

## BACHELOR

### Improving insight in the workload of return flows of printing supplies

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## Bachelor End Project

*Improving insight in the workload of return flows of printing supplies at  
ALSO International*

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# Abstract

Managing return flows of products has been a growing problem for a lot of companies in different branches for years. A lot of money and other resources are involved in this process and is therefore of interest for companies to have it in control. This research examines the return flows of ALSO International, a distributor which sells printing supplies, cartridges and toners all over Europe. The research explains the different flows of the products and their associated specifications. The amount and time it takes to process these returned products are calculated and consequently several solution indications were given to reduce both the amount of returned products and the time of processing returned products.

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# 1. List of Definitions

- **EDC:** European Distribution Centre, distribution centre located in Wijchen the Netherlands.
- **End-customer:** Customer that is actually buying and using the products.
- **GO:** Department that receives all the goods of the supplier (Goederen Ontvangst in Dutch).
- **Headquarter:** Headquarter of ALSO Nederland/International that is located in Nijmegen, the Netherlands.
- **Picking process:** Process of finding and extracting products from a warehouse to fulfill customer orders.
- **Processing returned products:** All *processing steps* that have to be executed, starting at receiving products at the *RMA department* until the products have left the *RMA department*.
- **Processing step:** One step in the process, for example checking the product, recording in SAP, or making a parcel.
- **Processing time:** Time it takes to do a specific *processing step*.
- **Product group:** Distinction between groups of products, there are three groups: *type-S products*, *type-R products* and *type-E products*.
- **Product type:** Groups of products that have the same attributes, there can be more products of the same product type (Stock Keeping Unit (SKU)). For example HP 901 ink color 9ml with material number 1553577 or EPSON Tinte Orange 11ml with material number 1383816.
- **QM-list:** List in the SAP system of all *product types* and amounts that are returned by a *retailer*, list consist of either *type-R* or *type-E products*.
- **Retailer:** Company that buys products of ALSO International and sells it to the *end-customer*, for example BOL.com, Amazon, Staples or Mediamarkt.
- **RMA department:** Return Merchandise Authorization, the department at which all returned products are processed.
- **Supplier:** A company that sells or supplies something such as goods or equipment to customers, for example HP, Canon, Lexmark or OKI.
- **SW pallet:** Pallet with products where the product box has for example a dent or crack and can therefore not be sold to the *retailers*, the product itself is however not broken.
- **Type-E products:** Products that have been returned which are defect, those products have been sold to the *end-customer*.
- **Type-R products:** Products that have been returned by a *retailer* which are not defect, those products have not been sold to the *end-customer*.
- **Type-S products:** Products received at *GO* from suppliers that contain damage.
- **UHD:** Date on which a product expires (Uiterste HoudbaarheidsDatum in Dutch).

## 2. Introduction

### 2.1 Company description

ALSO International is part of the company ALSO Holding AG. ALSO Holding AG has a portfolio of more than 550 vendors in the ICT product categories of hardware, software, and IT services, including all global market leaders [ALSO.com, 2019]. ALSO Holding AG is present in 22 European countries. ALSO International's core business is to distribute printing supplies, cartridges and toners, all over Europe. It is a Business to Business (B2B) company which means that it sells their products to *retailers* and not to the *end-customers*. The customers are for example office retailers and web-shop companies in IT and office supplies. ALSO International only sells products of premium brands. Figure 2.1 shows how the products are moving in the supply chain.

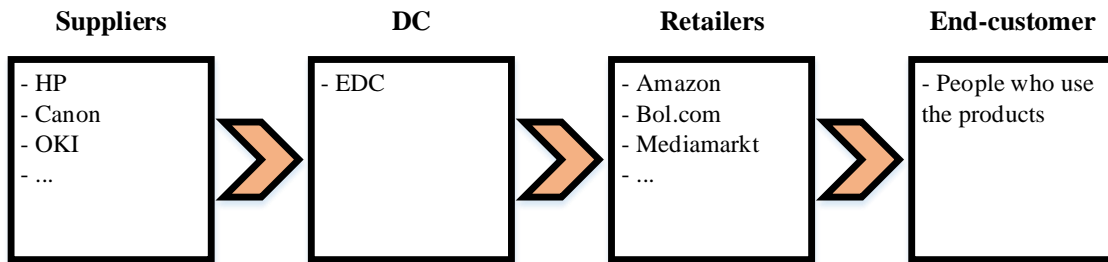


Figure 2.1: Product flows of the supply chain

### 2.2 Problem description

For a long time, companies have been dealing with returned products and the amounts keep increasing [de Koster Marisa P. de Brito and van de Vendel, 2002]. Every day products flow in the reverse direction of the supply chain, from consumer to producer [Autry, 2005]. For some businesses the return rates can be over 20%, it can be very costly if those returns are not handled properly [de Brito and De Koster, 2004]. The reverse Logistics Executive Council reported that US firms have lost billions of dollars due to inefficient processing of return flows [Rogers and Tibben-Lembke, 2001]. The e-commerce era caused a new role in these high return rates [de Koster Marisa P. de Brito and van de Vendel, 2002]. The logistics manager, Arnout van der Maas, stated that the return flows of cartridges and toners has been risen at ALSO International in recent years. Over 180,000 returned products have been processed in 2018. ALSO International is the largest distributor of printing supplies in Europe and is struggling with the problem that more employees are needed at the *RMA department*. Initially, one person was handling this process but currently two persons work full time on this process, while ALSO International is able to increase the capacity up to four working stations, when needed. That means that four people can work at the same time to *process returned products*. According to HP [Davey et al., 2005], there are three main drivers for the product returns: reseller overstocks, unfulfilled expectations of the *end-customers*, and product defects. In this report the reseller overstocks are seen as *type-R products* and the unfulfilled expectations of the *end-customer* and product defects are seen as *type-E products*, what this means will be explained later in the report. Reseller overstocks were due to a mismatch in quantity shipped to the reseller and the quantity that has actually been sold. Misleading sales clerks, uninformed consumers, and unreasonable expectations from the product were also key drivers for customer returns. Return flows have been increasing because customers return their products for just any reason. In the consumer electronics industry only 5% of the returns were truly defective. Most products were returned because the consumer did not like the product as much as anticipated, did not understand how to use it, or regretted an impulsive purchase [Su, 2009].

Returns can be expensive due to the high processing cost and low salvage values associated with returned merchandise [Janakiraman et al., 2016]. On top of that, capacity and other resources



are needed that the company wants to spent differently. Furthermore, extra transportation of products from *retailers* to the *EDC* is needed. That extra transport harms the environment due to the CO<sub>2</sub> emissions. Not only the product itself will be transported but also the box, pallets and packaging materials are part of reverse flows [de Koster Marisa P. de Brito and van de Vendel, 2002]. Next, due to the extra transportation the risk of transportation damage increases. Despite all those cost of returns, most retailers offer a return policy hoping that due to those policies the customers intentions of purchasing will be higher [Jeng, 2017, Janakiraman et al., 2016].

If the returned products are not processed correctly it would lead to unsatisfied customers. They are unsatisfied because they do not receive their money quickly for the products they returned. Those unsatisfied customers complain by sending emails to ALSO International if they did not receive their money after a few weeks. The *RMA department* must respond to those mails which results in even longer *processing times*. Next, those unsatisfied customers do not pay their invoices of ALSO International since they do not receive their money of ALSO International as well. It is therefore very important that the amount of returned products is low and that *processing* those *returned products* does not take long.

There are five groups of people involved in the whole process of returned products. The first group consist of the managers at ALSO International, in particular the logistics manager who is Arnout van der Maas. He has no or little insight in this process. It is for example hard to forecast how many products will be returned, how long it takes to *process returned products*, if there is any difference in *processing returned products*, and how many people are needed at the *RMA department*. The second group of people are the employees who work at the *headquarter*. They have contact with the *suppliers* and *retailers* of ALSO International. The *headquarter* communicates with the *suppliers* and *retailers* what to do with the damaged/used products that arrive at the *RMA department*. The third group consist of the *suppliers*, i.e., Brother, Canon, Epson, HP Inc., Lexmark, OKI and Kyocera. They each have different agreements with ALSO International about what must happen with the returned products. Some *suppliers* always return the money to the customers and throw the products away, while other *suppliers* want the damaged/used products back to their production factory. The fourth group are all the customers of ALSO International which are the *retailers*. They are the ones who actually return the products to the *EDC*. The last group are the employees, Chris and Bianca, who work at the *RMA department*. They are occasionally helped by Thijmen who normally works in the *picking process*. He is able to help the RMA department if the picking process is on schedule. To explain the task of the *suppliers*, employees of the *RMA department* and the *headquarter* an example is given. If for example a product of Canon is damage when it arrives at the *EDC* it is sent to the *RMA department*. Then an employee of the *RMA department* requests to the *headquarter* what to do with the product, the *headquarter* contacts Canon in this case and Canon respond that the product can go to the trash-bin. The *headquarter* forwards this message to the employees of the *RMA department* which then put the Canon product in the trash-bin.

The main problem that appears is that the *RMA department* needs more employees to process all the products that have been returned. The number of products that needs to be processed piles up which causes financial problems as discussed above. Since there is no or little insight in this process at ALSO International, it is not clear why the *RMA department* need more employees. It could for example be that the amount of returned products has increased, that the productivity of the employees has decreased or that certain *processing steps* take more time these days due to products that have been changing over the years. As stated in this subsection processing returned products costs money and other resources. Therefore it is important that research is done into this topic of ALSO International, so that the reasons for the busy times at the *RMA department* becomes clear and financial consequences involved can be reduced.

## 2.3 Research questions

The goal of the research is to figure out why more employees are needed at the *RMA department*. This will be done by looking at the returned products that arrive at the *RMA department*. A classification of companies should give more insight in the amount of returned products. Next, the amount of products will be investigated and the time it takes to process those products will determine which products take the most time. The focus will be on those products, to find out if the workload can be reduced.

### 2.3.1 Main research question

Why does ALSO International need more employees at the *RMA department*?

### 2.3.2 Sub-research questions

1. Which processes take place at the *RMA department*?
2. What quantities do the *product groups* have?
3. Which *product group* takes the most time in total?
4. What are the reasons that this *product group* takes so much time?
5. What can be done to reduce the total time?

## 2.4 Method

1. Which processes take place at the *RMA department*?

All processes that take place at the *RMA department* are mapped. The distinction between incoming product flows is described and the different *processing steps* of the *product groups* are shown by means of a diagram. This information will be gathered by talking with the employees.

2. Has the amount of returned products been growing?

An overview of all the flows that are connected to the *EDC* will be made. This gives more insight in where these returned items are coming from. The SAP system contains data about which *retailers* send which products and which quantities return to the *EDC*. The data will be gathered for multiple years to find out if the amount of returned products are increasing over the years.

3. Which *product group* takes the most time in total?

For this question the amount of returned products per *product groups*, calculated in second sub-question, is multiplied by the time it takes to process a product. To do this the *processing times* of the *processing steps*, discussed in the first sub-question, must be known. Data, observations and discussions with the employees are used to give an estimation of the *processing times*.

4. What are the reasons that this *product group* takes so much time?

If it is clear which *product group* takes the most time, it must be investigated why that is. This could be due to high amounts of products. Flows from the *EDC* to the *retailers* are useful as well, since then it can be seen if there are some *retailers* that sent large proportions of their received products back to the *EDC*. It is for example interesting to know if there is a *retailer* who returns ten percent of their products while other *retailers* return about one percent. It is then useful to investigate that *retailer*. The WMS system has data about flows going from the *EDC* to the *retailers*.

5. What can be done to reduce the total time?

Literature is used to find solution indications to reduce the *processing time* of products, which will lead to a reduction in total time. The previous sub-questions are used to find out if the amount of products can be decreased. Furthermore, other explorations that occurred during the research which could reduce the total time, are described.

## 2.5 Report structure

The remainder of this report is structured as follows. Chapter 3 gives an overview which processes take place at the *RMA department* and if there is any difference in the returned products. This is shown with the use of flows. The next chapter is about the amount of products that arrive at the *RMA department*. In chapter 5 it is calculated what time it takes to *process returned products*. Thereafter, reasons are given why it takes that much time. Possible solution indications are given in chapter 7. The answer on the main research question is given in the conclusion. The recommendations are listed in chapter 9. Finally, the limitations of this research and opportunities for future research are given in the discussion, chapter 10.

### 3. Which processes take place at the *RMA department*?

De Brito stated in 2004 that, independent of the return flow type, the following warehousing processes can be distinguished while *processing returned products*:

- Receipt
- Inspection, sorting & other handling
- (Interim/stock) storage
- Internal transport

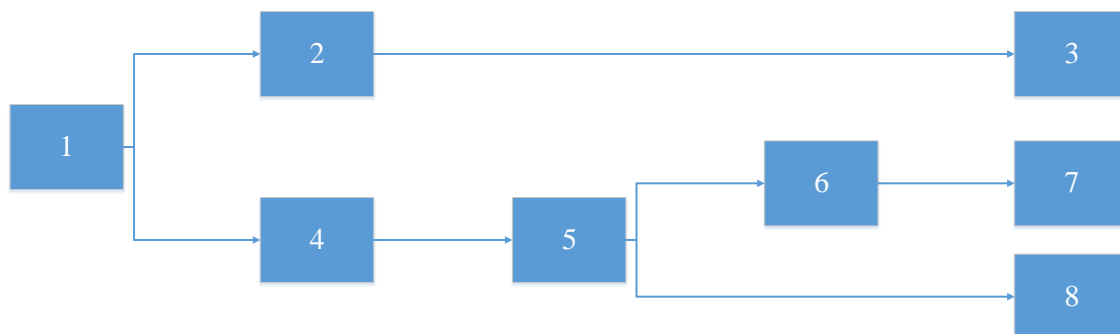
Operations may differ, for example returned products that are as-good-as-new can be restocked to be sold again, while end-of-life products are sold to for example a third party recycler but for all products the four processes above are performed [de Brito and De Koster, 2004]. This also applies to ALSO International. Therefore, the incoming product flows are categorized in three different *product groups*. Products that arrive at the *EDC* from the *supplier* can be damaged due to the transport for example, those products are given to the *RMA department* and they have to process it further. Therefore the first *product group* is called *type-S products*, *S* from *supplier*. Other products that are sent to the *RMA department* are products that are returned by *retailers*. When for example a *retailer* expects not to sell all the products that they bought, they request to return them to ALSO International. Those products are not sold to the *end-customer*. This *product group* is called *type-R products*, *R* from *retailer*. Lastly, products that are sent to the *RMA department* are defect products that have been sold to the *end-customer*. The product did not work and are therefore returned to the *RMA department*. This *product group* is called *type-E products*, *E* from *end-customer*. These three *product groups* are described in more detail below. Figure 3.1, 3.2 and 3.3 show the flows of the products. The number in the boxes means the *processing step* that is executed. All 25 *processing steps* are explained below. At the end of the chapter a summary is given in which the similarities and differences are explained.

1. Distinction between *suppliers*.
2. Picture of the damaged product and form is made and sent to the *headquarter* and the product is put on the HP-purchase pallet.
3. HP-purchase pallet is packed for transport and the right papers and forms are added.
4. Picture of the damaged product and form is made and sent to the *headquarter*, the product is temporarily stored in the cabinet, awaiting for an order from the *headquarter*.
5. *Headquarter* has received an order from the *supplier* and forwarded it to the employees of the *RMA department*.
6. Product is put on the *SW-pallet*.
7. *SW-pallet* is packed for transport and the right papers and forms are added.
8. Parcel is made of the product and is either sent to or collected by the *supplier*, depending on the preferences of the *supplier*.
9. Distinction between products that fulfill the requirements and can therefore go into stock and products that cannot go into stock. Product is checked for *UHD* and for damages.
10. Product is temporarily stored on a pallet that can go into stock.

11. Pallet is brought to *GO* and they make sure that the products go back into the stock of the *EDC*.
12. Product cannot go into stock, a picture is made and sent to the *headquarter*. The product is temporarily stored in the cabinet, awaiting for an order from the *headquarter*.
13. The *headquarter* has received an order from the *retailer* and forwarded it to the employees of the *RMA department*.
14. Parcel is made of the product and is either sent to or collected by the *retailer*, depending on the preferences of the *retailer*.
15. Product is put on the trash-bin pallet.
16. Trash-bin pallet is packed for transport and the right papers and forms are added.
17. Package is opened and products are checked for *UHD*, weight and originality.
18. Product is put on the HP-claims pallet.
19. Full pallet claims is packed for transport and the right papers and forms are added.
20. Product is put on the Lexmark-claims pallet.
21. Products on pallet have to be scanned.
22. Product is put on the Brother-claims pallet.
23. Brother-claims pallet is packed for transport and the right papers and forms are added.
24. Product is put on a temporarily trash-bin pallet, awaiting for the moment the *headquarter* gives the order to throw the products in the trash-bin pallet.
25. Product is put on the trash-bin pallet

### 3.1 *Type-S products*

Products of this *product group* are damaged products that have not been sent to the *retailers*. These products are received at *GO* and come from *suppliers*, if a person sees a damaged product in stock it is given to the *RMA department*. These products can be damaged due to transportation or (un)loading the trucks for example. With these products the case of the product is damaged. The *processing steps* that the employees at the *RMA department* need to take are displayed in Figure 3.1. Since HP is the largest *supplier* they have an own HP purchase pallet, with only *type-S products* of HP.



**Figure 3.1:** Sketch of the product flows of *type-S products*

### 3.2 Type-R products

*Type-R products* are products that have been sold to *retailers* of ALSO International, but because the *retailer* expects that those products will not be sold to the *end-customer*, they requests to ALSO International if they could return those products to the *EDC*. Other reasons for returning products can be that the *retailer* ordered the wrong products, the delivery was too late, the quantity was wrong and many more. The *headquarter* always decides if they accept or deny the request. If ALSO International thinks that they cannot sell those products to other *retailers* the request is denied. When the request is accepted, a *QM-list* with all *type-R product types* is made in the SAP system. *Type-R products* should be in a perfect condition so that it can go on stock, unfortunately since it has been transported and (un)loaded for a few times it is possible that the case of the product is damaged or that the *UHD* has expired, then the products cannot go into stock. Therefore these products are checked by the employees of the *RMA department*. The *processing steps* that have to be performed by the *RMA department* are shown in Figure 3.2.

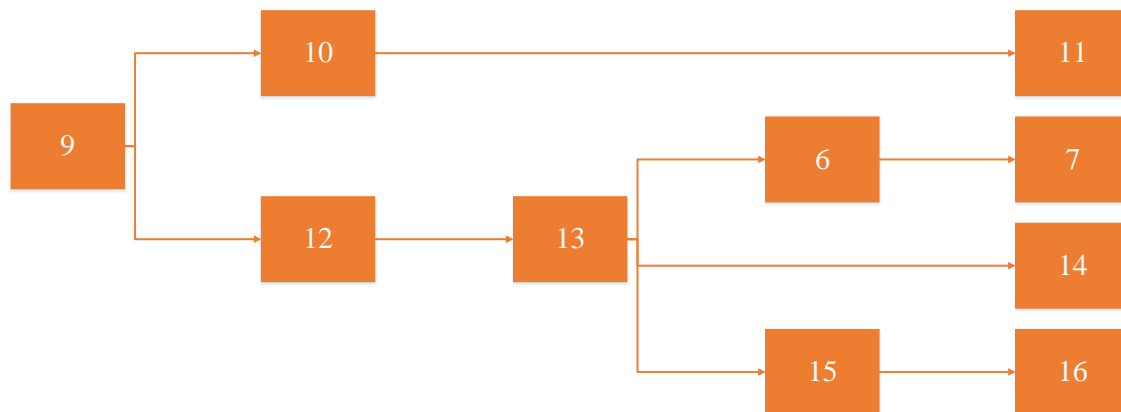
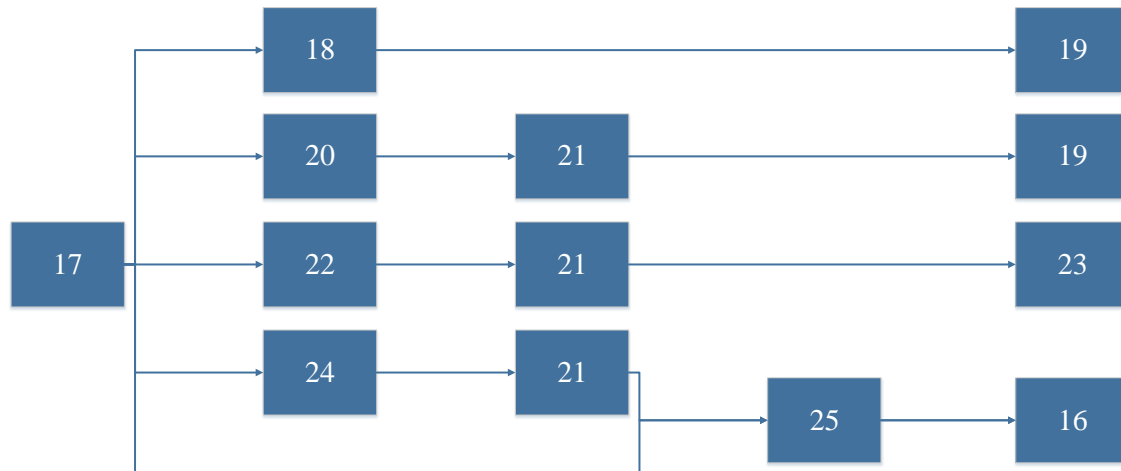


Figure 3.2: Sketch of the product flows of *type-R products*

### 3.3 Type-E products

This *product group* consist of products that have been sold to the *end-customer*. The *end-customer* returned the product because it did not work as it should be, reasons for that are for example the printer does not recognize the product, the product produces stripes/lines or the product is leaking. The products are checked by the *RMA department* since some *end-customers* are trying to manipulate things, they return for example products from fake brands or products that are empty. Figure 3.3 shows the *processing steps* that have to be performed for these products.



**Figure 3.3:** Sketch of the product flows of *type-E* products

### 3.4 Summary

The three product flows in Figures 3.1, 3.2 and 3.3 have some things in common but there are some big differences as well. Those similarities and differences are described below.

#### 3.4.1 Similarities

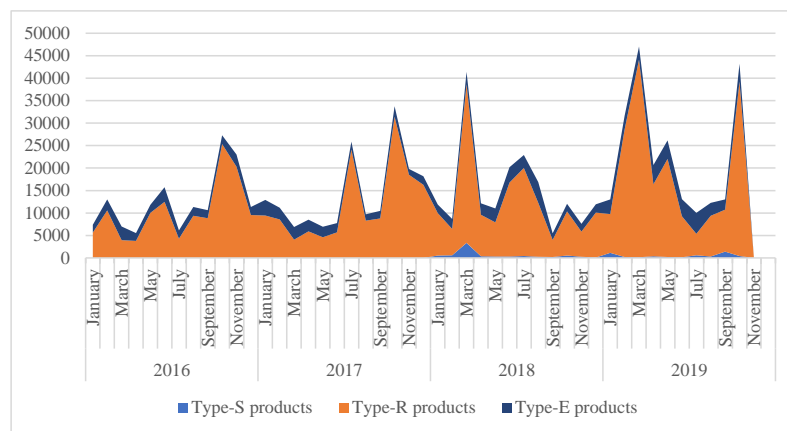
To make clear that for some numbers the *processing steps* are meant the processes are given in "curly brackets"  $\{ \}$ . So for example *processing step*  $\{8\}$  is the eight *processing step*. Processes  $\{4,5,6,7\}$  in *type-S* products are almost exactly the same steps as  $\{12,13,6,7\}$  for *type-R* products. This process involves that if a product is damaged it can go to the *SW-pallet*. Processes  $\{4,5,8\}$  for *type-S* products is almost the same as  $\{12,13,14\}$  for *type-R* products. Another similarity between *type-S* products and *type-R* products is that if a product is not good enough for the stock a picture has to be made and sent to the *headquarter*, these steps are  $\{4\}$  and  $\{12\}$  respectively. Next, with products that have been sent to the *retailer*, so *type-R* products and *type-E* products, the products are always checked, depending on the *product group* there are some requirements. If the products does not fulfill the requirements it can be sent to the trash-bin.

#### 3.4.2 Differences

The biggest difference between the three *product groups* is that only with *type-R* products products can go back into stock. Next, *type-S* products are not registered in the SAP system but in an excel sheet. Furthermore, *type-S* products cannot go to the trash-bin while it is possible with the other *product groups*. Another difference is that with *type-E* products some *suppliers* have their own pallet of used products while the *SW-pallet* consist of products of all different *suppliers* excluding HP.

## 4. What quantities do the *product groups* have?

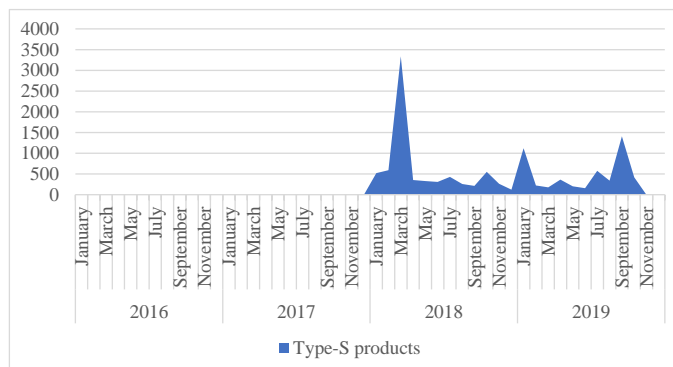
As stated before there are three *product groups*, it is checked per *product group* which amount has been received recent years. Data of previous years are used as well so that it can be seen if the amounts have been growing over the years. If that is the case it is possible that those amounts of that *product group* will rise further. In this part of the report the amount of returned products is measured per month for the years 2016, 2017, 2018 and 2019. For *Type-S products* the data of years 2016 and 2017 are missing, since 2018 an excel file has been used to keep track of these products. Due to deadline reasons of this report, the amounts are up to and including the month October for the year 2019. Figure 4.1 shows the total amount of products that are returned, a diversification is made between *product groups* so that these amounts can be clarified. Each *product group* is explained below and a summary is given at the end of this sub-question.



**Figure 4.1:** Total amount of returned products

### 4.1 *Type-S products*

Products of this *product type* are not registered in the SAP system. Since the start of 2018 an excel file has been used to keep track of these products, therefore only years 2018 and 2019 are visible in Figure 4.2. The high peak in March 2018 can be linked to a return of HP in which 3150 products were delivered incorrectly. Table 4.1 shows the amount of lines and products returned per year. The lines indicate the amount of different *product types* that arrived and the products indicate the amount of products that arrived. So if for example the same four products of HP arrive at the *RMA department*, it means that it has one line and four products.



**Figure 4.2:** Amount of *type-S* products

Year	Lines	Products
2016		
2017		
2018	1253	7,278
2019	841	4,985

**Table 4.1:** Amount of *type-S* lines and products



## 4.2 *Type-R products*

Products can be returned for a lot of reasons. There are over seventy problems that can be registered. It is however not the case that every product that is registered as a returned product, has physically been returned to the *EDC*. If for example a mistake is made and the wrong quantity is sent or there is a mistake with the invoice, it is corrected in the SAP system as returned products. Those products are however not returned physically, it is a fictive return to correct the mistake. In fact only with five problems the products are actually returned to the *EDC* and thus have to be processed by the employees of the *RMA department*. Therefore, only those five problems are important for this research. The five problems with associated problem-number are:

- (03) Total transport damage
- (22) RMC (mistake by purchase department)
- (25) Wrong ordered by customer
- (30) Product no longer required
- (98) Others

ALSO International uses the SAP system to register returned products. Figure 4.3 shows the amount of *type-R products* that have been returned. The high peaks show that there is a lot of fluctuations in the quantities per month. A potential reason for these peaks is that big *retailers* return a lot of products at once, according to the employees of the *RMA department*. The amount of orders, lines and products is shown in Table 4.2. If for example an order arrives with two of the same products of HP and five of the same products of Canon, it means that that there is one order, with two lines and seven products. The amount of products has increased with more than 17% in 2017 with regards to 2016 but in 2018 it slightly decreased compared to 2017. 2019, with still two months less than 2018, has already an increase of more than 31% compared to 2018 which is enormous.

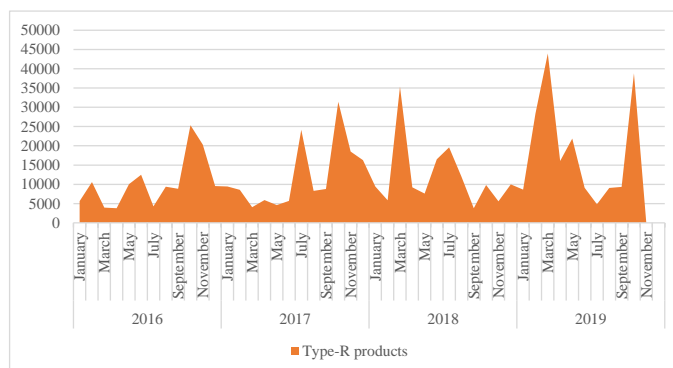


Figure 4.3: Amount of *type-R products*

Year	Orders	Lines	Products
2016	3659	13,316	124,201
2017	3732	15,813	145,698
2018	3621	18,456	144,703
2019	2745	19,440	189,983

Table 4.2: Amount of *type-R* orders, lines and products

## 4.3 *Type-E products*

Figure 4.4 shows the amount of *type-E products* that have been returned. There is some fluctuations but this is less than *type-R products*. Table 4.3 shows the amount of orders, lines and products. The amount of products has slightly grown in 2017 compared to 2016 and in 2018 it has grown with almost 15% compared to 2017. The amount of 2019 is 16% higher than the amount of 2018. Just as with *type-R products* the amounts with two months missing has been increasing.

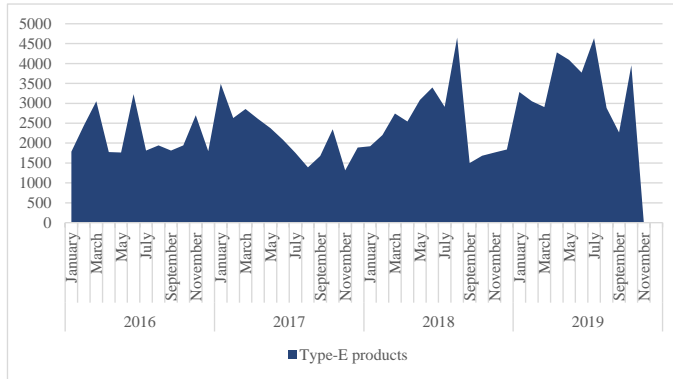


Figure 4.4: Amount of *type-E* products

Year	Orders	Lines	Products
2016	2,348	18,828	26,052
2017	2,332	19,496	26,416
2018	2,332	19,913	30,239
2019	3,930	27,754	35,134

Table 4.3: Amount of *type-E* orders, lines and products

## 4.4 Results

Tables 4.4, 4.5 and 4.6 show that the total amounts of lines and returned products has been growing since 2016. The amount of orders has increased in 2019 compared to 2018. *Type-S products* does not have orders since they are not registered in the SAP system. Those products have not been returned by *retailers* or *end-customers* and are therefore not in the SAP system. In the column "Total" in Tables 4.5 and 4.6 a star is added for the years 2016 and 2017, because the *type-S* lines and products are missing for those years the total amount would be higher actually. For the year 2019, there are still two months that have not been included in these amounts, so those amounts will be higher eventually. The high increase in returned products is mainly due to the increasing amount of *type-R products*. *Type-E products* have been growing as well but the total amount of *type-R products* is much higher. In 2019 *type-R products* contain more than 82% of the total amount of returned products and has therefore by far the biggest share. The high increase of *type-R products* is explained in chapter 6. Due to time limits of this report not each *product group* can be explained in detail, some extra data about *type-E products* is given in appendix B.

Year	<i>Type-S products</i>	<i>Type-R products</i>	<i>Type-E products</i>	Total
2016	0	3,659	2,348	6,007
2017	0	3,732	2,332	6,064
2018	0	3,621	2,332	5,953
2019	0	2,745	3,930	6,675

Table 4.4: Orders per *product group* in years 2016-2019

Year	<i>Type-S products</i>	<i>Type-R products</i>	<i>Type-E products</i>	Total
2016	-	13,316	18,828	32,144*
2017	-	15,813	19,496	35,309*
2018	1,253	18,456	19,913	39,622
2019	841	19,440	27,754	48,035

Table 4.5: Lines per *product group* in years 2016-2019

Year	<i>Type-S products</i>	<i>Type-R products</i>	<i>Type-E products</i>	Total
2016	-	124,201	26,052	150,253*
2017	-	145,698	26,416	172,114*
2018	7,278	144,703	30,293	182,220
2019	4,985	189,983	35,134	230,102

Table 4.6: Returned products per *product group* in years 2016-2019

## 5. Which *product group* takes the most time in total?

In order to answer this question, it is important that the *processing time* of the *processing steps* of Figures 3.1, 3.2 and 3.3 are known. This will be explained in the first part of this chapter. With that information the total time per *product group* can be calculated in the second part, so that the sub-question can be answered.

### 5.1 *Processing time per processing step*

Unfortunately, not for every *processing step* there is data of the first ten months of 2019. Therefore, some steps are determined with the use of the data of 2018. For other steps an observation together with the opinions of the employees were decisive. Since every order is different, it is very hard to come up with an average *processing time* per *processing step*. For example, an order with hundred products with the same *product type* takes less time than an order with hundred products with hundred different *product types*. On top of that, if all products are damaged it takes much more time than if the products are in a good condition. Below each *processing step* is explained.

1. Distinction between *suppliers*.

This *processing step* does not take any *processing time*. The total amount of products that arrive at *processing step* {1} is 4,985 as described in chapter 4. The amount of HP products is 2,356, this is about 47% of the total amount of *type-S products*. So 47% of the *type-S products* that are received at the *RMA department* goes to *processing step* {2} and 53% of the products goes to *processing step* {4}.

2. Picture of the damaged product and form is made and sent to the *headquarter* and the product is put on the HP-purchase pallet.

To find the *processing time* of this *processing step*, Chris was asked during the interview to give an approximation, see Appendix A. This was combined with watching him performing this step, concluding that the mean of this step is one minute and ten seconds (00:01:10).

3. HP-purchase pallet is packed for transport and the right papers and forms are added.

Packing a pallet with plastic and adding the right papers takes about twenty minutes (00:20:00), see Appendix A. But this is for a whole pallet with a lot of products on it. The amount of products on a HP purchase pallet differ a lot. Table 5.1 shows the amount of products that were on a HP purchase pallet in 2019. Twenty minutes divided by the amount of products on that pallet is the average time per product in seconds. For the HP-purchase pallet an average of about 9 seconds (00:00:09) per product is used.

4. Picture of the damaged product and forms is made and sent to the *headquarter*, the product is temporarily stored in the cabinet, awaiting for an order from the *headquarter*.

Observing Chris and consulting together it takes about 3 minutes (00:03:00) to do per product.

Amount products on HP purchase pallet	Average time per product in seconds
132	11,36363636
97	12,37113402
102	11,76470588
150	8
208	5,769230769
105	11,42857143
138	8,695652174
143	8,391608392
145	8,275862069
379	3,166226913
135	8,888888889
131	9,160305344
1077	1,114206128
96	12,5
286	4,195804196

**Table 5.1:** Amount of products on HP purchase pallet

5. *Headquarter* has received an order from the *supplier* and forwarded it to the employees of the *RMA department*.

The response time of the *headquarter* has been improving, see Appendix A. About 80% of the time a response is given in one week 15% of the time a response is given in two weeks and about 5% of the time it takes three weeks. This is however not that important since it does not take any time for the employees. The *processing time* can therefore be ignored. Chris however states that it does bother him if products stay in the cabinet for a month, because it is nice if the cabinet is tidy. About 26% of the products have to be sent to the *supplier*, *processing step* {8}, which means that 74% of the products are put on the *SW-pallet*, *processing step* {6}.

6. Product is put on the *SW-pallet*.

According to the observation the mean time to put a product from the cabinet on the *SW-pallet* is one minute and fourteen seconds (00:01:14).

7. *SW-pallet* is packed for transport and the right papers and forms are added.

Packing a pallet takes about 20 minutes (00:20:00), see the translation of the interview of Chris in appendix A. The amount of products on a *SW-pallet* is fluctuating. Table 5.2 shows the amount of products and the average time per product of *SW-pallets* in 2019. The mean time of packing a *SW-pallet* is about 8 seconds (00:00:08) per product.

Amount products on HP purchase pallet	Average time per product in seconds
159	7,547169811
199	6,030150754
120	10

**Table 5.2:** Amount of products on *SW-pallet*

8. Parcel is made of the product and is either sent to or collected by the *supplier*, depending on the preferences of the *supplier*.

This *processing step* takes about ten minutes (00:10:00) per product, see Appendix A.

9. Distinction between products that fulfill the requirements and can therefore go into stock and products that cannot go into stock. Product is checked for *UHD* and for damages.

The time for checking the products is measured together with *processing step* {10} and {12} so therefore the *processing time* is zero. The total amounts of product that arrive is 189,983 which can be seen in chapter 4. Since ALSO International does not receive overviews of what percentage goes to stock anymore, data of 2018 is used. The amounts and percentages of eight months can be found in Table 5.3, the data of the missing months was not available. The column "Total" means the total amount of *type-R products* that have been returned to the *RMA department* in that month.

Month	Total	Stock	Percentage
Jan	92275	91420	99,07%
Feb	18220	17235	94,59%
Mar	58533	56831	97,09%
Apr	69591	68746	98,79%
May	33110	31076	93,86%
Jun	31517	29341	93,10%
Jul			
Aug			
Sep			
Oct	36992	36134	97,68%
Nov	18927	17077	90,23%
Dec			
Average			95,55%

**Table 5.3:** Amount of products go to stock of *type-R products*

The percentage that goes into stock {10} is 95,55%. 4.45% of the products goes to *processing step* {12}.

10. Product is temporarily stored on a pallet that can go into stock.

Checking the products, including moving the pallet to the desk takes about one minute (00:01:00).

11. Pallet is brought to *GO* and they make sure that the products go back into the stock of the *EDC*.

The amount of products that are on a pallet differ a lot, Chris normally puts about fifteen different *product types* on a pallet, it could be that there is only one product per type or it could be ten products. When observing and talking with the employees the mean time per product is about fifteen seconds (00:00:15) per product.

12. Product cannot go into stock, a picture is made and sent to the *headquarter*. The product is temporarily stored in the cabinet, awaiting for an order from the *headquarter*.

The *processing time* is about 2 minutes (00:02:00).

13. The *headquarter* has received an order from the *retailer* and forwarded it to the employees of the *RMA department*.

The response time of the *headquarter* is the same as with *processing step* {5}. About 30% of the products have to be packed for a parcel and thus go to *processing step* {14}, see Appendix A. According to the data that has been used in *processing step* {9} as well, goes about 46% of the products to the *SW-pallet* so to *processing step* {6} and 24% goes to the trash-bin which is *processing step* {15}.

14. Parcel is made of the product and is either sent to or collected by the *retailer*, depending on the preferences of the *retailer*.

This has the same *processing time* as *processing step* {8}.

15. Product is put on the trash-bin pallet.

This *processing step* takes about 2 minutes (00:02:00), this includes reading the mail saying that the product can go to the trash-bin.

16. Trash-bin pallet is packed for transport and the right papers and forms are added.

This is hard to measure because the amount of products that can go into the trash-bin pallet, is hard to find out. This depends on the amount of cartridges and toners. Since the package material is removed more products can go on a trash-bin pallet than on a *SW-pallet*. The package material is about two times the product, which would imply that there are two times more products on a trash-bin pallet than on a *SW-pallet*. Furthermore there are two pallets that have to be full, before it is transported. This would imply that the mean *processing time* is about two seconds (00:00:02) per product.

17. Package is opened and products are checked for *UHD*, weight and originality.

When observing it took about two minutes and ten seconds (00:02:10) per product. 35,134 products arrived in 2019. About 76% of the products of this *product group* is of the brand HP and thus goes to *processing step* {18}. About 4% is of Lexmark and goes to {20}, 3% is of Brother and goes to {22}, 2% is of OKI and goes to {24}, and the remaining 15% goes to the trash-bin {15}.

18. Product is put on the HP-claims pallet.

This takes about ten seconds (00:00:10).

19. Full pallet claims is packed for transport and the right papers and forms are added.

This is the same as for the trash-bin pallet. Only with these pallets there is just one pallet instead of two and the pallet is a bit bigger. Therefore the mean *processing time* is about three seconds (00:00:03) per product.

20. Product is put on the Lexmark-claims pallet.

This takes about ten seconds (00:00:10) per product.

21. Products on pallet have to be scanned.

This takes about two seconds (00:00:02) per product.

22. Product is put on the Brother-claims pallet.

This takes about ten seconds (00:00:10) per product.

23. Brother-claims pallet is packed for transport and the right papers and forms are added.

This pallet is much smaller and takes therefore more time per product to process. This takes approximately 6 seconds per product (00:00:06).

24. Product is put on a temporarily trash-bin pallet, awaiting for the moment the *headquarter* gives the order to throw the products in the trash-bin pallet.

This takes about ten seconds (00:00:10) per product.

25. Product is put on the trash-bin pallet.

This takes about ten seconds (00:00:10) per product.

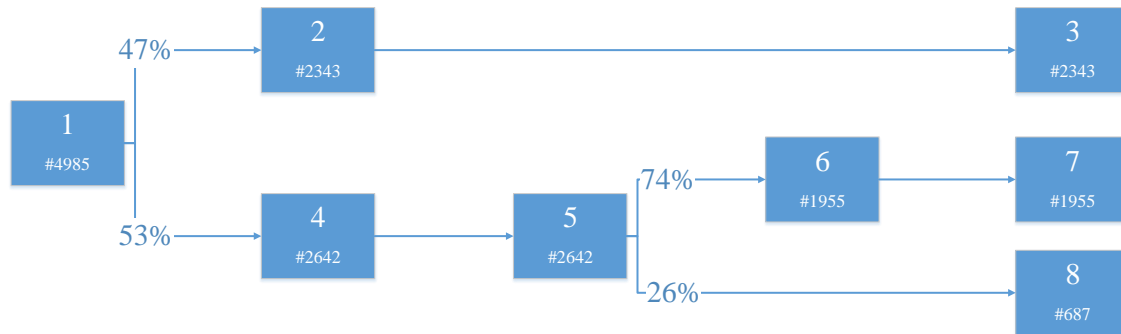
## 5.2 Total time per *product group*

Per *product group* the total time is calculated. With the use of Figures 3.1, 3.2 and 3.3 the total time of the products will be calculated. The amount of products that will be used is of the first ten months of 2019 for all the three *product groups* and the amounts are shown in the boxes of Figures 3.1, 3.2 and 3.3.

### 5.2.1 *Type-S products*

The last *processing step* is either {3}, {7} or {8}. If the amount of products in those *processing steps* is clear, the time it takes to come to that step can be calculated. Therefore, the first step is to calculate the amounts that ends in *processing step* {3}. Figure 5.1 shows the amount of products that go to each step. The percentages and amounts are described in section 5.1.

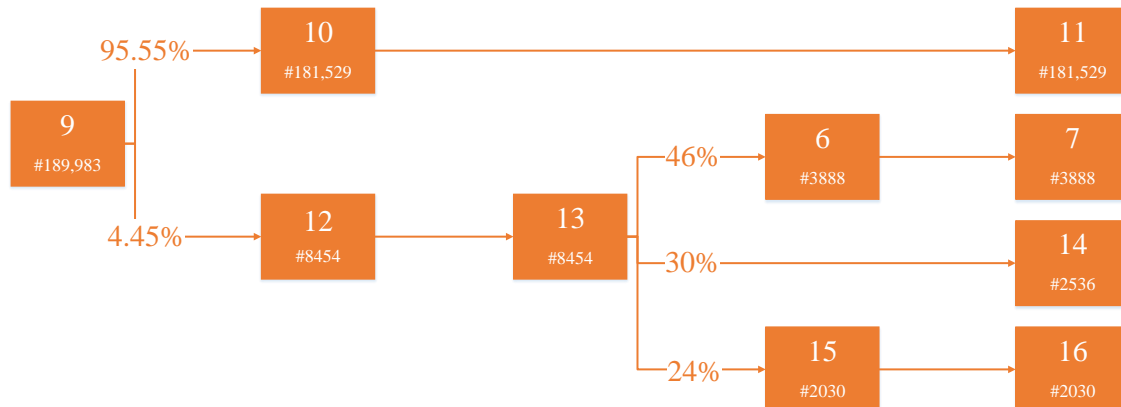
To find the total *processing time* of *type-S products* the *processing time* has to be multiplied by the amounts. The 2,343 ( $4,985 * 47\%$ ) products that are processed with *processing step* {3} and thus have taken path {1,2,3}, take (00:00:00), (00:01:10) and (00:00:09) respectively which is a total time of (00:01:19) per product. This means that 2,343 products took (00:01:19) per product which is a total amount of (51:24:57). The 1,955 ( $4,985 * 53% * 74\%$ ) products with the last *processing step* {7}, have taken path {1,4,5,6,7} which takes (00:00:00), (00:03:00), (00:00:00), (00:01:14) and (00:00:08) respectfully. Those times together is (142:16:50). For *processing step* {8} the path is {1,4,5,8} which has a time of (00:00:00), (00:03:00), (00:00:00) and (00:10:00) which is a total of (00:13:00). Multiplied by 687 ( $4,985 * 53% * 26\%$ ) products is a total of (148:51:00). This means that the total time of processing 4,985 products of *type-S products* is (342:32:47). It means that, in year 2019, approximately **343** hours is spent on *type-S products*.



**Figure 5.1:** Sketch of the product flows of *type-S products* with amounts

### 5.2.2 *Type-R products*

The last *processing step* for *type-R products* is either {11}, {7}, {14} or {16}. The percentages and amounts are given before and are shown in Figure 5.2.



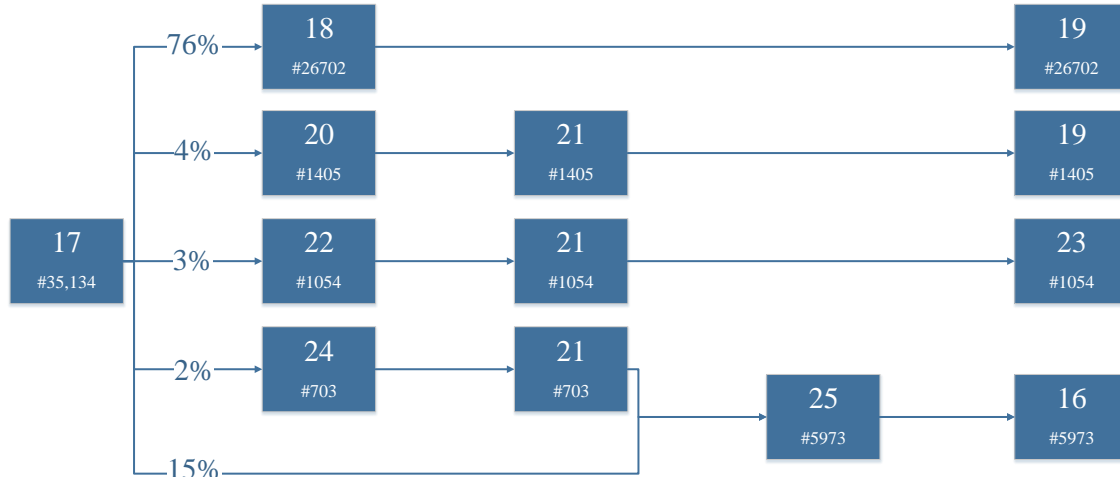
**Figure 5.2:** Sketch of the product flows of *type-R products* with amounts

The path to *processing step* {11} is {9,10,11}. The time it takes is (00:00:00), (00:01:00) and (00:00:15) respectively, together this is (00:01:15). Multiplied by 181,529 ( $189,983 * 95.55\%$ ) products that have taken *processing step* {11}, gives a time of (3781:51:15). The path to *processing step* {7} is {9,12,13,6,7}. The time it takes is (00:00:00), (00:02:00), (00:00:00), (00:01:14) and (00:00:08) respectively. This together is a time of (00:03:22), multiplied by 3,888 ( $189,983 * 4.45\% * 46\%$ ) products of *processing step* {7} is a total time of (218:09:36). {9,12,13,14} is the path to *processing step* {14}. This time is (00:00:00), (00:02:00), (00:00:00) and (00:10:00) which together is a time of (00:12:00). For 2,536 ( $189,983 * 4.45\% * 30\%$ ) products of *processing step* {14} the time is (507:12:00). The path to *processing step* {16} is {9,12,13,15,16}. The time it takes is (00:00:00), (00:02:00), (00:00:00), (00:02:00) and (00:00:02) respectively. The time together is (00:04:02), multiplied by 2,030 ( $189,983 * 4.45\% * 24\%$ ) products is (136:27:40). The total *processing time* of *type-R products* is  $(3781:51:15) + (218:09:36) + (507:12:00) + (136:27:40) = (4643:40:31)$ . So, approximately **4644** hours were spent on *type-R products* in the first ten months of 2019.



### 5.2.3 Type-E products

The products can either end in *processing step* {19}, {19}, {23} or {16}. The percentages and amounts are shown in Figure 5.3.



**Figure 5.3:** Sketch of the product flows of *type-E products* with amounts

The path to *processing step* {19} is {17,18,19}. The time it takes is (00:02:10), (00:00:10) and (00:00:03) respectively. The time together is (00:02:23), multiplied by 26,702 ( $35,134 * 76\%$ ) products of *processing step* {17} is (1060:39:46). The other path to *processing step* {19} is {17,20,21,19}. The time it takes is (00:02:10), (00:00:10), (00:00:02) and (00:00:03). The time together is (00:02:25), multiplied by 1,405 ( $35,134 * 4\%$ ) products is (56:35:25). The path to *processing step* {23} is {17,22,21,23}. The time it takes is (00:02:10), (00:00:10), (00:00:02), (00:00:06). Together this is (00:02:28), multiplied by 1,054 ( $35,134 * 3\%$ ) products is (43:19:52). *Processing step* {16} can be reached via path {17,24,21,25,16} and via path {17,25,16}. The first *processing time* is (00:02:10), (00:00:10), (00:00:02), (00:00:10) and (00:00:02). Together this is (00:02:34), multiplied by 703 ( $35,134 * 2\%$ ) products is (30:04:22). The other path takes (00:02:10), (00:00:10) and (00:00:02). Together this is (00:02:22), multiplied by 5,270 products is (207:52:20). 5,270 products comes from 5,973 minus 703 products. The total time for processing *type-E products* is (1060:39:46) + (56:35:25) + (43:19:52) + (30:04:22) + (207:52:20) = (1398:31:45). This means that approximately **1399** hours is spent on *type-E products*.

## 5.3 Summary

The total time for processing *type-S products* is approximately 343 hours, the total time for processing *type-R products* is approximately 4644 hours and the total time for processing *type-E products* is approximately 1399 hours. The total amount together is  $343 + 4644 + 1399 = 6386$  hours. *Type-S products* contain about 5%, *type-R products* contain about 73% and *type-E products* contain about 22% of the total amount of returned products. This means that processing *type-R products* takes by far the most time to process. As discussed in chapter 5.1 it is hard to find an average *processing time* for some *processing steps*. The average *processing time* per product of large orders will be lower on average than an order with a few products. Furthermore, it differs if the products are in a good condition, then it is easier because the product immediately can go on stock while otherwise an email has to be sent which takes more time. All in all the approximation was quite okay. The approximated time the employees of the *RMA department* would have been working on the returned products as measured in this chapter is 6386 hours. The time that is registered for the *RMA department* by ALSO International is about 6815 hours, which is quite close to the approximation.

The average time to process according to the calculation is for *type-S products* four minutes and seven seconds (00:04:07), for *type-R products* it is the lowest of the three namely one and a half minute (00:01:30) and for *type-E products* it takes on average two minutes and 23 seconds (00:02:23). Although *type-S products* has the highest average time, *type-R products* contain almost 73% of the total time. All in all *type-R products* have the highest amount of products as stated in chapter 4 and has the highest share in *processing time* according to this chapter. The focus will therefore be on *type-R products* in the next chapter.

## 6. What are the reasons that this *product group* takes so much time?

As seen in chapter 5, processing of *type-R products* takes the most time of the three *product groups*. The high amount of products is definitely part of the reason why, however the average *processing time* per product is the lowest of the three. Therefore, the amount of *type-R products* is investigated in more detail to find out why that amount is growing that much. Next the reasons for those returns will be addressed to find out if that has influence as well.

### 6.1 Explanation of the high amounts of *type-R products*

Explaining these high amounts is extremely hard. Therefore, a distinction in *retailers* has to be made. This distinction makes sure that each group can be analysed separately. It is chosen to make four groups, since each of that group has specific agreements with ALSO International. The first group contains ALSO companies, they are part of ALSO Holding A.G. as well. Those companies sell among others, products of ALSO International. The second group is the largest customer of ALSO International: Amazon. The third group are companies at which ALSO International has consignment stock. That means that ALSO International stores their products at the warehouses of those companies but ALSO International is still the owner of the products. The companies that have consignment stock are Office depot and Staples. The last group are the regular retailers. Each group is explained in more detail below.

#### 6.1.1 ALSO companies

Figure 6.1 shows which amount of total *type-R products* is from ALSO companies. A few peaks can be explained to the returns of ALSO companies. Table 6.1 shows that only a small percentage of the orders is from ALSO companies. While Table 6.3 shows that the amount of products is much higher. This implies that ALSO companies do not return that often products, but if they return it are a lot of products at once. This explains the high peaks in Figure 6.1. Table 6.2 shows that the percentage of lines is not that high compared to the percentage of products. This implies that if they return a product, it is most of the time more than one of that same *product type*. In 2018 it contained almost half of the returned *type-R products*. In 2019 the amount has grown with almost 8%, and there are still two months are missing. The column "Percentage returned" in Table 6.3 shows the amount of *type-R products* of ALSO divided by the amount sold. That percentage has increased with 0.30% in 2019 compared to 2018.

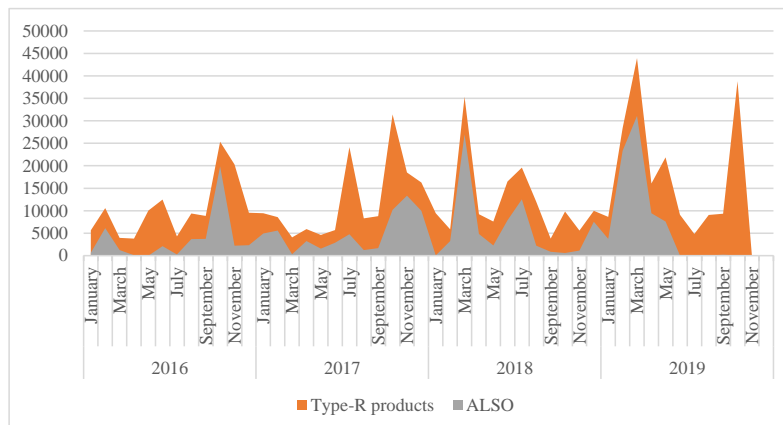


Figure 6.1: Amount of *type-R products* ALSO companies

Year	Total <i>type-R</i> orders	<i>Type-R</i> orders ALSO	Percentage of <i>type-R</i>
2016	3,659	87	2.38%
2017	3,732	109	2.92%
2018	3,621	215	5.94%
2019	2,745	132	4.81%

**Table 6.1:** Amount of *type-R* orders ALSO companies

Year	Total <i>type-R</i> lines	<i>Type-R</i> lines ALSO	Percentage of <i>type-R</i>
2016	13,316	972	7.30%
2017	15,813	2,163	13.68%
2018	18,456	3,965	21.48%
2019	19,440	2,123	10.92%

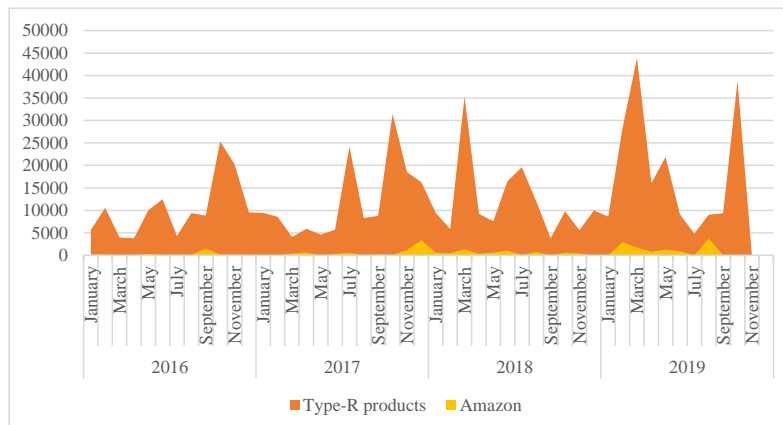
**Table 6.2:** Amount of *type-R* lines ALSO companies

Year	Total <i>type-R</i> products	<i>Type-R</i> products ALSO	Percentage of <i>type-R</i>	Amount sold	Percentage returned
2016	124,201	42,318	34.07%		
2017	145,698	59,732	41.00%		
2018	144,703	70,183	48.50%	9,361,294	0.75%
2019	189,983	75,597	39.79%	7,208,100	1.05%

**Table 6.3:** Amount of *type-R* products ALSO companies

### 6.1.2 Amazon

Table 6.4 shows that quite a lot of orders is from Amazon, compared to the amount of products returned in Table 6.6. This means that Amazon returns very often, but the orders do not contain much products. Figure 6.2 shows that there is indeed not that much fluctuation, some months are higher than others but all in all there are no extremes. Amazon is the biggest customer of ALSO International. Table 6.6 shows the amount and percentages of the total *type-R* products that is from Amazon. According to the logistics manager Arnout van der Maas Amazon contains about 20% of the sales, this is confirmed according to the data of 2019. Their returns are therefore not that high, but are increasing substantially with 80%. The column "Percentage returned" in Table 6.6 is the amount of *type-R* products of Amazon divided by the amounts sold. The percentage has grown with 0.06% in 2019 compared to 2018.



**Figure 6.2:** Amount of *type-R* products Amazon

Year	Total <i>type-R</i> orders	<i>Type-R</i> orders Amazon	Percentage of <i>type-R</i>
2016	3,659	426	11.64%
2017	3,732	789	21.14%
2018	3,621	1040	28.72%
2019	2,745	1216	44.30%

**Table 6.4:** Amount of *type-R* orders Amazon

Year	Total <i>type-R</i> lines	<i>Type-R</i> lines Amazon	Percentage of <i>type-R</i>
2016	13,316	2,192	16.46%
2017	15,813	3,482	22.02%
2018	18,456	6,042	32.74%
2019	19,440	7,308	37.59%

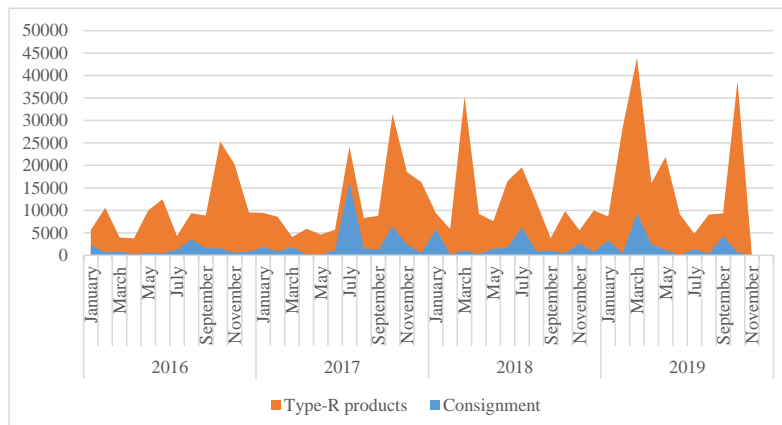
**Table 6.5:** Amount of *type-R* lines Amazon

Year	Total <i>type-R</i> products	<i>Type-R</i> products Amazon	Percentage of <i>type-R</i>	Total sold	Percentage returned
2016	124,201	3,235	2.60%		
2017	145,698	6,831	4.69%		
2018	144,703	6,437	4.45%	6,461,788	0.10%
2019	189,983	11,619	6.12%	7,135,283	0.16%

**Table 6.6:** Amount of *type-R* products Amazon

### 6.1.3 Consignment companies

Tables 6.7 and 6.9 show that the amount of orders is in line with the amount of products. Figure 6.3 shows what amount of total *type-R* products is from companies that have consignment stock. There are some peaks in the figure and that is due to the decreasing amount of orders. Less orders with the same amount of returned products, means that the orders are sent less often but the orders contain more products. The amount and percentage of returned products is fluctuating a bit, but the amount in 2019 is almost the same as in 2018. In 2017 the consignment companies had a high peak in July, which refers to the high amount and percentage that year. The column "Percentage returned" in Table 6.9 is the amount of *type-R* products of consignment companies divided by the amount that has been sold. Although the amount has been quite the same in 2018 and 2019 the percentage returned has grown with 0.29%.



**Figure 6.3:** Amount of *type-R* products consignment companies

Year	Total <i>type-R</i> orders	<i>Type-R</i> orders consignment	Percentage of <i>type-R</i>
2016	3,659	805	22.00%
2017	3,732	703	18.84%
2018	3,621	656	18.12%
2019	2,745	332	12.09%

**Table 6.7:** Amount of *type-R* orders consignment companies

Year	Total <i>type-R</i> lines	<i>Type-R</i> lines consignment	Percentage of <i>type-R</i>
2016	13,316	2,477	18.60%
2017	15,813	4,489	28.39%
2018	18,456	3,138	17.00%
2019	19,440	4,322	22.23%

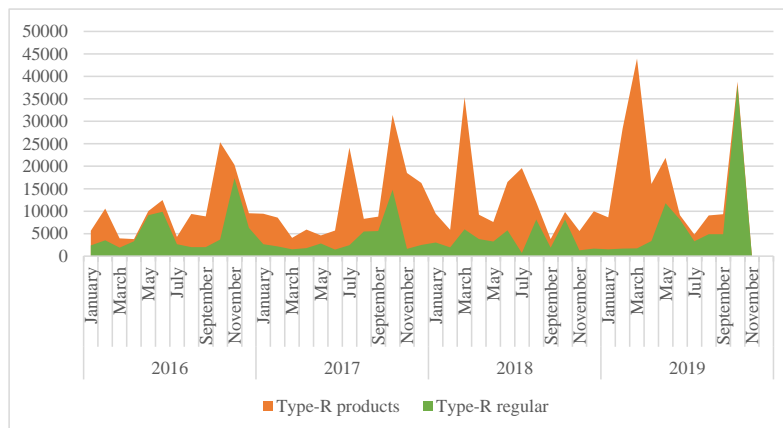
**Table 6.8:** Amount of *type-R* lines consignment companies

Year	Total <i>type-R</i> products	<i>Type-R</i> products consignment	Percentage of <i>type-R</i>	Total sold	Percentage returned
2016	124,201	14,512	11.68%		
2017	145,698	34,418	23.62%		
2018	144,703	22,616	15.63%	4,793,412	0.47%
2019	189,983	23,468	12.35%	3,087,842	0.76%

**Table 6.9:** Amount of *type-R* products consignment companies

#### 6.1.4 Regular companies

This group consist of the regular *retailers*, which does not have consignment stock or different agreements with ALSO International. Figure 6.4 and Table 6.12 show the amount of *type-R* *products* that are sent by regular customers. Table 6.10 show that the amount of orders is decreasing each year since 2016, so those companies return less often. Due to the fluctuating amount of returned products in years 2016-2019 it is hard to take a conclusion out of this. The amounts and percentage in 2017 and 2018 are almost identically but in 2019 it increased a lot with almost 75%. The column "Percentage returned" in Table 6.12 is the amount of *type-R* *products* of regular companies divided by the amount sold, that percentage has more than doubled in 2019 compared to 2018.



**Figure 6.4:** Amount of *type-R* products regular companies

Year	Total <i>type-R</i> orders	<i>Type-R</i> orders regular companies	Percentage of <i>type-R</i>
2016	3,659	2,341	63.98%
2017	3,732	2,131	57.10%
2018	3,621	1,710	47.22%
2019	2,745	1,065	38.80%

**Table 6.10:** Amount of *type-R* orders regular companies

Year	Total <i>type-R</i> lines	<i>Type-R</i> lines regular companies	Percentage of <i>type-R</i>
2016	13,316	8,480	63.68%
2017	15,813	5,679	35.91%
2018	18,456	5,311	28.78%
2019	19,440	5,687	29.25%

**Table 6.11:** Amount of *type-R* lines regular companies

Year	Total <i>type-R</i> products	<i>Type-R</i> products regular companies	Percentage of <i>type-R</i>	Total sold	Percentage returned
2016	124,201	64,136	51.64%		
2017	145,698	44,717	30.69%		
2018	144,703	45,467	31.42%	18,920,422	0.24%
2019	189,983	79,299	41.74%	15,957,001	0.50%

**Table 6.12:** Amount of *type-R* products regular companies

### 6.1.5 Summary

It can be seen that for every group the amount of product returns has increased. For some it is just slightly for others it has been more than 75% and those amounts are only for the first ten months of 2019 (November and December are not included). When just looking at the percentage returned it can be inferred that ALSO companies have the highest return rate in 2019 with 1.05%. This means that ALSO companies return on average 1.05% of the products they buy. The consignment companies have a return rate of 0.76%, the regular companies have an return rate of 0.50% and Amazon has a rate of 0.16% in 2019. This means that ALSO companies have a return rate of more than 6.5 times the rate of Amazon. Furthermore, it is shocking that the return rates of the regular companies has more than doubled in 2019 compared to 2018. It still has the second lowest return rate but it is growing rapidly.

## 6.2 Explanation of the reasons for returning *type-R* products

Each order that is returned to the *RMA* department has a reason for returning. The five reasons for that are described in chapter 4.2. Table 6.13 shows per problem the amount of products per year for 2016 until 2019. Problem-number (98) "Others", is not that relevant for this research since no conclusion can be made and the amounts are very low, therefore this problem is neglected in this research. It can be seen that problem "Product no longer required" with problem-number (30) has the biggest share in *type-R* products. Furthermore, the amounts of this problem have grown each year as well. A striking thing is that problem "Wrong ordered by customer", problem-number (25), has been growing a lot in 2019 compared to 2018 and other years. It is strange that customers order already five times more wrong products in ten months of 2019 compared to twelve months of 2018.

Problems "Wrong ordered by customer (25)" and "Product no longer required (30)" have the biggest share of *type-R* products in 2019. Those amounts increased enormously. This is not good, since the *retailers* sent more/sooner products return to the *EDC*.

However, a good thing that happens is that the amounts of the problems "Total transport damage (03)" and "RMC (mistake by purchase department) (22)" have been decreasing each year since 2017. That means that less mistakes are made by the purchase department and during the transportation of the products.

Problem number	Amount				Percentage of total			
	2016	2017	2018	2019	2016	2017	2018	2019
(03)	18,636	21,091	15,744	13,213	15.55%	14.48%	11.09%	7.13%
(22)	18,036	21,025	17,553	8,674	15.04%	14.43%	12.36%	4.68%
(25)	7,707	10,922	6,451	39,888	6.43%	7.5%	4.54%	21.52%
(30)	74,958	92,618	102,268	123,572	62.53%	63.58%	72.01%	66.67%
(98)	547	14	1	1	0.46%	0.01%	0.00%	0.00%

**Table 6.13:** Amount and percentage of *Type-R products* per problem

Table 6.13 does not show which of the four groups (ALSO companies, Amazon, Consignment companies and regular companies) returns products with which problems. Therefore each group is explained below to find out if there are some striking things.

### 6.2.1 ALSO companies

Table 6.14 shows that problem "Product no longer required (30)" is by far the most common reason for returning products in ALSO companies. This means that ALSO companies buy products of ALSO International but they buy too many products and therefore sent a lot of products return, since they expect that they do not get all those products sold themselves. It can be seen that problem "Total transport damage (03)" is decreasing each year, which is good to see since then less damages are made while transporting the products. Furthermore, problem "RMC (mistake by purchase department) (22)" is zero in 2019 and was very low in 2018 as well, which means that hardly any mistakes are made.

Problem number	Amount				Percentage of total			
	2016	2017	2018	2019	2016	2017	2018	2019
(03)	3,266	5,428	1,405	330	7.72%	9.09%	2.05%	0.44%
(22)	265	5,410	16	0	0.63%	9.06%	0.02%	0.00%
(25)	201	1,922	2	0	0.48%	3.22%	0.00%	0.00%
(30)	38,580	46,972	67,275	75,267	91.18%	78.64%	97.93%	99.56%

**Table 6.14:** Amount and percentage of *Type-R products* of ALSO companies per problem

### 6.2.2 Amazon

It can be seen in Table 6.15, that problem "Total transport damage (03)" is the most common problem of returning products for Amazon. The amounts have been increasing every year. Problem "Product no longer required (30)" has been decreasing since 2017 which is a good sign, since then almost every product Amazon buys is sold. A striking thing is that the problem "Wrong ordered by customer (25)" did not occur in 2018 and 1,432 products have been returned for that reason in 2019, which is quite a big difference. These 1,432 products are all created on the same date: February 1st, 2019. This would imply that it was just an incident. As well as with ALSO companies the reason "RMC (mistake by purchase department) (22)" hardly occurs in four years which is good.



Problem number	Amount				Percentage of total			
	2016	2017	2018	2019	2016	2017	2018	2019
(03)	1,761	3,592	5,144	9,993	54.44%	52.58%	79.94%	86.01%
(22)	46	0	0	0	1.42%	0.00%	0.00%	0.00%
(25)	41	245	0	1,432	1.27%	3.59%	0.00%	12.32%
(30)	1,280	2,994	1,291	194	39.57%	43.83%	20.06%	1.67%

**Table 6.15:** Amount and percentage of *Type-R products* of Amazon per problem

### 6.2.3 Consignment companies

The most striking thing is that the amounts of especially problems "Total transport damage (03)", "RMC (mistake by purchase department) (22)" and "Product no longer required (30)" are fluctuating very much. Another thing is that both problems "Total transport damage (03)" and "Wrong ordered by customer (25)" decreased quite a lot in 2019 compared to previous years.

Problem number	Amount				Percentage of total			
	2016	2017	2018	2019	2016	2017	2018	2019
(03)	1,240	6,809	5,988	263	10.06%	19.79%	26.48%	1.12%
(22)	6,022	1,498	8,178	1,107	48.87%	4.35%	36.17%	4.72%
(25)	1,590	1,707	1,378	556	12.90%	4.96%	6.09%	2.37%
(30)	3,056	24,371	7,067	21,542	24.80%	70.85%	31.25%	91.79%

**Table 6.16:** Amount and percentage of *Type-R products* of Consignment companies per problem

### 6.2.4 Regular companies

The most striking thing is that both problems "Total transport damage (03)" and "RMC (mistake by purchase department) (22)" have been decreasing since 2017 which is a good thing. Problem "Wrong ordered by customer (25)" has grown in 2019 with more than seven times the amount of 2018. That is a huge difference and is therefore the most common problem in 2019. This is due to the orders of *retailer* Page Distribution, they returned 35,448 products on October 25th, 2019. This number can therefore be seen as an incident. Problem "Product no longer required (30)" has almost the same amount in 2019 as in 2018, the percentage however has drastically decreased due to the high amounts of problem (25) in 2019.

Problem number	Amount				Percentage of total			
	2016	2017	2018	2019	2016	2017	2018	2019
(03)	12,357	5,263	3,205	2,626	19.93%	11.77%	7.24%	3.52%
(22)	11,702	14,117	9,359	7,508	18.87%	31.58%	21.14%	10.06%
(25)	5,873	7,048	5,071	37,900	9.47%	15.76%	11.45%	50.80%
(30)	32,042	18,281	26,635	26,569	51.68%	40.89%	60.16%	35.61%

**Table 6.17:** Amount and percentage of *Type-R products* of Regular companies per problem

### 6.2.5 Summary

Table 6.13 shows that problem "Total transport damage (30)" has been decreasing since 2017. This can be seen for ALSO companies, consignment companies and regular companies as well. It is however strange that so much products of Amazon contain transport damage compared to the other groups. In fact, the amount of transport damages is even increasing for Amazon. The reason why Amazon has so much transportation damage is unclear. Problem "RMC (mistake by purchase department) (22)" is decreasing in total and did not even occur for some groups. Regular companies have still quite some mistakes, the amounts are however decreasing since 2017. 95% of the problem "Wrong ordered by customer (25)" is from the regular companies, it has increased

with more than a factor of seven in 2019 compared to 2018, due to the incident of *retailer* Page Distribution. For Amazon this problem did not occur that often in 2016, 2017 and 2018 but in 2019 it was quite high, due to the month February in which all those mistakes were made on February 1st. Problem "Product no longer required (30)" is over all the most common problem for each group, except for Amazon. For ALSO companies 99.56% of the products was returned due to this reason in 2019. The amounts for consignment companies is very changeable each year. It was high in 2019 but in 2018 it was much lower. For regular companies these amount are almost identically in 2018 and 2019.

# 7. What can be done to reduce the total time?

During the research several options for possible improvements to reduce the total time appeared. Literature states that formalization of reverse logistics can lead to a better handling of returned products [Autry, 2005]. More information about formalization of reverse logistics and what this contains for ALSO International is explained in the first part of this chapter. Next, solution indications are given to reduce the amount of *type-R products*. Chapter 6 shows that there are some striking things about the amounts of certain companies, which affects the total time for *processing returned products*. The third part will be about reducing the *processing time* of certain *processing steps*. If that is possible the total time should be reducing as well. Lastly, a summary of the possible improvements is given.

## 7.1 Formalization of reverse logistics

”Formalization refers to the degree to which control mechanisms such as rules, processes, or procedures guide intra-firm or inter-firm (i.e., supply chain) operations” [Autry, 2005]. This means that highly formalized *suppliers* or *retailers* have standard operating procedures for returned products. With high formalization the approach of *processing returned products* is defined in advance and in a structured way. It mainly provides rules which should improve the efficiency of *processing returned products*. Effective *processing of returned products* can result in economic and strategic benefits. More formalized reverse logistics programs are more likely to yield performance gains such as increased profitability or reduced inventory investment. [Autry, 2005].

When applying this to ALSO International, it means that *processing steps* {4,5} and {12,13} have to disappear. These *processing steps* take quite a lot of time since, if it is not clear what has to be done with the product an email has to be sent and the product is stored in the cabinet. If the *headquarter* has given an order the product is taken out of the cabinet and is further processed. This means that the employee has the product twice in his/her hands, which takes extra time. It appears that *supplier* HP has a high formalization in particular. *Type-S products* of HP have a special HP-purchase pallet on which all *type-S products* of HP are stored. It is clear what should happen with the products. Products of HP that have been sold/used by the *end-customer* so *type-E products* have an own HP-claims pallet as well. It is clear which *processing steps* have to be performed if a HP product arrives. Other *suppliers* does have agreements for *type-E products*, but they do not have a standard *processing steps* for *type-S products*. Those products are stored in the cabinet waiting for an order from the *headquarter*. Therefore, those *suppliers* have a lower formalization than HP. *Type-R products* are from the *retailers*, since there are so many retailers it is hard to have a high formalization with each *retailer*. Actually, only Amazon has a high formalization with ALSO International. Those *processing steps* are 'spelled out' in advance.

That a high formalization takes less time can be confirmed with *type-S products*. The average time for HP products, so path {1,2,3}, is one minute and nineteen seconds (00:01:19). For the other products the mean time is:

$$\frac{(142 : 16 : 50) + (148 : 51 : 00)}{1955 + 687} = (00 : 06 : 37).$$

This is much higher than the *processing time* of HP products of *type-S products*. For *type-E products* the formalization is high for the six largest brands, they all have a standard procedure. Those six brands contain almost 100% of all *type-E products*. The average *processing time* of *type-E products* is two minutes and 23 seconds (00:02:23). This is not that much, compared to *type-S products*, because it is not needed to sent an email to the *headquarter*, since the *processing steps* are determined in advance.

To reduce the total time, the level of formalization for more *suppliers* should be increased. So that the *processing steps* are determined in advance just as with products of HP. This reduces the

*processing time* and will therefore reduce the total time. This also applies for the *retailers* but that is more complicated. If for example a returned product is damaged, the *retailer* could want the product back if they still think that they can sell the product, but if the product is damaged and the *UHD* is close, the *retailer* could give the order to put the product on the trash-bin pallet. This differs for every product and is therefore complicated to determine in advance.

## 7.2 Reducing amount of *type-R* products

If the amount of returned products that have to be processed reduces, it will lead to a lower total time. Each group that is explained in chapter 6 has their own specifications and will therefore be appointed below.

### 7.2.1 ALSO companies

The average amount of products that ALSO companies return is more than one percent of what they buy, which is extremely high. Almost 100% of those products is returned with the reason that the product was no longer required. This means that the ALSO companies buy more products than they eventually sell. It would imply that the forecasting method is not precise enough, which causes those high return rates. In order to improve these rates, the forecasting method has to be investigated. If the forecast method predicts a more precise number of products that will be sold, less products will be returned which reduces the total *processing time*.

### 7.2.2 Amazon

The amount of returned products of Amazon has increased with more than 80% in 2019 compared to 2018. Although it still has the lowest return rate of the four groups, it is growing a lot. The strangest thing is that the amount of products that have transportation damage is increasing. For other groups it is decreasing each year but for Amazon the amount is growing each year. The reason for the high amount of transportation damages needs to be discovered first, in order to reduce that amount which will lead to a reduction of the total time. A possible solution indication to reduce this amount can be with some combination of improved handling, better packaging, improved transportation and storage of the items as they are being distributed [Stock et al., 2006].

### 7.2.3 Consignment companies

For the consignment companies, Office depot and Staples, the same steps as the ALSO companies should be taken. Their return rate is a bit lower than the rate of ALSO companies, but they return just as ALSO companies by far the most products with the reason that the products are not required anymore.

### 7.2.4 Regular companies

This is the hardest group to improve, since it is a combination of more than 300 companies together. It is hard to find concrete actions that holds for every company.

## 7.3 Reducing *processing time of processing steps*

In the beginning of the project, it was needed to understand what the employees at the *RMA department* had to do. Therefore collaborating with the employees for a few days, was a good start of knowing which processes take place at the *RMA department*. During that exploring phase

it occurred that if there is a large order, with a lot of *product types*, *processing steps* {10} and {12} take quite a lot of time. This is due to time the employees have to search for the right line in the *QM-list* with the right products they sorted. That list can be sorted on for example name or material-number, but if the order i.e. contains more than 30 different *product types* and thus more than 30 lines in the *QM-list*, it takes some time to search the right line in the *QM-list*. If the line is found it can be checked, with the use of a barcode scanner, if it is the right *product type* and thus the right product. It is however not possible to scan the product so that the right line in the *QM-list* immediately appears. If that is possible the search time will be reduced. About 7.50% of the orders has more than 20 lines in 2019, so more than 20 different *product types*. Those 7.50% of the orders with more than 20 lines contain more than 66% of the total amount of products in 2019. So if this function is made, 66% of the returned products will have a lower *processing time* and will thus lead to a reduction in the total time.

## 7.4 Summary

Highly formalized *suppliers* and *retailers* have a determined procedure, which *processing steps* need to be performed is known in advance. This reduces the *processing time* for products. Only HP and Amazon are highly formalized companies for ALSO International. If more *suppliers* and *retailers* become more formalized, the total time will decrease. The ALSO companies and the consignment companies have a high return rate and therefore have to investigate their forecasting method in order to reduce that rate. If the amounts decrease, the total time will decrease as well. In order to reduce the total time, it must be known why 75% of the transport damages are from Amazon. It is hard to find concrete actions for regular companies since that group is a combination of over 300 companies. A reduction of *processing time* for *processing step* {10} and {12} will reduce the total time. This can be generated if an extra function is made, which highlights the line in the *QM-list* if the sorted product is scanned with a barcode scanner.

## 8. Conclusion

The goal of this research was to answer the main research question:

Why does ALSO International need more employees at the *RMA department*?

To answer the main research question, the processes at the *RMA department* were analyzed. At first, a diversification of the products that arrived at the *RMA department* was made. Secondly, the amounts per *product group* were gathered to find out which had the biggest share. The next step was to find out which *product group* takes the most time to process. A more detailed explanation of this group was given to find out what the reasons are for those high amounts. Afterwards, possible solution directions were given.

The main reason why ALSO International needs more employees at the *RMA department* is that the amount of returned products has been increasing since 2016. In 2018 the amount of products that have been returned was 182,220 products and in the first ten months of 2019 the amount was 230,102 products. That is already an increase of more than 26%. The main reason for that increase is that *type-R products* have increased with more than 31% in 2019 compared to 2018.

The *type-R products* are divided in four groups to investigate what the reasons are for the increase. The returns of ALSO companies increased with 8%, Amazon had an increase of 80%, the consignment companies did not have a significant increase and the regular companies had an increase of more than 75%. Almost 67% of the returned products have been returned with the reason that the products were not required anymore. Most of the returned products with that reason are from ALSO or consignment companies. Almost 100% of the products of ALSO companies is returned with that reason and for consignment companies the percentage is almost 92%. This means that their forecasting model is not that accurate, if the forecasting model will be more precise, less products will be returned and thus less time will be spent on *processing returned products*. Another possibility to reduce the total time is reducing the search time for some *processing steps*. This can be done by building a function in the SAP system that automatically shows the product in the *QM-list* if a product is scanned by a barcode scanner. The total time can also be reduced if some *suppliers* and *retailers* have a higher formalization. This means that the *processing steps* are determined in advance so that it is clear what should happen with the product.

## 9. Recommendations

### 9.1 Formalization of *suppliers* and *retailers*

More *suppliers* and *retailers* should have a higher formalization level just as HP and Amazon. For the *suppliers* the formalization of *type-E products* is good, but it can be improved for the *type-S products*. The *suppliers* that should be contacted are Epson and Brother since they have the second highest amount of *type-S products*. 63.71% of *type-S products* is from HP and 16.17% are Epson products and 13.57% are Brother products. If both Epson and Brother have a determined procedure of *processing returned products* it would reduce the total time. For the *retailers* it is not feasible to have a high formalization for every company. As discussed in chapter 7 it is complicated to have a high formalization for *retailers*. The ALSO companies and the consignment companies have more than half of the *type-R products*, if those companies could have a fixed approach of *processing returned products* it would have a major impact. A possible solution indication can be that if ALSO International receives products of ALSO companies or consignment companies that are damaged, that those products immediately go on the *SW-pallet* and that it is noted in the SAP system that those products were damaged. Then it still has no high formalization, but it is increased. There are still a lot of products that have to be checked by the *retailer*, because it often happens that products are sent to ALSO International but that those products are not on the *QM-list*. Then the *retailer* has to give an order what to do with the products, which is different for every product. The *headquarter's* task is to contact the *suppliers* and the *retailers*, so it would be logical if they are communicating with Epson, Brother, ALSO companies and consignment companies about the possibilities for a higher level of formalization.

### 9.2 Forecasting method

The forecasting methods of the ALSO companies and the consignment companies is not that accurate. It ensures that a lot of products are returned with the reason that the products are not required anymore. An investigation into those forecasting methods can reduce the return rates. It is therefore important to look into this. The supply chain department of the *headquarter* is responsible for the forecasting model and has to figure out why more than one percent of the products that are sold to ALSO companies will be returned. This is the same for consignment companies but their return rate is a bit lower.

### 9.3 Amazon's transportation damages

For each group the transportation damages is reducing every year but for Amazon it is increasing each year. That is a strange and not desirable fact. An investigation should find the reasons for that and subsequently come up with a solution which reduces the total time. Possible solutions to reduce the amount are better packaging and improved transportation among others.

### 9.4 SAP function

An extra function should be made in the SAP system for the *RMA department*. The function should make it possible that when an employee opens a *QM-list* and scans a product that is on the list, the highlighted line of that product should appear. Such a tool reduces the search time and thus the *processing time* of certain *processing steps*. There is no SAP system specialist who can build such a tool at the *EDC*, so an employee at the *headquarter* should program such function.

### 9.5 Keep track of consignment companies

Problem "RMC (mistake by purchase department) (22)" is fluctuating each year for the consignment companies. If it is clear why that happens, it may be possible to reduce the amount. Those

products are returned due to mistakes by employees of ALSO International, to be more specific by the purchase department of ALSO International. The manager of this department is responsible for these mistakes and must therefore figure out what the reasons are. The reasons have to be known at first, in order to tackle the problem.



# 10. Discussion

## 10.1 Limitations

All returns of Amazon are handled a bit differently compared to the other *retailers*. Due to the time constraints it was not possible to understand and therefore distinguish the Amazon orders and the normal orders. The Amazon orders were seen as normal orders in this research.

Another limitation is that for some *processing steps* no data exist over the *processing time*. The opinion of the employees and the observations of the *processing steps* were decisive to form a guideline for the *processing time* and percentages. The time calculated in chapter 5 is therefore not the actual time that is spend on the *product groups*.

The amount and damage reasons of the *product groups type-S products* and *type-E products*, have not explained in much detail due to the time limits of the project.

## 10.2 Future research

Several subjects were out of the scope for this research and still need to be studied:

A more detailed explanation of the amounts and damage reasons of *type-S products* and *type-E products* can lead to solution implications so that those amounts are reduced as well. For *type-S products* it would be useful to find out what the reasons are for those damages, since now the products are just given to the employees of the *RMA department*, but no reason is noted. If for example the products are damaged because the pallet trucks are not skilled enough and therefore hit the products, it could be useful to give a training to those employees. A difficulty can be that for example an employee is ashamed of damaging a product and therefore does not register it. Then it stays unclear what the reasons are for the damages. To gain more insight into *type-E products* it is useful to figure out what the reasons are for returning the products. A start is made in Appendix B. It is however not clear which amount comes from which *retailer*.

Next, the regular companies of *type-R products* can be specified into more clusters to find specific actions for each company, which makes sure that the returns of those companies are reduced as well. It is not reliable to find for every *retailer* possible improvements, since not every *retailer* returns products or at least not many. *Retailers* like Bueromarkt Bttcher AG, Digital Revolution B.V. and MCR INFOELECTRONIC for example have quite some returns in 2019 as well. If those companies could have a higher formalization level, the *processing time* will reduce.

On top of that, a possible future research can be about eliciting the distributions of the *processing times* of the *processing steps*. The *processing time* of certain steps variate a lot. It depends on the amount of lines the order has, the amount of products the order has, if the right products that are on the *QM-list* are returned and if the products are in a good condition. If the distributions are known it is possible to make a simulation model, with the use of the simulation model it is possible to find out what the optimal amount of workers is to process all the returned products.

Future research should be done to find out what the reasons are for the increasing transportation damages from Amazon. The first thing that should be done is contacting Amazon and asking if they know what the reasons are for these increases, because without the reasons it is not possible to come up with solutions. A possible difficulty can be that Amazon does not give any information about these damages, because it turns out that Amazon is not always cooperating that easily. It could however save a lot of time and resources if the amount of transportation damages reduces.

Furthermore, it is very valuable if the costs of *processing returned products* are involved as well, instead of just the amounts and *processing times*. It could be for example cheaper to just give the money without *processing returned products* of certain products. Some companies like Bol.com for example have an agreement with ALSO International that the customers always get their credit, but those products are never processed by the *RMA department*. It could be beneficial for more

companies as well. To do this it is needed to calculate the cost of *processing returned products*. Then a calculation has to be made about what it would save by implementing this. It is important to keep in mind that some customers are returning products of fake brands or empty products, hoping to receive money. These products will not be discovered in this method and can therefore be more riskier than the current procedure.

A reason that more employees are needed at the *RMA department* can be that for example the productivity has decreased over the years. This would lead to an increase in *processing time* which will lead to a higher total time of processing. Some research is done and explained in Appendix D. It would be useful to calculate the productivity since that gives a lot of insight for the manager. To do this, a norm has to be determined and the employees have to be rated. Another possible reason why the *RMA department* needs more employees, can be because more *processing steps* had to be performed or some steps needed more *processing time* because checking the products must be more thorough. A begin is made on this topic in Appendix C.

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# A. Appendix interview translations

## Interview with Chris Kuipers

Name: Chris Kuipers  
Company: ALSO International  
Department: *RMA department*  
Date: November 13, 2019

### Introduction

Chris Kuipers has been working at ALSO International for two and a half year, he first started in the *picking process* but has now been working at the *RMA department* for more than two years. He is *processing returned products of product groups; type-S and type-E*, if that is on schedule he processes *type-R products* as well.

### Interview

#### **How many products are *type-S products*?**

Chris keeps track of these products in an excel file, it is registered from which manufacturer the product is coming from, the date at which the product is received, the article number and the quantity among other things.

#### **Is the amount of *product types* increasing? How do you notice that?**

There are a lot of different *product types* but that is not important for Chris, the increasing amount is more important to him. The product number is still on the box so he does not have to search for it. Therefore it does not affect the *processing time*.

#### **Has the amount of *processing steps* increased?**

Since approximately half a year HP need pictures of the broken products. Before they only needed a picture of the administrative papers. With these pictures of the products it is better to work with because it is more clear and it minimizes the misunderstandings.

#### **Do you have the feeling that you have a lot of responsibilities?**

Yes, definitely, he has to keep track of everything. Products that are damaged always go to him, he determines if it can go into stock of that it can go to the trash bin. No one who works at ALSO International knows what tasks he has to do and what happens at the *RMA department*.

#### **How is the work environment?**

The environment is good, there is a nice mood, good lightning, comfortable chairs and it is safe. More space since they have an own department. Every now and then the computer is slow or there are some start-up problems and sometimes the labels does not come out of the printer. Generally speaking the environment is good.

#### **Do you have the feeling that there is not enough work sometimes? Or too many?**

He is working really structured which makes sure that he always knows what to do and what needs to be done. There is always enough work to do. He is not panicking due to the amount of work.

#### ***Type-S products:***

##### **Which percentage immediately goes to *SW pallet*?**

Only products of the *supplier* HP always go to the *SW pallet*. A picture of the damaged product and the administrative paper has to be made before it can go to the *SW pallet*.

##### **What time does it take to make a picture and to save it?**

Approximately 5 minutes per product.

**What time does it take for the *headquarter* to respond on your request?**

Most of the time it takes about one week, but sometimes it takes 3 weeks or more. Approximately 80% is in one week, 10% in two weeks and 10% in three weeks.

**After the *headquarter* gives you a respond, what percentage goes to *SW pallet* and what percentage goes back to the *supplier*?**

Approxamitely 70% goes to the *SW pallet* and about 30% of the products goes to the *supplier*.

**What time does it take to finish a pallet that is full?**

To pack it with plastic and to make sure that it contains the right papers takes about ten minutes per pallet.

**What time does it take to make a parcel?**

Making a parcel, printing the right papers and bringing it to the pallet all together takes about ten minutes per parcel.

**Is there a difference between sending and collecting parcels?**

With respective to time there is no difference, but sending parcels is much better since then the products are picketed up by a carrier every day so it is gone immediately. When a *supplier* collects the parcel it is possible that the parcel will be at the *EDC* for weeks. Lexmark wants to collect their parcels very often.

***Type-R products:***

**What time does it take to check a product and register it in the SAP system?**

To check a product for damages and for *UHD* it takes about twenty seconds per product.

**What percentage can go to stock?**

About 90% of the products can go to stock, for the other 10% I need to send an email with a picture of the damaged product to the headquarter. After the answer of the headquarter about 70% goes to the *SW pallet*. An *SW pallet* can contain about 1000 products. The other 30% will be send to the *retailer* which returned the product.

***Type-E products:***

**What time does it take to open a package?**

It takes about one minute.

**What time does it take to check the product?**

To check the *UHD*, weight, originality and the *supplier* takes about 30 seconds, including registering in the SAP system.

**Which *supplier* immediately goes to the trash bin?**

Canon and Epson.

**What happens with the products that does not go to the trash bin?**

For HP products they are collected on two pallets with both approximately 1000 products so in total 2000 products, then the headquarter makes the list with all the products that are on the pallet. Next the pallets are packed with plastic and the right papers are added so it can be send the HP.

With Lexmark and Brother products it is quite the same, but instead of that the headquarter makes the list, Chris has to do that by himself.

With products of OKI, they are registered until the headquarter has contacted the *supplier* and then it always go to the trash bin.

## **Other**

### **Do you have indications why it is so busy at the *RMA department*?**

The amount of returns when all the products come at the same time has grown which causes problems.

### **Do you have solution indications which could help you improving the work?**

When products can go back in stock it first needs to be registered in the SAP system and then the *GO department* needs to register the same things in the WMS system, which is double work. Faster responses of the headquarter would be better, it has however increased.

## Interview with Bianca Peters

Name: Bianca Peters  
Company: ALSO International  
Department: *RMA department*  
Date: November 14, 2019

### Introduction

Bianca Peters works at the *RMA department* and is mainly focusing on *type-R products*.

### Interview

#### **Is the amount of *product types* increasing? How do you notice that?**

Bianca does not know how many different *product types* are at the *EDC*. According to her it has no influence on her work. She can use a scanner to find the products in the list otherwise.

#### **Do you have the feeling that you have a lot of responsibilities?**

Yes, she feels responsible for their work, it is important that the work is done.

#### **How is the work environment?**

The environment is not extremely good or bad, she has enough space which is good but the light, chairs etc. does not affect her job.

#### **Do you have the feeling that there is not enough work sometimes? Or too many?**

There is always enough to do and she knows what she can do.

#### ***Type-R products:***

#### **What time does it take to check a product and register it in the SAP system?**

This is hard to say, she cannot link a number to this question since it depends on the length of the *QM-list*, if it is a long list it is harder to search for the product than with a short list.

#### **What percentage can go to stock?**

Again hard to say, there are *QM-lists* where everything can go into stock, some with more than others. It can happen that during transport products are damaged.

### Other

#### **Do you have indications why it is so busy at the *RMA department*?**

The *RMA department* is like the dump department, everything is dropped at the *RMA department*. All the ALSO Holding A.G. companies dump their products at the *RMA department*.

#### **Do you have solution indications which could help you improving the work?**

With ALSO Holding A.G. companies why do they return everything to the *EDC* and not processes anything themselves?

## B. Appendix *type-E* product damages

There are fifteen damage reasons with each a specific damage number. These are reasons why a product is returned by an *end-customer*. The list is given below, the number in bracelets is the damage number:

- (06) Does not fit
- (11) Gives error message
- (14) Halts after few prints
- (02) Is leaking
- (03) Is not recognised by printer
- (12) Makes noises
- (15) Not specified
- (16)/(99) Other
- (09) Produces bad prints
- (08) Produces dots
- (01) Produces stains
- (07) Produces stripes/lines
- (05) Reads as empty
- (04) Stagnates
- (10) Wrong ink colour

Table B.1 shows that there are five problems that occur often and that the other problems do not happen that much. The problem that occurs the most is (07) "Produces stripes/lines", the percentage in 2016 38.85% has almost doubled to 74.29% which is about three fourths in 2019.

Damage number	Amount				Percentage of total			
	2016	2017	2018	2019	2016	2017	2018	2019
06	1	4	4	1	0.00%	0.02%	0.01%	0.00%
11	199	203	128	102	0.76%	0.77%	0.42%	0.29%
14	33	3	4	2	0.13%	0.01%	0.01%	0.01%
02	311	340	241	97	1.19%	1.29%	0.80%	0.28%
03	4,182	7,112	5,797	977	16.05%	26.92%	19.22%	2.79%
12	32	12	21	15	0.12%	0.05%	0.07%	0.04%
15	5,839	2,423	3,464	7,395	22.41%	9.17%	11.48%	21.15%
16/99	3,028	1,892	1,974	147	11.62%	7.16%	6.54%	0.42%
09	1,785	338	4,831	148	6.85%	1.28%	16.02%	0.42%
08	27	12	37	7	0.10%	0.05%	0.12%	0.02%
01	136	248	156	61	0.52%	0.94%	0.52%	0.17%
07	10,122	13,735	13,426	25,976	38.85%	52.00%	44.51%	74.29%
05	297	70	67	23	1.14%	0.27%	0.22%	0.07%
04	41	17	12	5	0.16%	0.06%	0.04%	0.01%
10	19	6	3	8	0.07%	0.02%	0.01%	0.02%

**Table B.1:** Amount and percentage of *Type-E* products per damage



## C. Appendix investigating changing *processing times*

There are a lot of different types of printing equipment. There are single functional which include printers and faxes, there are multi-functional printers, for example production printers, wide format printers (for formats larger than A3 printers) and printers for specific applications such as label, picture or barcode [Pianoo, 2019]. Currently, the most used printers are laserprinters and inkjetprinters [Go4inkt, 2016]. Next to size and technology, the industry is segmenting on speed and volume as well. This ensures that there are a lot of different devices, which all need cartridges and toners and therefore the number of *product types* is increasing.

ALSO International has about 5500 different product types in the *EDC* currently. According to the logistics manager Arnout van der Maas, this number increases with approximately one hundred products per year. This could be influencing the *processing time* of the *processing steps*. Furthermore it could be that *suppliers* or *retailers* want that the products are checked more carefully when they are returned or that extra *processing steps* must be performed. This can cause an increase in *processing times* as well. To find out if this is the case in-depth interviews with the employees at the *RMA department* are conducted, since they have the knowledge and experience in this field.

There are a lot of methods to find more information from employees, for example focus groups, interviews, observations, etc.. The aim of a focus group or group discussion is to encourage the group to interact with each other. Participants present their own views and experience, but they also hear from other people. They listen, reflect on what is said, and in the light of this consider their own standpoint further. Additional material is thus triggered in response to what they hear from others [Ritchie et al., 2013]. Since the *RMA department* employees have split the tasks, one person is processing *type-R products* while the other person processes *type-S* and *type-E products* and only helps with the *type-R products* when there are a lot of *type-R products*. They do both different tasks and can therefore not respond to each other which is the clue of focus groups. The goal of the interviews is to explore in detail the experiences, motives, and opinions of the employees. They both can give information about their own tasks in detail which is useful for the research. Limitations of In-depth interviews can be that it can be biased or time-intensive. With biased is meant that participants want to "prove" that a program is working [Boyce and Neale, 2006]. Since the employees have not changed or adapt something they have nothing to prove. They want to be helped since they are too busy and to give more insight in this problem this research is done. Furthermore observations can be performed as well to gain more detailed data.

### Amount of *product types*

It is possible that due to an increasing amount of *product types* it takes more time to *process returned products*. It could be that it takes more time to search the products which leads to longer *processing times*. According to both Chris and Bianca the amount of *product types* has no influence on the *processing steps* (appendix ??). The product numbers are on the box so those are not hard to find and therefore does not affect the *processing time*.

If the *QM-list* is long it is harder to find the right product, a scanner can be used to provide an extra check to confirm if it is the right product, but then the employee has to search for the product itself first. If the scanner can find the product in the *QM-list*, such that it is not needed for the employees to search in that list themselves it can reduce the search time and therefore the *processing time*.

## **Amount of *processing steps***

The total *processing time* can be increased if the amount of *processing steps* increases. Chris states that he has to take one extra step with the *type-S products*. Before it was needed to take a picture of the administrative paper only, now a picture of the damaged product has to be made as well. Chris believes this works better since it minimizes the misunderstandings with the *headquarter*. It is an extra *processing step* but it does not take that much time since now two pictures are needed instead of one. Bianca states that there has not been changes to her *processing steps*.

## **Technical problems**

During the interview Chris stated that every now and then the computer was slow or that there are some start-up problems, what caused that he had to wait. The printer has sometimes some problems as well, this result in not printing the labels. Those problems do not happen that often but have a negative influence on the *processing time*.

## D. Appendix productivity

Productivity is defined as the ratio to measure how well an organization converts input resources into goods and services [Tangen, 2002]. In this case input resources are for example labour hours and unprocessed products. The output are processed products. Productivity is seen as which people can produce with the least effort [Ali et al., 2013], rising the productivity implies either more output is produced with the same amount of inputs, or that less inputs are required to produce the same level of output [Rogers, 1998]. Improving organizational productivity is an issue that has been a challenge for some time and will continue to be important [Pritchard, 1995]. Employees need good working condition so that their productivity can increase [Ali et al., 2013].

Productivity depends on several factors. When workers are given more responsibility, they are more effective workers and are potentially more productive [Bond and Galinsky, 2006]. Organizations that have a friendly, trusting, and save environment experiences greater productivity, hence working conditions are related to the productivity [Ali et al., 2013]. The level of workload has influence on the productivity as well, therefore workload has to be investigated as well.

### Responsibilities

When workers are given more responsibility and are therefore accountable for their work, research proves that they are more effective which lead to more satisfaction, more commitment to their employers and potentially more productivity [Bond and Galinsky, 2006]. Both Bianca and Chris feel a level of responsibility. They both say that it is important that this work is done. Chris states that he has to keep track of everything, all products come to the *RMA department* and they have to process them. No one at ALSO International knows what they have to do exactly.

### Working condition

Working conditions refers to working environment and all existing circumstance affecting labor in the work place, including: amount of working hours, flexibility of working hours and physical aspects. When the working condition of the job is not comfortable and according to the needs of the employees their productivity is affected [Ali et al., 2013].

### Working hours

If workers have the ability to choose their own working time arrangements it has a positive impact on their job performance and their productivity. This choice turns out to be a powerful factor in determining an increase in productivity, since it results in a more satisfied workforce who is more committed and productive. Furthermore, the amount of working hours is important as well. When the working hours of the work is not appropriate and according to the ability of the employees their productivity is affected. High working hours could bring employees in a continually diminishing ability to do their work which lead ultimately to a decrease in productivity [Ali et al., 2013].

### Physical aspects

The physical condition under which employees have to work is important to the output, offices and factories that are too hot and ill ventilated are debilitating to effort. A number of things are meant by physical aspects, for example temperature, humidity and air flow, noise, lighting, employee personal aspects, contaminates and hazards in the working environment, as well as supply of good protective clothing, drinking water, restrooms, toilets, first aids facilities, etc. [Ali et al., 2013]. Chris believes that the environment is good, the mood is nice, there is good lighting, comfortable chairs and it is safe. Since they have their own department, they have more space which benefits the process. Bianca says that the environment is not particularly good or bad, she

can do her job which is important and has not problems or benefits from the chairs or lights, that does not affect her job according to her.

## **Workload**

An increase in employees workload can improve short-term productivity, it can however increase long-term costs, as stress, illness and low productivity among employees. In organizations where employees are exposed to stressful working conditions, the productivity is negatively influenced and there is a negative impact on the deliver of service. Research indicates that there is a negative relationship between workload and employee productivity. This means that an increase in workload will decrease the productivity and a decrease in workload will increase employee productivity [Ali et al., 2013].

Both Chris and Bianca say that there is always (more than) enough to do. Since they are doing this job for years they know what they have to do and how to keep it structured.