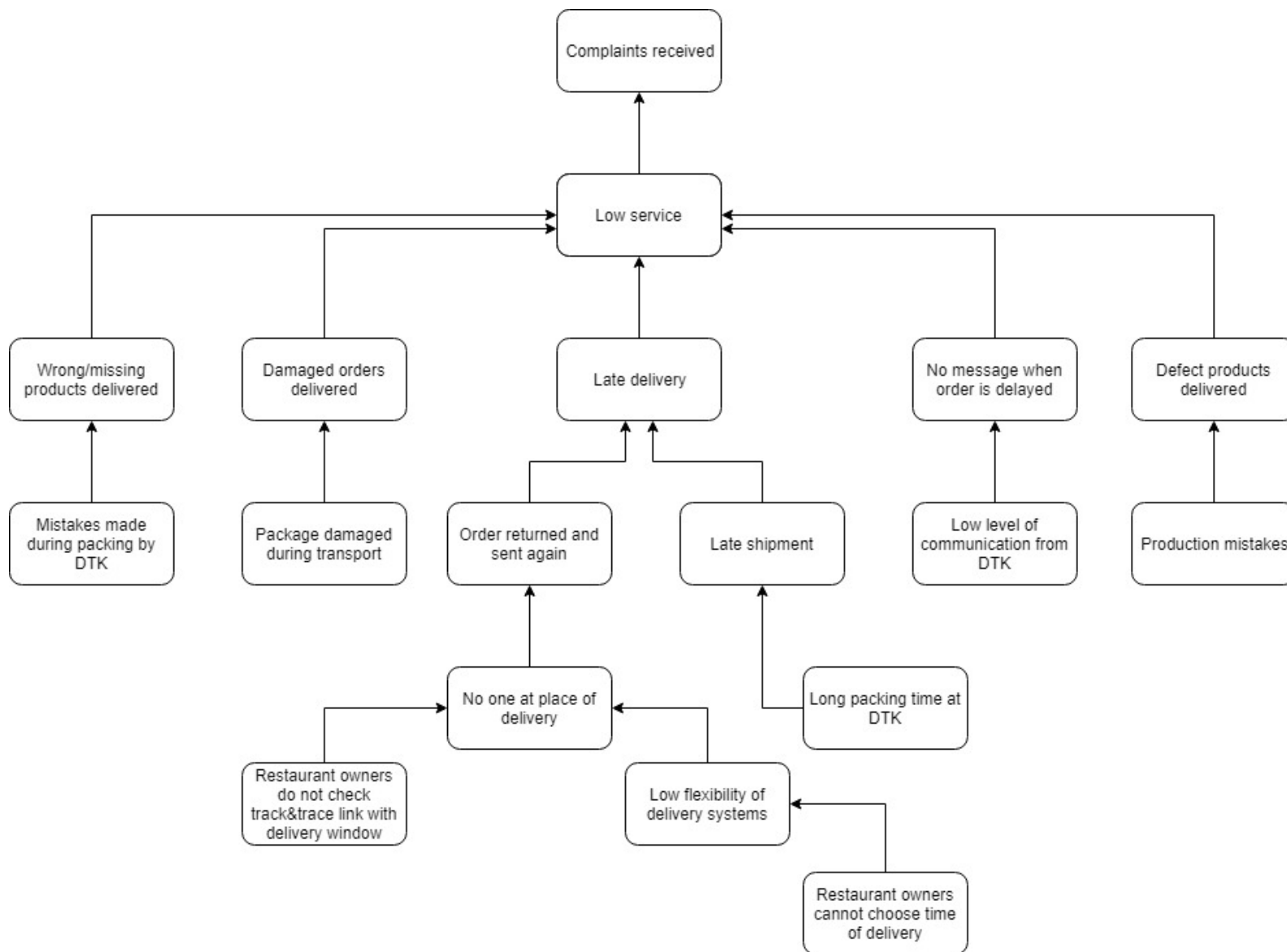
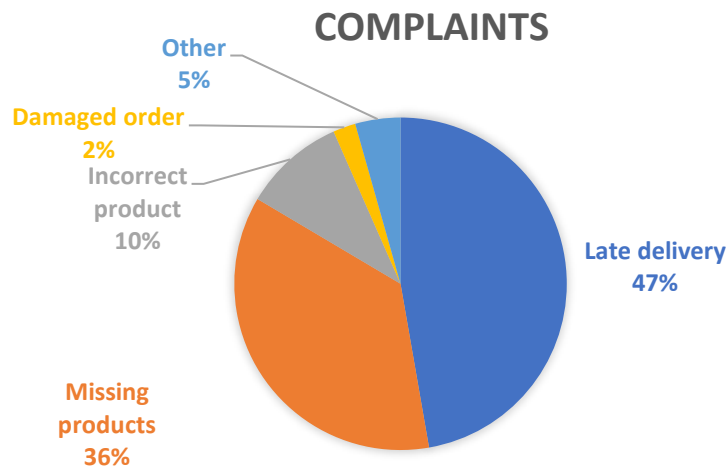


Figure 11 - Problem Cluster

5.2 Complaints

To get a better understanding of the underlying reasons for the complaints, all complaints from the period from October 2017 until May 2018 were analyzed and categorized into 6 categories based on the nature of complaint. This period of time was used due to the fact that Milou Potgieter started working as the first Partner Service Assistant from October 2017 and she handled all complaints from that moment. Before that moment the communication was less organized as this was done by multiple departments, like Sales and Customer Service, depending on where the complaint was received. Graph 5 provides an overview of the nature of complaints. The Partner Operational Manager believes that an improvement of the performance will reduce the number of complaints. The following sections describe what the nature of the complaints are and what relations with the previous stated KPIs are.



Graph 5 - Nature of complaints

In the chosen period of time there were 92 complaints on a total of 5312 orders in the Netherlands. This means that restaurant owners complained in 1,7% of the times they placed an order. As not every person complains when something goes incorrectly, this could paint a picture that is too positive for the situation.

To understand how the complaints could be prevented, it is necessary to understand the nature of these complaints. There are 3 categories of complaints that contain together over 90% of all complaints, (1) late delivery with 46%, (2) missing products with (36%) and (3) incorrect product (10%). If the causes of these issues could be addressed, service will increase, and this could result in a lower complaint rate.

5.2.1 Late delivery

As late delivery causes for 46% of the complaints, this seems an important issue that could have a great effect on the performance. The processes in chapter 2 are reviewed to investigate issues that could cause late delivery. As the first part of the order process is almost completely automated and completed instantly, it was decided to look at the last two processes: (1) the order picking process and (2) the shipment process for issues.

5.2.1.1 Order picking process

When issues arise during the order picking process, on-time performance of DTK will be low. In section 4.3.1 is stated that on-time performance is low for every product group. So, it can be concluded that there

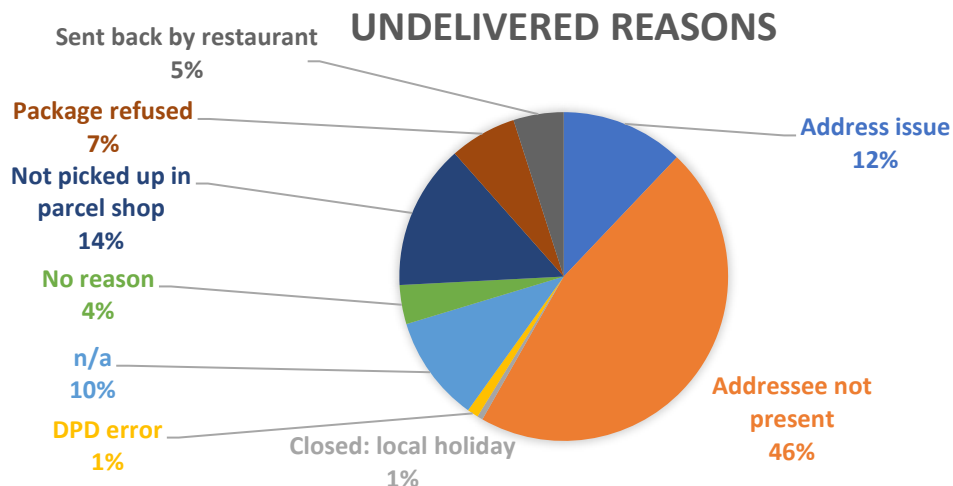
are some issues in this process. To improve this process, DTK should improve their on-time performance or Takeaway.com should investigate other companies that could carry out the 3LP activities. A possible solution for DTK to improve their performance is stated in the following chapter.

5.2.1.2 Shipment process

Another factor that influences late delivery is the shipment process described in section 2.4. In this process is stated that every order is offered twice to the restaurant owners at most. If the order could not be handed over in these two times, the order is returned to the storage facility. If this happens, the delivery time of the order is increased a lot.

All information around these undelivered orders is gathered by the Supply Chain Coordinator. This information is put into an excel sheet and the reasons of return are noted. The reasons of why orders could not be delivered are mentioned by the delivery party, DPD, in the track&trace link of the order. Graph 6 provides an overview of the reasons of why orders could not be delivered.

In 46% of undelivered orders the reason of return is that no one is present to accept the order. If this could be addressed, overall shipment time would be decrease and performance would increase. The following sections give possible causes for the fact that no one is present to accept the order. This provides a better insight in possible solutions for this issue.



Graph 6 - Reasons of why orders could not be delivered

5.2.1.2.1 Track&trace link

One of the reasons that no one is present to accept the order is that restaurant owners do not check the email with the track&trace link that provides a time window for the delivery. If a restaurant owner does not check the link, they are not aware of the fact when the delivery will take place which could cause that they are not present at the place of delivery when the delivery party tries to deliver the order. If this happens twice for one order, the order is returned to the storage facility of DTK and these extra actions all costs extra time. Which causes a longer CRT.

5.2.1.2.2 Restaurant not opened

Another reason is that orders are delivered when the restaurant is not open. Almost all orders are delivered to address of the restaurant and practice learns that restaurant often do not open before 13:00, so this would mean that it would be wise to deliver packages in the afternoon or in the evening when

restaurants are opened. For every undelivered order with the reason that no one was present it was decided to check at what times the orders had been delivered. In 66% of these orders, the delivery attempt was before 13:00, what could cause that no one was present to accept the order. If this is addressed, shipment time would decrease, and performance would increase.

5.2.2 Incorrect and missing products

During the period October 2017 till May 2018, 46% of all complaints are regarding the delivery of incorrect products or missing products in the order. As all orders are automatically forwarded to DTK for order picking, it can be assumed that mistakes made in the packing of the order is done by DTK. In the current situation, as described in chapter 2, orders are picked by employees of DTK and packed into boxes. When all products are picked, a shipping label is printed and added to the box. Checking if all products are packed into the box is done by hand. Due to the fact that this is done by hand, human errors could occur which causes incorrect or missing products in the order. A possible solution for these problems is stated in the following chapter.

5.2.3 Damaged orders

With only 2 orders arriving damaged at a total of 5312 orders in the period from October 2017 till May 2018, we can conclude that this problem is not one of the primary causes of the main problem. In both cases it was a problem that could be solved easily by sending an extra box of products free of charge to the restaurant owners. Due to the low amount of damaged orders it was decided to leave this problem out of the picture.

5.2.4 Defect orders

With just two orders were products arrived defectively in a total of 5312 orders in the period from October 2017 until May 2018 in the Netherlands, we can conclude that this problem is not the primary cause of the main problem. Since it is not one of the primary causes, it was decided to leave this problem out of the picture.

6 Solutions

This chapter provides possible solutions for the issues mentioned in the previous chapter. As mentioned in section 4.4, the highest priority will be at improving CRT and on-time performance. Next to these improvements, a focus will be on improving flexibility of delivery systems, increasing level of communication of DTK and improving the early notification of disruption by DTK.

6.1 Improving performance of 3LP

In the current situation the performance of the 3LP, DTK, is not as it should be. Their on-time performance is below the desired level and mistakes are made in the picking process. The on-time performance should be increased, and the mistakes should be prevented to increase overall performance. In section 4.3.1 is stated that on-time performance of DTK is improving but has to improve further if they want to achieve the performance desired by Takeaway.com. One of the ways they can improve their performance is decreasing the mistakes made in the order picking process. At this moment the check if everything is packed into the boxes is done by hand. If they introduce a system where every product in the order has to be scanned at the moment it is packed and a shipping label cannot be printed before all products are scanned, human errors could be prevented, and the performance will increase. The use of a system with scanners would mean that DTK has to do additional investments, which could cause a rise in costs for Takeaway.com but it will decrease mistakes in the picking process. These mistakes cause extra actions for DTK as they will have to send additional packages to correct the mistake. So, they will not be reluctant to improve their own performance, which would increase the feasibility of this solution.

As the 3LP plays a major role in the delivery process, improvements in their processes will have major impact on the overall performance. Due to these facts this solution will prove to be an important solution that will have a considerable impact on the performance it is recommended to improve the performance of the 3LP as soon as possible.

6.2 SLA adjustments

The current on-time performance SLA of DTK stated in section 2.5.3 is based upon whether orders are picked and prepared for shipment in time. The Partner Operational Manager desires a KPI based on the moment of delivery instead of the shipping moment. Gunasekaran et al. (2004), Chan (2003) and Beamon (1999) also see this delivery time as an important KPI. Based on this the best recommendation is to adjust the SLA to the delivery moment instead of the moment of shipping. This way, on-time performance of DTK provides Takeaway.com a better grip on the performance of DTK as DTK is not only responsible for shipping but also for delivery. This will also mean that the delivery party, DPD, will be one of the stakeholders of the delivery processes.

6.3 Higher flexibility of delivery systems

One of the issues mentioned in the previous chapter is late delivery due to the fact that no one is present at the restaurant to accept the order. In 66% of the cases this is caused by the fact that the delivery attempt takes place too early on the day. If restaurant owners could provide a desired delivery moment, for example when their restaurant is opened, it could decrease the amount of orders that have to be returned due to the fact that they could not be delivered. Fewer returned orders would mean that average delivery time would go down and on-time performance would increase. Considering these facts, a recommendation would be to provide restaurant owners a choice in the moment of delivery, so they are present at the moment of delivery. Increasing the flexibility will increase the initial costs for the shipment

process, but it will decrease the amount of orders that will return to the storage facility. As a major part of all returned orders are caused by the fact that the restaurant owner is not present, this solution would be the first solution that should be implemented. The downside of this solution is that it will increase initial costs, but the upside is that the service will improve and the returned orders will decrease.

Due to the fact that the size of the issues never has been mapped before, this solution was not already used. But an initial study to the feasibility of this solution has been done. The implementation of the option for restaurant owners to choose a time window for delivery in the web shop can be done without much difficulties. The delivery part, DPD, also offers time window-based delivery options. This increases the feasibility of this solution.

6.4 KPI dashboard

In the interviews with the Partner Operational Manager and the Supply Chain Coordinator stood out that they wanted to better aware of the scores of the chosen KPIs to adjust the situation when needed. For the collection of data for this project, data was exported from the software pack Store-Vision and processed to fit the situation. However only the orders of the Netherlands were considered, collecting and processing this data took a significant amount of time. If this information could be available within a few clicks in a dashboard, time would be saved that could be invested in other projects. Based on the interview, the large amount of time it cost to gather and collect the data, and the fact that only orders from the Netherlands was considered, the best recommendation is to create and implement a dashboard that provides up-to-date information. This solution will create live insight into the overall performance, which could aid the Partner Operational Manager in his decisions for improvements of the delivery process in the future. This however would be not a solution that has a high priority compared to the above-mentioned solutions.

6.5 Live tracking of orders

In the current situation there are no notifications regarding disruptions from DTK. This causes for situation where sometimes orders are delayed by 20 days or more. These incidents cause for a low service towards restaurant owners and should be prevented. If DTK notifies Takeaway.com quickly about any disruptions, Takeaway.com could act accordingly by informing the restaurant owner that their order has been delayed or by sending a new order to the restaurant owner. One of the ways to make this possible is to implement another software pack that allows to track the status of orders. By tracking orders both Takeaway.com and DTK could respond quick to any disruptions that arise. By implementing a live tracking system of orders, the issue of “No message during delay” also could be addressed. This however would take some extra actions like implementing automatic messages when there is a delay in the delivery of the order. The selection and implementation of another software pack will take a big investment, but this software pack could also be used in other processes of the Partner Services department, such as inventory management and purchase management.

7 Conclusion

This chapter provides conclusions of the project and what further research is suggested.

7.1 Conclusions

The main reason behind this project was a gut feeling that Takeaway.com was not performing as it should due to the complaints they received from restaurant owners ordering merchandise from Takeaway.com. Carrying out this project provided a lot of valuable information regarding the process flows of the delivery process of merchandise products for Takeaway.com that can be reported in the following points:

- By conducting a literature study, KPIs were found for performance measurement of the delivery process as a whole and for performance measurement of DTK. From measuring this performance can be concluded that the performance is not at the desired level and should be improved. This can be done in multiple ways mentioned in the recommendations.
- By analyzing the current situation, it was noticed that a lot of valuable information was missing or incorrect due to flaws in the software pack Store-Vision and the reusing of track&trace links by DPD. Resulting from this the used information could paint a picture that is not in tune with the true situation. Together with the slow loading and exporting of the data, it seemed that the software pack Store-Vision used in the current situation is not the best fit.
- The biggest portion of the complaints received by Takeaway.com are regarding late delivery or incorrect content of the orders. Addressing these issues will have a positive effect on the performance of the delivery of merchandise products. As almost all activities are performed by DTK there are some recommendations on how DTK could improve their performance.
- The main reason behind this project was the large number of complaints. With only 1,7% orders with complaints, it can be concluded that the number of complaints is lower than expected beforehand.

7.2 Limitations

One of the greatest limitations in this project is the inconsistency in the data. A lot of data is missing or incorrect due to the reuse track&trace links. One third of the data could not be used, what makes that the measurement of performance does not give a correct picture of the situation. This missing data only affected the CRT and the on-time delivery. For the other KPIs, all orders were considered. In the case of CRT and on-time delivery a best-case scenario was sketched by considering all orders with missing data as perfect deliveries. Even in this best-case scenario, the CRT was too high and the on-time delivery too low.

Another limitation in this project is hard to get data regarding delivery moments. As most of the restaurant do not open before noon, it is interesting to have data about the moment of the first delivery attempt. At this moment it is possible to review this information per order, as the track&trace link provides this information. But loading this information costs a lot of time and can only be done for one order at the time. If an overview of all orders with this information could be created, it would be easier to detect other possible issues.

Further limitations within this research are regarding the product groups and the countries within the project. Due to the fact that a couple of product groups were left out of the scope, the outcomes of the measurements could differ from reality. Next to the product groups there are some countries left out of the scope. After this project it is not clear how adding the other product groups or other countries would affect the overall performance. But adding new countries would affect the desired level of CRT, due to

the fact that all delivery is done from the Netherlands and it would cost extra time to deliver to other countries. If the same CRT should be achieved, Takeaway.com should think about adding extra storage facilities in other countries than the Netherlands.

7.3 recommendations

As this project only focused on the performance of delivery in the Netherlands, there lies a big potential in measuring the performance in the other lands where Takeaway.com is active. This provides a complete picture of the performance and with this complete picture it will be easier to pinpoint the issues.

Another point of interest is the collection of data regarding the moments of delivery. When orders are returned to the storage facility, they could not be delivered within two delivery attempts. These orders have been looked at in this research to see at what time of the day they have been delivered. Orders that could not be delivered in the first delivery attempt but are delivered in the second delivery attempt, are almost always too late but are not researched within this project. Increasing the percentage of deliveries handed over in the first delivery attempt, would decrease CRT and increase on-time delivery. If Takeaway.com could get more insight in the percentage of orders that are not handed over in the first delivery attempt, they could research possible solutions in this scope and increase their performance even further.

Another aspect that stood out in the interviews and conversations with employees of the Partner Services department is the level of inventory. Inventory management was not part of this research, as out of stock products could not be purchased, but a better inventory management would mean that restaurant could order more products. When the products are out of stock, they cannot be ordered in the current situation, which means that restaurant owners will go to competitors if they need their products. If all products are always on stock, there is a higher chance that restaurant owners will buy their merchandise and disposables from the Takeaway.com web shop, which would increase sales. The current software pack Store-Vision does not support this kind of options. If a new software pack would be introduced for the live tracking of orders and with a dashboard function, it would be wise to also look at parts that support a better inventory management.

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Appendices

Appendix A: Interview regarding KPIs and common issues

What are important aspects of the delivery process?

What Key Performance should be implemented for performance measurement of the delivery process?

Given the following Performance Indicators, what performance indicators would you choose for performance measurement of the delivery process?

- On time delivery
 - Delivered at agreed upon moment in time
 - Perfect delivery (No missing/defect products)
- Flexibility of delivery systems
 - Agreed upon mode of delivery
 - Agreed upon place of delivery
 - Agreed upon time of delivery
- Customer response time
 - Reaction time
 - Manufacturing time
 - Transportation time / delivery speed

What are common issue in the delivery process?

How could the following issues be addressed in your point of view?

- Incorrect products delivered
- Missing products
- Late delivery
- Late pick-up
- Long picking time
- Long packing time

Appendix B: Steps for processing data from Store-Vision

Step 1	<i>Download data from Store-Vision</i>				
Step 2	<i>Open data with Excel while using "From Text/CSV". This is done by opening a new excel file, going to the tab "Data", selecting "From Text/CSV" and selecting the downloaded file from Store-Vision. Make sure that the delimiter is "Semicolon" and select "No data Selection" click load. Rename this loaded sheet "ALL"</i>				
Step 3	<i>Divide text to columns from column "O.CustomerOrderID" with divider (~). This is done by inserting an extra Colum right from column B, selecting column B, going to the tab "Data" and selecting text to column. Choose "Delimited" and click next. Set Delimiter to other, put ~ in the box next to other and click next. Click Finish</i>				
Step 4	<i>Filter orders from NL with advanced filter and copy to new sheet "NL". Filtering is done by selecting all data, going to tab "Data", selecting advanced and set Criteria range to the 9 cells below</i>				
	O.CustomerOrderID	O.CustomerOrderID	O.CustomerOrderID		
	>100000000	<200000000			
					>1100000000
Step 5	<i>Filter Children by filtering on Column C for non-empty values and copy to new sheet "NLC". This is done by selecting all data in sheet NL, going to tab "Insert" and click on "Table". After this click on the little arrow at column C and deselect (blank). Copy all data and paste in a new sheet called NLC</i>				
Step 6	<i>Check if order is child or parent in sheet "NL" this is done by the below-mentioned steps</i>				
	Select all data, go to tab "Insert" and click on "Table"				
	Add column at column A with name "Child?" and enter the following formula in A2 "=NOT(ISBLANK(D2))"				
	Add column at column B with name "Parent?" and enter the following formula in B2 "=AND(COUNTIF(NLC!B:B,D2)>0,NOT(A2))"				
Step 7	<i>In sheet NL Filter "Parent?" = "FALSE" by clicking on de arrow next to Parent? And deselect false. Select columns B to Z and copy to new sheet "NLWOP"</i>				
Step 8	<i>In sheet NLWOP, filter beachflags, ebike, test, scoober, and without actual delivery and copy to new sheet "Workdays" in "NLWOP". This is done selecting al data, going to tab "Data" and clicking advanced. Set Criteria Rang to the 10 cells below. Copy all data and copy to new sheet "Workdays"</i>				
	OL.ItemDescription	OL.ItemDescription	O.ClientName1	O.ClientName1	O.ClientName1

<>Beachflag	<>*E-bike*	<>Thuisbezorgd .nl Office	<>*Test*	<>*training *
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Step 9 *Set date and time from laptop to DD-MM-YYYY*

Step 10 *List Holidays as below in new sheet "Holidays"*

Holidays	2016	2017	2018
Nieuwjaarsdag	31-Dec-16	01-Jan-17	01-Jan-18
Goede vrijdag	25-Mar-16	14-Apr-17	30-Mar-18
1e Paasdag	27-Mar-16	16-Apr-17	01-Apr-18
2e Paasdag	28-Mar-16	17-Apr-17	02-Apr-18
Koningsdag	26-Apr-16	27-Apr-17	27-Apr-08
Hemelvaartsdag	05-May-16	25-May-17	10-May-18
1e Pinksterdag	15-May-16	04-Jun-17	20-May-18
2e Pinksterdag	16-May-16	05-Jun-17	21-May-18
1e Kerstdag	25-Dec-16	25-Dec-17	25-Dec-18
2e Kerstdag	26-Dec-16	26-Dec-17	26-Dec-18
Oudjaarsdag	31-Dec-16	31-Dec-17	31-Dec-18

Step 11 *Select all data, go to tab "Insert" click on "Table". Format columns "D", "E" and "F" as Dates in format dd-mm-yy, replace "-" with "/" and Calculate Working days in "Workdays" by inserting a column right from column "F" and enter the following formula =NETWORKDAYS([@[O.OrderDate]],[@[O.ActualDeliveryDate]],Holidays!B2:D12)*

Step 12 *Filter orders with personalized products (P) and copy to new sheet "P". This is done by selecting all data in sheet "Workdays", going to tab "Data" and click on advance. Select cells below as Criteria range and press enter. Select all data and copy to new sheet P*

OL.SellingPrice	OL.CustomerID	OL.ItemDescription
*,90000	*GP*	*gepersonaliseerd*

Step 13 *Clear previous filter in "Workdays" sheet and add filters for Disposables (D) and orders Without Personalized products (WOP). This is done by completing the below-mentioned steps*

Add column at A "D?" and enter following formula =LEFT(T2,3)="NLD"

Add column at B "WOP?" and enter following formula
=NOT(COUNTIF(P!A:A,C2)>0)

Step 14 *Clear previous filter and filter "D?" = "TRUE" in Workdays and copy Columns C to AA to new sheet "D"*

Step 15 *Clear previous filter and filter "WOP?" = "TRUE" AND "D?" = "FALSE" in Workdays and copy Columns C to AA to new sheet "WOP"*

step 16 *Delete duplicates in "P" "WOP" "D" based on "O.OrderID" by selecting all data per sheet, going to "Data" click on "Remove duplicates", deselect everything and select O.OrderID.*

Step 17 *Define "P" "WOP" "D" as table by selecting all data, going to "Insert" and click on "Table"*

Step 18 *Create Pivot Tables for "P" "WOP" "D"*
