The journey towards local redeployment of returns

A Case Study at Cycleon

CYCLEON
REVERSE LOGISTICS GROUP

Master Thesis Summary

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October 2019

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October 2019

Enschede, The Netherlands

MASTER THESIS SUMMARY

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Summary

This research on reverse logistics was performed at Cycleon BV, Utrecht which is a global supply chain and service integrator. Cycleon offers returns management solutions for diverse clients ranging from fashion to electronics. The company operates over a global network consisting of clients and warehouses spread across geographies. Cycleon wants to find innovative solutions to serve the client better. In this research, we focus on e-commerce customer returns in the United Kingdom (UK) made for one client – a leading footwear manufacturer. The returns constitute of fast fashion goods such as shoes, jerseys and sweatpants. We focussed on our client's returns made by customers in the UK.

Problem Description

The client perceives that there is a delay in redeploying returns which in turn affects the price and time taken to restock and resell the returned items to the customer. So, the client wants to have a change in the current supply chain flow to reduce the redeployment lead time. Cycleon wants to know if it is feasible to have a modification in the existing returns supply chain to achieve that. The focus is on the returns supply chain network across the UK, since with Brexit, potential benefits of fulfilling locally are higher. The current returns supply chain from the UK is shown in Figure M1.

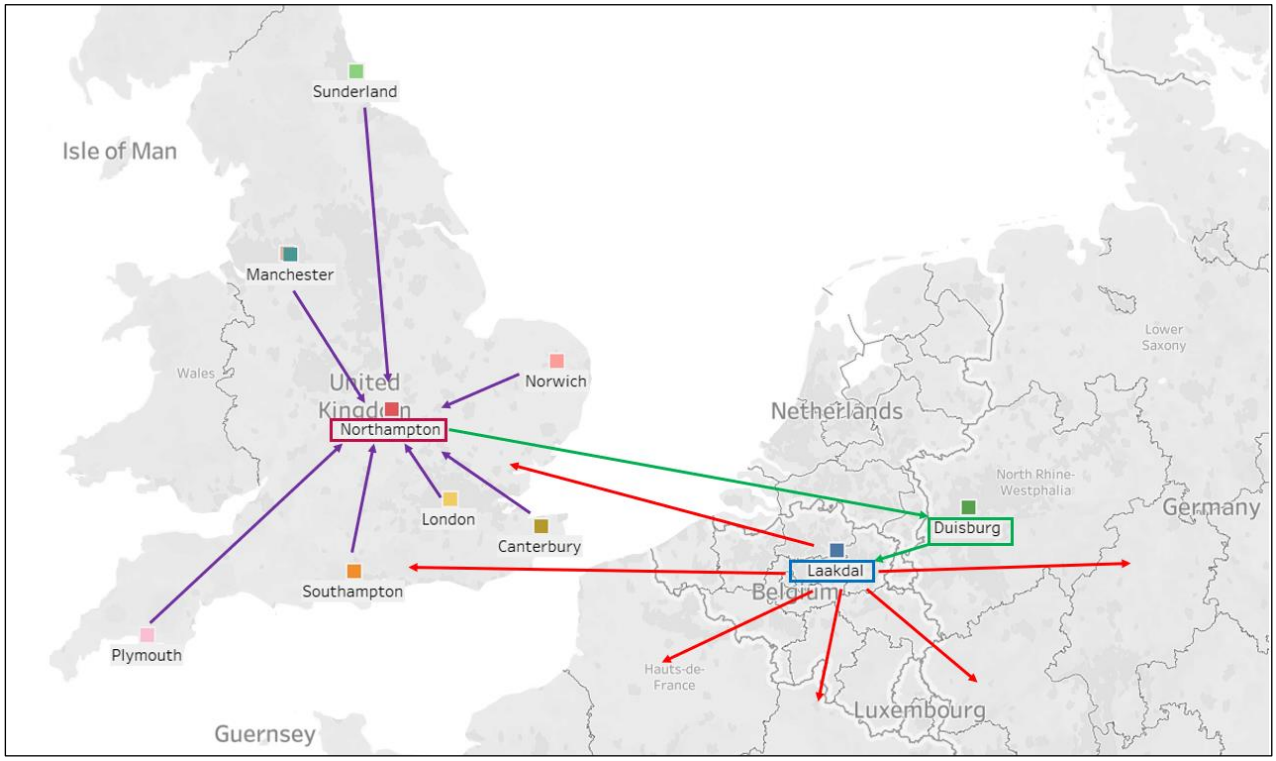

Figure M1 Customer returns from UK – Current network flow

In Figure M1, Purple arrows represent flow of returns from customers across various locations in UK towards the Regional return center (RRC) located in Northampton, UK. The green arrows represent flow of consolidated returns from RRC UK to client distribution center (DC) located in Laakdal, Belgium via European return center in Duisburg, Germany. The red arrows represent demand fulfilment flows from client DC to the UK and other European countries.

Research Objective

The objective of the research is to recommend the client to solve the perceived delay in redeploying returns by analysing the feasibility of a modification in the existing reverse supply chain flow. We

investigate the impact of this modification from a financial perspective and for which categories of products it makes sense. The proposed modification in the returns supply chain network is shown in Figure M2. We thus have our central research question as follows:

WHAT IS THE FEASIBILITY OF REDEPLOYING CLASS "A" RETURNS FROM THE CLIENT LOCALLY IN UK AS OPPOSED TO THE CURRENT CENTRAL MODEL?

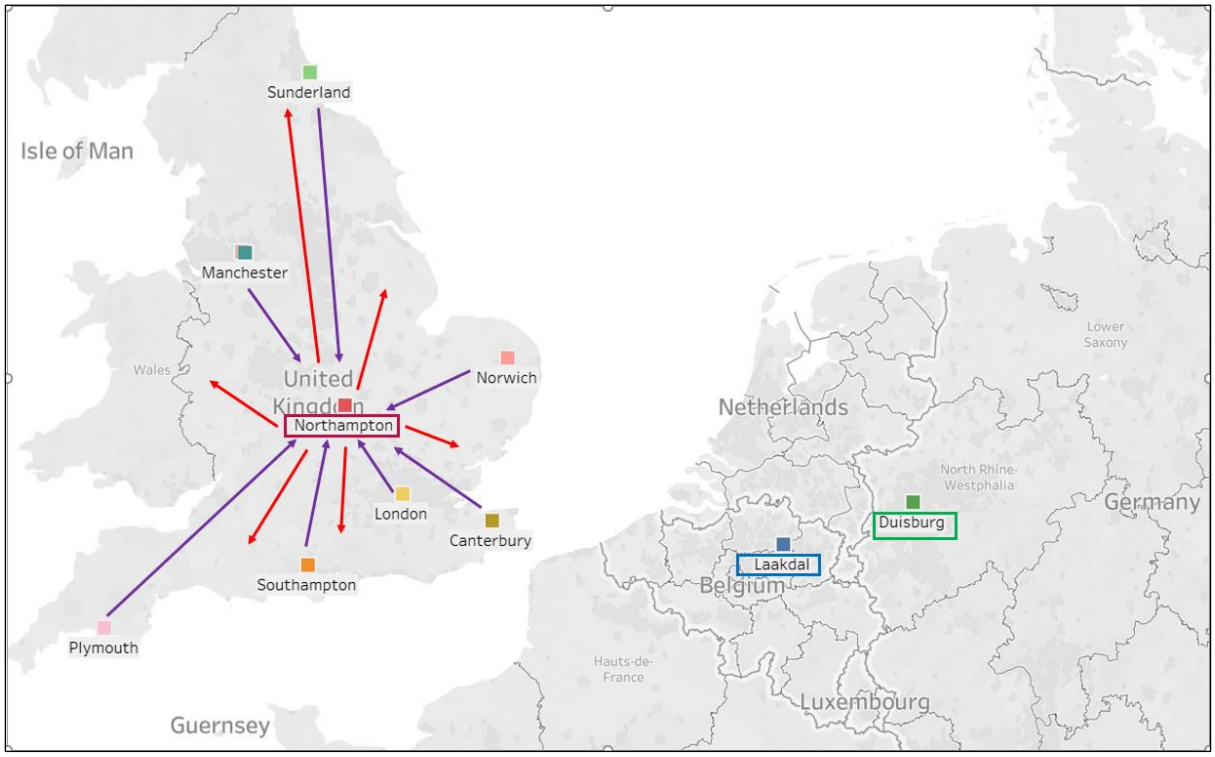

Figure M2 Proposed flow of customer returns from UK (Flow to Europe cut off)

So, customer returns are consolidated at RRC UK and are fulfilled back to customers in the UK provided they are of "A" quality. We call this 'Local Redeployment'. Transportation to ERC, Germany and client DC in Belgium which we refer as 'current central model' is avoided.

Research Questions

For our research project, we frame the following central research question:

> *What is the feasibility of redeploying class "A" returns from the client locally in UK as opposed to the current central model from a financial perspective?*

The Central research question can be further divided into a set of sub research questions.

Sub-Research Questions

These questions are categorized as As-is questions, Bottleneck questions and To-be questions. As-is questions are sub-research questions relevant to what is happening at the moment with respect to the reverse supply chain of returns management. Bottleneck questions deals with problems and barriers. To-be questions deals with questions relating to the desired state of the reverse supply chain.

As-Is Questions

1. What is the current returns supply chain flow of client's items across UK?
   a) What is the current returns process?
   b) Who are the stakeholders involved?
   c) What are the items being returned?

2. What are the Key performance indicators (KPIs) currently in place?

3. What literature is available on returns management?
   a) What is the available Literature on returns management and reverse supply chains?

Bottleneck Questions

4. How is performance in terms of the KPIs?
   a) What bottlenecks can be identified?

5. What are the problems associated with the current returns supply chain flow of client's items across UK?

To-Be Questions

6. What KPIs are useful in addition to the existing ones?

7. What improvement options can be distinguished?
   a) What modifications are required in the current supply chain flow to achieve this?
   b) What are the pros and cons of the chosen improvement options?

8. What is the best possible solution out of the chosen options?
   a) What are the financial implications involved in trying to do this?
   b) What are the other benefits apart from possible cost savings?

9. How can the solution be implemented?

Research Design

In this section, we provide the research plan to execute this project. Following these methods would help us in answering all the research questions thus help us realize our research objective.

Please find below the methods that are used for answering the research questions:

As-Is Questions

1. *What is the current returns supply chain flow?*

   An explanation of the current returns process is made based on interviews with customer success team and operations team at Cycleon and information gathered from the database in Cycleon and official website of the client.

2. *What are the KPIs currently in place?*

   Upon interviews with the client and further analysis of latest returns data, we will find the relevant KPIs. Structured query language (SQL) query and Microsoft excel pivot table analysis can be used to gain insights about the data.

3. *What literature is available on returns management?*

   Literature review would be done with appropriate key word searches in Scopus, Science Direct, Academia etc. With the citations, and references, more articles would be gathered and read. Textbooks and other scientific publications will also be reviewed to gain relevant ideas.

Bottleneck Questions

4. *What are the problems associated with the current returns supply chain flow?*
   Currently an efficient reverse supply chain is in place. As a result, the lead time between return of an item until it reaches the point of disposition is high.

5. *How is performance in terms of the KPIs?*
   Based on data analysis and visualization, how the current KPIs with respect to the current reverse supply chain are will be studied.

To-Be Questions

6. *What KPIs are useful in addition to the existing ones?*
   Time value decay, Delay cost, Discounted profit over steady state period would be some of the KPIs useful in addition to the ones existing in place.

7. *What improvement options can be distinguished?*
   Literature and Benchmarking will be used to find out a set of solution alternatives to the existing problems. A model to compare the current scenario and the new proposed scenario will be created and the difference could give us useful insights on what is the possible benefit out of the new scenario.

8. *What is the best possible solution out of the chosen options?*
   The solutions from the chosen set of alternatives will be analysed and upon concurrence from Cycleon and the client, the one solution that fits best to solve our research objective will be chosen.

9. *How can the solution be implemented?*
   The proposed solution will be discussed with the Client implementation team within Cycleon by explaining the possible value the solution would bring to the company and the client.

We propose the following activity map for the Research as seen in Figure M3. Once we create the model, we will evaluate the results of the model and analyse alternative scenarios to find the best solution and thus provide suitable recommendations to the firm.

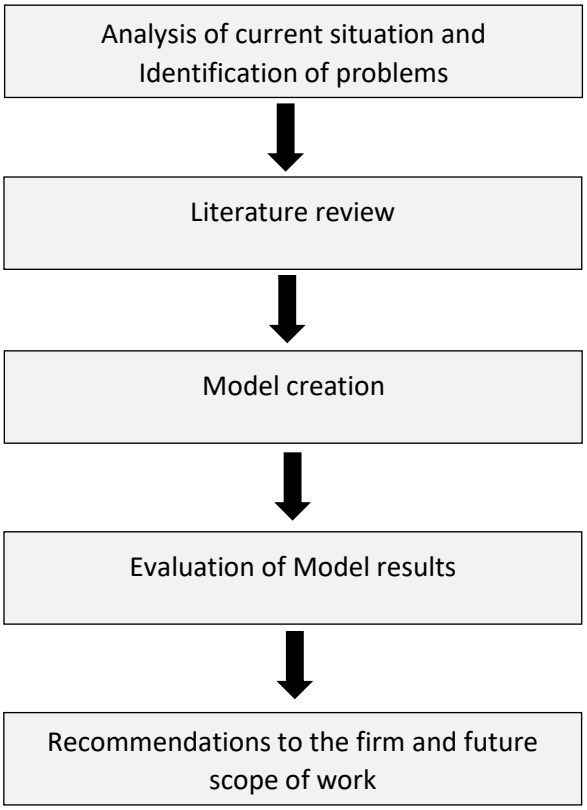

Figure M3 Research Plan

Literature review

The topics related to our research, the relevant literature reviewed, the key learnings made from the literature and how these learnings are relevant to the current research are summarized below.

Topic	Literature Reviewed	Key learnings	Relevance to current research
Returns management and supply chain management	(Rogers, Lambert, Croxton, & Garcia-Dastugue, 2002)	Different types of returns and how returns management is linked to supply chain management.	We understand the different types of returns and the returns studied as a part of our research are consumer returns.
Strategic and operational sub processes in returns management	(Rogers, Lambert, Croxton, & Garcia-Dastugue, 2002)	Significance of returns avoidance, gatekeeping and disposition procedures	Through Gatekeeping we ensure that only certain items and not every item reach a part of a supply chain and this plays a significant role in making the returns flow management efficient.
Time value of returns	(Blackburn, Jr., Souza, & Van Wassenhove, 2004)	Importance of marginal value of time of returned products	Customer return rates for Cycleon's client across UK are high and the fast-moving fashion products lose value at a rapid rate, so it is important to understand the marginal value of time of returned products.
	(Tagaras & Zikopoulos, 2008)	Early recovery of returned products results in increased total profits	Sooner the returned products are recovered, higher are the profits. This is in fact what we are trying to investigate with our research, as to what are the benefits of redeploying returns locally(sooner) as opposed to centrally(later).
	(Beamon & Fernandes, 2004)	Significance of present worth method over other depreciation methods.	Costs for Setting up the facility for grading and recovery of returned products earlier in the supply chain might be high in terms of initial setting up costs etc but considering the present worth method, there is a possibility that the high investment costs could indeed be beneficial due to lower future operational costs, which will be investigated in the financial analysis in our research.
Planning problems	(Nuss, Sahamie, & Stindt, 2015)	Challenges involved in the various planning problems thus indicating the importance of holistic planning of the reverse supply chain	Several planning problems are presented in the reverse supply chain planning matrix shown in Table 4.1. For our research, most of the problems are from an operational point of view such as sorting and grading, Returns handling and inspection and Demand fulfilment. Other aspects of the planning are also very much important, such as collection strategy and acquisition pricing problems but for now they are beyond the scope of our research.

	(Atasu, Jr., & Van Wassenhove, 2008)	There is a need to include management accounting in the CLSC research	There is still no clarity on how to value the returned products with respect to value of the item degraded across the supply chain and the lead times including transportation that is saved. A proper management accounting of all these costs and revenues across the supply chain helps in giving a holistic picture of the potential benefits of an earlier redeployment.
	(Van Hillegersberg, Zuidwijk, Van Nunen, & Van Eijk, 2001)	Importance of support and integration from ICT in the reverse supply chain environment.	All the operational and movement related data across the reverse supply chain starting from the point of order of an item to its return until it reaches the client's distribution centre is recorded in the data warehouse. Structured querying of the required data for the research is possible because of the coordination of ICT across the reverse supply chain.
Product Recovery management	(Thierry, Salomon, Van Nunen, & Van Wassenhove, 1995)	How product recovery strategies impact the customer relations, supplier relations and network structure	For our case study, we mainly use two recovery strategies viz. product reuse and recycling. And sooner the decision is made regarding the product recovery strategy in the returns supply chain, the better it is from a financial point of view which is investigated in our research.
	(Fleischmann, Beullens, Bloemhof-Ruwaard, & Van Wassenhove, 2001)	A deterministic modelling approach, for most cases, is appropriate for the recovery network design.	With the current information and inputs regarding data available, it does make sense to use an analytical model with a deterministic modelling approach. In future, we can include the stochasticity and other parameters when more accurate data are available but for now this is beyond the scope of our research.

Solution approach

We initially studied the current flow of returns across UK and the supply chain thereafter until it reaches the client's distribution centre, European Logistics campus (ELC) in Belgium. We conducted interviews with stakeholders from Cycleon and the client to understand more about the problem and the network. Visits were also made to the warehouses in European return centre (ERC) in Germany to understand the processes better.

Once the network structure and problems were clear, we reviewed scientific literature to obtain useful information necessary to solve our research problem. Next, we started gathering data. The cost and process related data was obtained by contacting relevant stakeholders at the warehouses and client. And data regarding the orders and returns of items, we obtained from the data warehouse with the help of Structured query language (SQL).

Once all relevant data was obtained, we built a model to solve our central research question. We name this the redeployment feasibility model. A brief description of the model is made here. For the chosen time period we have the data of how much items per each SKU are ordered and how much items per

each SKU are returned from customers in UK. We are going to make a simple heuristic. In the local warehouse in UK initially there are zero inventory(say) at starting of the time period. When a return is initiated by a customer and it reaches the RRC UK, the inventory becomes one. We regard return as an inventory and order as the demand. So, the items received and registered at the RRC UK are the returns which we regard as the inventory and the orders made by customers in UK as demand.

Our fundamental idea is to see what is the feasibility that an item returned on a particular day which is stored as an inventory in the RRC after grading can be used to satisfy order(s) made on the next day and further provided that is found to be of "A" quality after grading. We look at ways to determine the feasibility of redeploying the returns locally at UK. There are multiple ways to do this. We could make a deterministic analysis, a stochastic analysis, models with backorders, a cost minimisation-based optimisation model etc. But for now, we only consider a deterministic analysis of an inventory bookkeeping model We restricted our analysis to a time period of one month. Items are ordered and returned in the time period. The lead time of getting a returned item ready for resale is one day. When a return made and it is of grade "A", it is ready for resale the following day. When we have a demand in the following days for the same stock keeping unit (SKU) that was returned, we fulfil the demand from the return received in the UK. Thus, we avoid transportation to ERC, Germany and ELC, Belgium.

At a given day, we determine the amount of orders that can be fulfilled by first adding the returns stock accumulated from the previous day(s) which have not been fulfilled yet to the returns inventory at that day. We compare this with the demand or number of orders made the next day. The minimum of these two gives the number of orders that can be fulfilled from the returns inventory on hand. This is how fulfilment takes place. A detailed explanation is given later in this section with the help of variables and equations.

The order of subsequent days that is not able to be filled by the returns stock on hand is the demand that is yet to be fulfilled. It could either be fulfilled from the returns arriving on next day(s) or it could be fulfilled from the client DC. There could also be cases where the inventory on hand from returns is higher than the orders in next days. So, there is surplus inventory.

This surplus inventory of a day is the stock already present at beginning of the next day in the returns inventory of that item. The total number of days a returned item stays in inventory before fulfilling an order is the total inventory stock time. Now, the process is repeated along the entire time period, for all items under a category to get the overall fulfilment rate across a category and the average inventory stock time across a category. Similarly, the process is done for all the categories thus we have an idea of what is the overall fulfilment rate and average inventory stock time possible for the entire time period taken into consideration for the analysis. This will be used as input for the financial analysis.

The model is first built per SKU, identified by Unique product code (UPC). The SKUs are classified into different categories based on the quantity of items ordered and returned across each SKU. We name them Focus groups. This is done to see for which categories of products it makes sense to redeploy locally. The model is then extended for all items across all SKUs in the chosen time period.

The model thus gives the average fulfilment rate of orders per SKU per category. We thus come to know the number of orders that can be fulfilled in the specific time period with the returns received. This is used in the financial impact analysis with the help of all cost data gathered to determine the financial impact of redeploying returns locally, across each category of SKUs. We then discuss if it makes sense to redeploy all or only certain categories of SKUs locally.

We executed multiple iterations of the model for varying values of a defined parameter, Days on stock (DOS) which is the maximum number of days the returns are kept on stock in RRC, UK. We observed

that the number of orders fulfilled from returns increases with increase in DOS. We introduced a term β_{DOS}, which corresponds to the value of DOS beyond which there is no increase in the number of orders fulfilled. The β_{DOS} is represented by circles across each focus group in Figure M4.

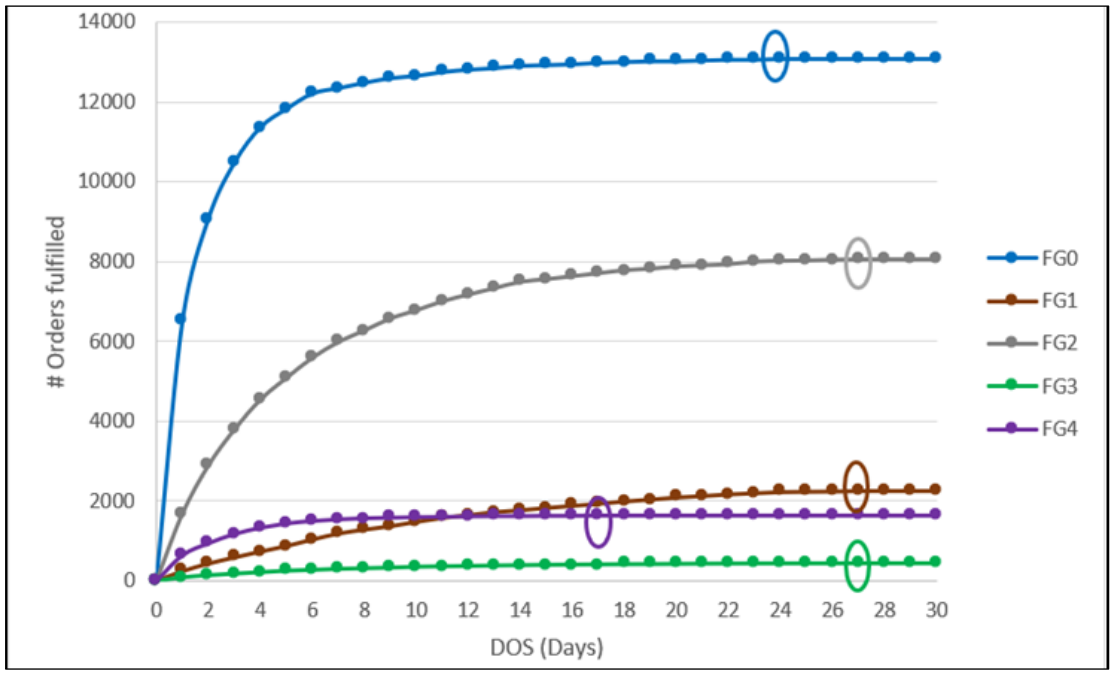

Figure M4 Number of orders fulfilled Vs DOS across each focus group (denoted as FG in the figure)

We later performed a financial impact analysis wherein we analysed the expenditure and savings associated with the new scenario of redeploying returns locally in UK. The main KPIs for our analysis are the average fulfilment rate, the number of orders fulfilled and the net profit. We analysed the impact of DOS on net profit. We considered four scenarios for different values of DOS across every focus group and eventually determined the best configuration of DOS that results in highest net profit and maximum average fulfilment rate across every focus group.

Conclusions and Recommendations

Based on the approach discussed above, across every focus group, we obtain highest net profit and maximum average rate of fulfilment of orders from returns for a configuration displayed in Table M1.

Focus group	0	1	2	3	4
Description	High order High return	Low order Low return	Medium order Medium return	Low order High return	High order Low return
Highest net profit achieved when	DOS = 1	DOS = 27	DOS = 27	DOS = 27	DOS = 1
Maximum average fulfilment rate achieved when	DOS = 24	DOS = 27	DOS = 27	DOS = 27	DOS = 17

Table M1 Recommended best configuration to achieve desired service level

Looking across all the items ordered and returned across various SKUs in the time period, we conclude that it is feasible to redeploy the returns locally and it is profitable. The benefits of local redeployment are shown in Table M2.

Key performance indicators (KPIs)	Items are kept in stock for a maximum of one day	Items are kept in stock for a maximum of 30 days	Items are kept in stock for a maximum of 'DOS' days across each focus group as defined in Table M1
Average fulfilment rate	2.39%	6.65%	6.65%
Number of orders fulfilled	9159	25451	25451
Net profit achieved by local redeployment	€ 617.39	€ 492.86	€916.78

Table M2 Benefits of Local redeployment

For the items returned and orders across various SKUs, it is beneficial to redeploy them locally. Grading and stocking the items in the local warehouse for the purpose of redeployment for a maximum of just one day results in an average fulfilment rate of 2.39% that corresponds to 9159 orders being fulfilled from the received returns. The net profit in the time period for this scenario is €617.39. Increasing the DOS to 30, results in an average fulfilment of 6.65% across all items that corresponds to 25451 orders being fulfilled from the received returns. The net profit in the time period for this scenario is €492.86. Setting the DOS to the number of days defined across each focus group in Table M1, we get the same average fulfilment rate and the number of orders fulfilled from returns as in the case of DOS = 30days but the net profit increases by €423.92.

The results we obtained are based on analysing the data of customer orders and returns across a month. We advise Cycleon to extend the model for a year of data. In this way, the quality and amount of data can improve which enables getting accurate insights on order fulfilment rate across every SKU. We recommend Cycleon to obtain information on product value, seasonality and trend of SKUs from client thereby better classification of SKUs can be made. Future work can focus on including product value depreciation into the financial impact analysis, including "B" quality and "C" quality returns also into consideration for redeployment. We also advise Cycleon to investigate the feasibility of local redeployment for the client across other European countries. We finally made a road map to Cycleon for the future to execute the tasks based on our suggestions and recommendations.