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Management of International Logistic Processes A Case Study at Tchibo

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Chapter 1

Introduction

Investigating autonomous cooperation in logistic processes is a challenging research topic. In this context, the starting point lies in real world logistic processes which are hitherto centrally organised. Thereby, the practical examination forms the foundation for subsequent investigations from a more theoretical point of view. Owing to Tchibo's agreement to participate in this investigation, their forward logistics processes are the chosen subject of this case study. The following reasons motivate why Tchibo is a good choice as a partner in this research proposal: First, a high percentage of Tchibo's suppliers is located in Far East. As a consequence, Tchibo's logistics department has to deal with complex international processes. Second, Tchibo supplies a great many outlets throughout Europe with a continuously changing range of products. This fact underlines the amount of goods that have to be procured and distributed, but also gives an impression of the dynamics in their processes. The case study is conducted on the basis of an internship at Tchibo's forward logistics department as well as divers interviews with their employees.

In the first part of this case study Tchibo is introduced. This introduction is supposed to motivate why especially this company is an appropriate choice for the practical examination. Later on, in the second part Tchibo's logistic processes are investigated in more detail. In this context, the area of forward logistics is especially considered. It comprises the containerised transportation of goods which have been produced and purchased in Far East and whose destination are the European ports. Subsequently, these containers have to be transferred to an appropriate warehouse. Here, the picking is conducted which precedes the distribution into the shops throughout Europe. Finally, the participating entities are identified and characterised.

Chapter 2

Coffee Roasting and Consumer Products

The first part of this case study introduces Tchibo itself. First, a short overview of the company's history is provided. It covers the time from 1949, the year in which Tchibo was founded, until the beginning of 2006, the year in which the case study at hand is conducted. Afterwards, the general concept of Tchibo's range of products and their offering is discussed. This subsection gives the foundations needed in order to understand their logistic requirements. Finally, general facts about the company are discussed which outline Tchibo's company size, its structure, as well as its market position.

2.1 A Short Overview of Tchibo's History

Tchibo's history goes back to 1949 when the company was founded by Max Herz and Carl Tchilling-Hiryan. They recognised the problem, that roasted coffee demands for a fast delivery to the end customer since its shelf time is rather limited. At that time, the available time-frame was too short for most of the established coffee traders. So, Herz and Tchilling-Hiryan decided to supply their customers with roasted coffee by mail order. Tchibo GmbH (2004) points out that already this initial business idea coincided with solving a logistic problem. Tchibo, the company's name, is an abbreviation that derives from the combination of the first syllables of Tchilling and Bohne, whereby Bohne is the German word for (coffee) bean.

About six years later, in 1955, Tchibo extended its business and opened its first shop in Hamburg. Like the whole company at that time the shop was specialised in selling coffee. In particular, the shop offered its customers to try out the company's products already before buying them for consumption at home. Until today, the total number of Tchibo shops has grown to about 1200. Already this amount of shops gives a rough impression of the logistic processes demanded behind the scenes. Nevertheless, this is not the total number of outlets to be supplied. In addition, Tchibo started in 1963 to place its products in bakeries and cake shops. This shop-in-shop concept was extended in 1987 to food trading outlets in general. Today, Tchibo supplies more than 56000 outlets in total. They are spread all over Europe as Tchibo started the international expansion

of its outlet business in the 1990s. More precisely, their outlets are located in German-speaking Europe, the Czech Republic, the Netherlands, Poland, as well as the United Kingdom of Great Britain and Northern Ireland.

Apart from its original coffee business, Tchibo extended its activities also to non-food products in 1973. In that year, the company began to offer its customers a limited range of consumer products. Actually, the roots of this concept lie even more far back in the company's history. In Tchibo's first years, coffee was product of high price that was only sold in small amounts. Therefore, Tchibo decided to sell it in practical sideline products instead of standard paper bags. For example kitchen towels pertained to this kind of packages. Later on, this concept was extended by other products related to coffee or kitchen. This proceeding bothered other German retailers in the 1970s. So they took legal measures which prevented Tchibo from further bundling coffee with non-food products. Instead of completely taking off from the non-food market, Tchibo decided to adapt its concept and started to sell coffee and non-food products uncoupled from each other (see Sect. 2.2).

Today, the distribution of Tchibo's non-food product line is no longer limited to their outlets. Instead, Tchibo revived its former mail order business in 1996. The German online shop, which has been established in 1997, as well as its successors in other European countries also pertain to this channel of distribution.

2.2 A New Experience Every Week

Apart from special offers, Tchibo's range of coffee is permanently available in its shops. By contrast, for the non-food business another approach is applied. According to Tchibo their concept is globally unique: the range of consumer products sold changes on a weekly basis. These products are always grouped together by particular topics, e. g. depending on the season. The spectrum of articles varies concerning their price, weight, and volume. The articles range for example from prepaid cards for mobile phones to jewelry in price, from pillow cases to tabletop football in weight, as well as from cutlery to mattress in volume. In general, only one occurrence of each article is offered. In proceeding this way, Tchibo aims at preventing customers from being spoiled for choice. An exception from this principle is for example formed by textiles as they are offered in different sizes. All occurrences of one article are internally grouped together into one project. Each of the weekly sales phases consists of about 30 projects. As outlined above, the total number of articles within one sales phase varies depending on the respective topic.

All products sold by Tchibo are developed by product managers within the purchase department. This department is supported by trend scouts as well as market researchers in order serve current trends. All articles are exclusively produced for Tchibo (mainly in Far East) and sold under their own brand: TCM. This acronym stands for Tchibo Magazine which is a weekly catalogue presenting Tchibo's offers.

2.3 Some General Facts about Tchibo

Tchibo claims to have an awareness level of about 100% in Germany. Taking the company's market share of 27% in the coffee business as a basis, Tchibo is Germany's leading coffee roaster. With its worldwide market presence in the coffee roasting and exporting business Tchibo is the fifth worldwide. Besides that, Tchibo retails its coffee as well as its non-food products itself in several countries throughout Europe. As already mentioned above, apart from Germany these countries comprise Austria, the Czech Republic, the Netherlands, Poland, Switzerland, as well as the United Kingdom of Great Britain and Northern Ireland (Fig. 2.1). Except for the Czech Republic and Poland, Tchibo operates also e-business activities in these countries. Especially the German online shop is very successful as it is the second largest in Germany, directly behind Amazon's store and even before Otto and KarstadtQuelle which are long-established in the mail order business. This follows from the number of visitors that has been measured by Nielsen Netratings in February 2006 (Die Welt, 2006).



Figure 2.1: The map depicts the European countries with Tchibo outlets that are supplied by the logistics department. These comprise Austria, the Czech Republic, Germany, Poland, Switzerland, the United Kingdom, as well as the Netherlands

Nowadays Tchibo is structured as follows: Since 1988, the Tchibo Holding AG (Fig. 2.2) acts as the parent company for many different companies. It is wholly owned by members of the family of Max Herz, one of the company's founders. The original coffee and non-food business is subsumed within the Tchibo GmbH, which is a wholly-owned subsidiary of the holding. Apart from this company, there exists another major company in which the Tchibo Holding AG is involved, namely the Beiersdorf AG. Beiersdorf is a globally operating producer of beauty products. Tchibo started getting involved in Beiersdorf with a non-controlling interest in 1977. Since 2004, Tchibo owns 50.46% of Beiers-

dorf's shares and therefore holds a controlling interest. In total, the Tchibo Holding AG had an annual turnover of about 8.8 billion euro in the year 2005 (Tchibo Holding AG, 2006). From this turnover about 4.0 billion euro have been earned within Tchibo GmbH. As an example, this is comparable with the turnover figures of Karstadt's department stores in the same year (Karstadt Quelle AG, 2006). This comparison illustrates the size of Tchibo. The number of employees of Tchibo GmbH lies at 12,796, that of the whole group is about 29,619 (from which 16,783 belong to Beiersdorf and 40 to the holding).

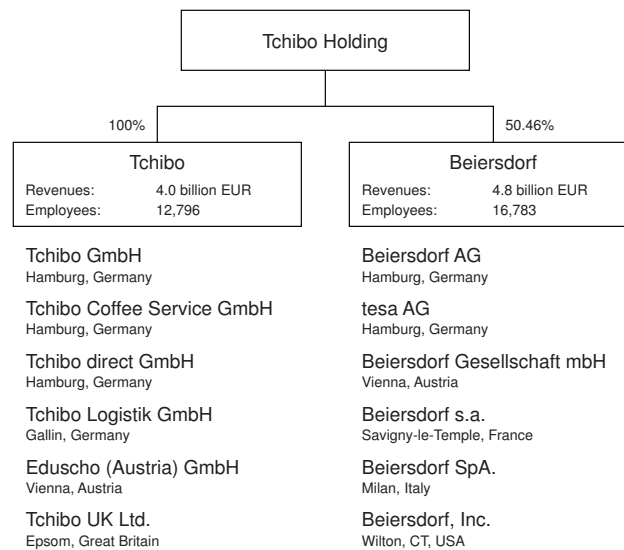


Figure 2.2: The Tchibo Holding is the parent company for Tchibo, in which the original coffee and non-food business is subsumed, as well as for Beiersdorf, which is a producer of beauty products (Tchibo Holding AG, 2006)

After this short excursus on the Tchibo Holding AG back to its subsidiary Tchibo GmbH, which is in the main focus of this case study. Tchibo GmbH itself is parent company to a great many subsidiaries. These comprise mainly companies in the coffee business as well as subsidiaries in foreign countries. From the point of view of logistics especially one wholly-owned subsidiary is of special interest: Tchibo Logistik GmbH. This company manages the logistic demands of Tchibo in general. It is paid per year for a fixed number of cargo handlings. The registered office of the Tchibo Logistik GmbH is Gallin which is located near Hamburg in western Mecklenburg. After the German reunification Tchibo opened its new logistics centre in Gallin in 1996. Nevertheless, today the major part of the administration of Tchibo's logistics department is located in Bremen. This fact is related to the takeover of the Eduscho group, one of Tchibo's major competitors in the German coffee business. Since Eduscho operated its logistics department at its headquarters in Bremen, this was chosen to become also the new site for the joint logistics department.

Chapter 3

Forward Logistics Processes

Following the general introduction of Tchibo, this chapter deals with the forward logistics processes that are applied in order to realise their concept. As an introduction, Tchibo's supply chain is examined in Sect. 3.1. Subsequently, the process of transporting goods from Far East to Europe is examined in Sect. 3.2 before the delivery from the port to the warehouse is described in Sect. 3.3. In order to describe the relationship of logistic processes the event-driven process chains (EPC) of the ARIS concept (Keller, Nüttgens, & Scheer, 1992) are applied.

3.1 Supply Chain Reorganisation

In 2004, Tchibo's logistics department was awarded with the German Logistics Award. This award was set up in 1984 by the Bundesvereinigung Logistik e. V., a nonprofit organisation characterising itself as an expert network of the German logistics sector. With this award the logistics department was especially tributed for the reorganisation of its supply chain (Tchibo GmbH, 2004): Tchibo has to deal with a great many suppliers from Far East. Through the ports in Far East, they are connected to Europe by many carriers. In the past, each vendor applied his own carrier for the transportation to his preferred port of discharge in Europe (see left hand side of Fig. 3.1). From here, transportation continued to a number of warehouses storing the goods waiting for their distribution into Tchibo's outlets. This organisation lead to a great many relations between the participating entities.

During the reorganisation of its logistic processes Tchibo tightened the structure of their supply chain by reducing the number of participating entities and thereby the number of relations between them. Today, Tchibo confines itself to a limited number of preferred carriers. In order to ensure low prices and a good quality of transportation a framework agreement was concluded. Thereby, each participating carrier is guaranteed to receive a fixed percentage of Tchibo's shipping assignments. In return, the preferred carriers realise low prices and the quality of transportation that is demanded by Tchibo. Quality of transportation concerns in this context that scheduled dates are met, especially, having in mind that the amount of transported containers changes from week to week. However, transportation is not limited to those preferred carriers, since they serve

several routes together with partnering companies (Wood, Barone, Murphy, & Wardlow, 1995, pp. 106–126). From this follows, that the number of carriers that may actually transport Tchibo's containers is higher. Nevertheless, the number of carriers that have direct contracts with Tchibo still remains small and manageable.

The number of ports for discharge of cargo was also limited to Bremerhaven and Hamburg in Northern Germany. Both of them are well connected to the most significant change within the reorganised supply chain: the new logistics centre at the Neustädter Hafen (LCNH) in Bremen, which has been established in 2003 as a central high-bay warehouse instead of many smaller ones as before. It forms the focal entity of the supply chain where all relations are concentrated. However, this strict concept does only hold in theory as in practice not all articles can actually be stored in the high-bay warehouse. Apart from it, Tchibo has contracts with several other warehouses which can alternatively be chosen. The LCNH is owned and operated by the BLG Logistics Group AG & Co. KG (BLG). At the time this case study is conducted, the capacity of the LCNH is just extended to over 200000 pallets by the addition of a third warehouse slot (BLG in.add.out Logistics GmbH & Co. KG, 2006).

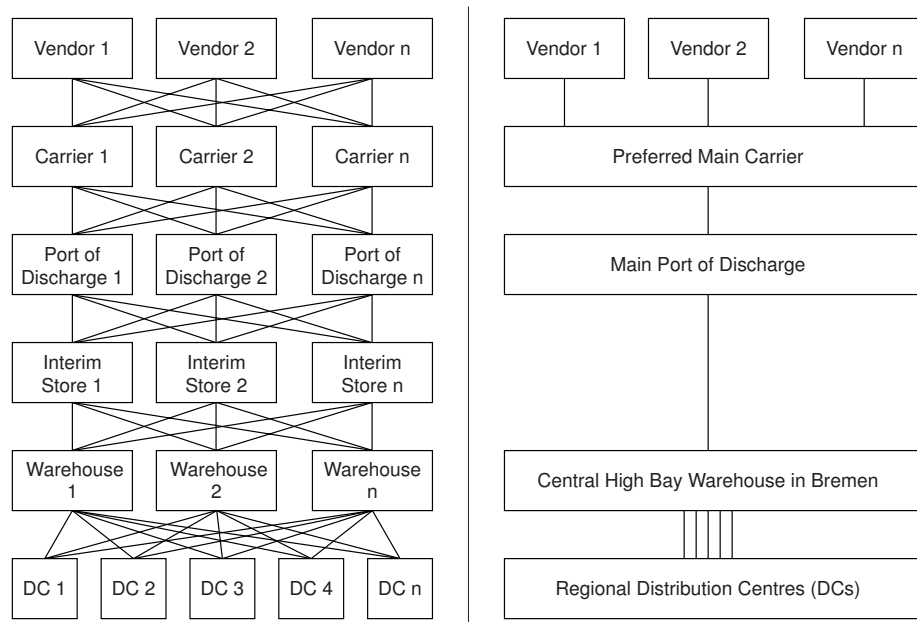


Figure 3.1: The former (left) and current (right) organisation of Tchibo's supply chain. As it can easily be seen, today Tchibo, or more precisely its central warehouse, is the focal entity of the supply chain (Tchibo GmbH, 2004)

Figure 3.2 shows a generalised organigram of Tchibo's logistics department. Since the focus of this case study lies on forward logistics processes, this branch of the company is depicted in more detail than the other parts. Starting from the top, the Tchibo Logistik GmbH is divided into two parts. One of them deals with operations and processes, while the other one is responsible for business and project management. The first one is again divided into four parts:

forward logistics for non-food products, food and reverse logistics, as well as operations north/west and operations south/east. The two latter ones are concerned with managing Tchibo's distribution centres. Compared to the forward logistics processes, that deal with supplying the outlets, the amount of goods handled by the reverse logistics division is much smaller. In order to obtain divisions of comparable in size, this part of the department is also concerned with distributing Tchibo's original product: coffee. As illustrated in Fig. 3.2 the forward logistics division itself consists of four sections. These comprise the processes that are related to containerised transportation by sea from Far East to Europe which are described in Sect. 3.2. A second part, that is discussed in Sect. 3.3, deals with the delivery from the port to the warehouse. And finally, the articles have to be distributed into the outlets by a third part. As this case study especially concentrates on containerised transportation, the distribution is not further investigated here. The same holds for the last part which deals with process standards.

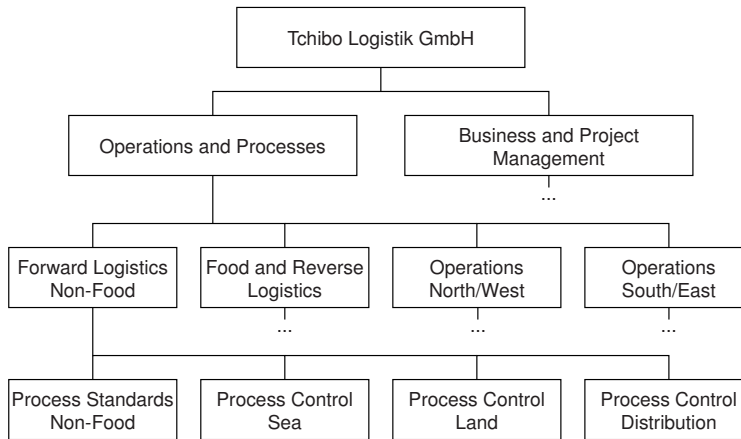


Figure 3.2: A generalised organigram of those parts of Tchibo's logistics department that are relevant in the context of this case study

3.2 Transportation from Far East to Europe

About 70% of Tchibo's non-food products are purchased on international markets, especially in Far East. Tchibo's logistics department has to ensure that all products arrive in Europe on time. On time means in this context, that each product is supposed to be present in the shops in its scheduled main sales phase. Depending on the amount of goods a project consists of, its transportation can be split into multiple shipments. In any case, time has also to be considered for the transportation from the port to the warehouse, for quality assurance, as well as for the further distribution into the shops.

In the following the processes that are handled by the sea forward logistics division are investigated in more detail. These comprise booking a shipment and, afterwards, handling the shipping itself. Another task of the sea forward logistics division, that is not further investigated, comprises handling the billing of shipment costs as well as handling customs.

3.2.1 Booking

In order to ship a container with a specific vessel, a booking has to be placed at least ten days before the estimated time of delivery, i. e. the date when goods are handed over in the port. Since it depends on the manufacturer when the goods are ready for shipping, he or rather his respective vendor in Germany has to initiate the booking (Fig. 3.3). In order to support a central organisation by Tchibo, he is not allowed to place a booking directly at the carrier. Instead, he is supposed to send his booking to the booking agent that is deployed by Tchibo. Each booking has to contain the respective project, the number of containers needed, as well as the port of loading. After having received this booking request, the booking agent starts with assigning a priority to each of the affected containers. The priority varies from one to three and depends on the time that is left until the start of the main sales phase. After having chosen a vessel, the respective carrier may be provided with a space forecast. In this case he reserves space on the chosen vessel. Subsequently, a pre-advice is created by the booking agent and sent to the logistics department of Tchibo. Having received the pre-advice, the logistics department's task is to validate it concerning several points. These comprise the time, the amount and type of containers, the ports of loading and discharge, as well as the chosen priority and carrier (Fig. 3.4).

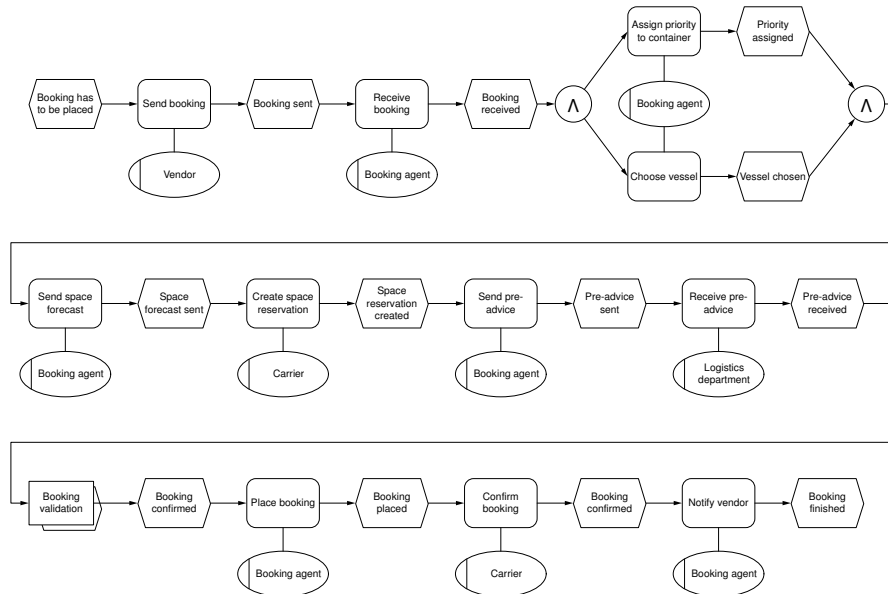


Figure 3.3: The booking process is initiated by the vendor, prepared by the booking agent, validated by the logistics department, and finally placed by the booking agent again

Time is validated concerning the question whether the predefined time frame is met or not. If the delivery is late, the logistics department has to check whether or not the status is critical. Critical means in this context that it is in question whether or not the main sales phase can be met. In this case, the purchase department has to choose if either another vessel, i. e. a faster one, or

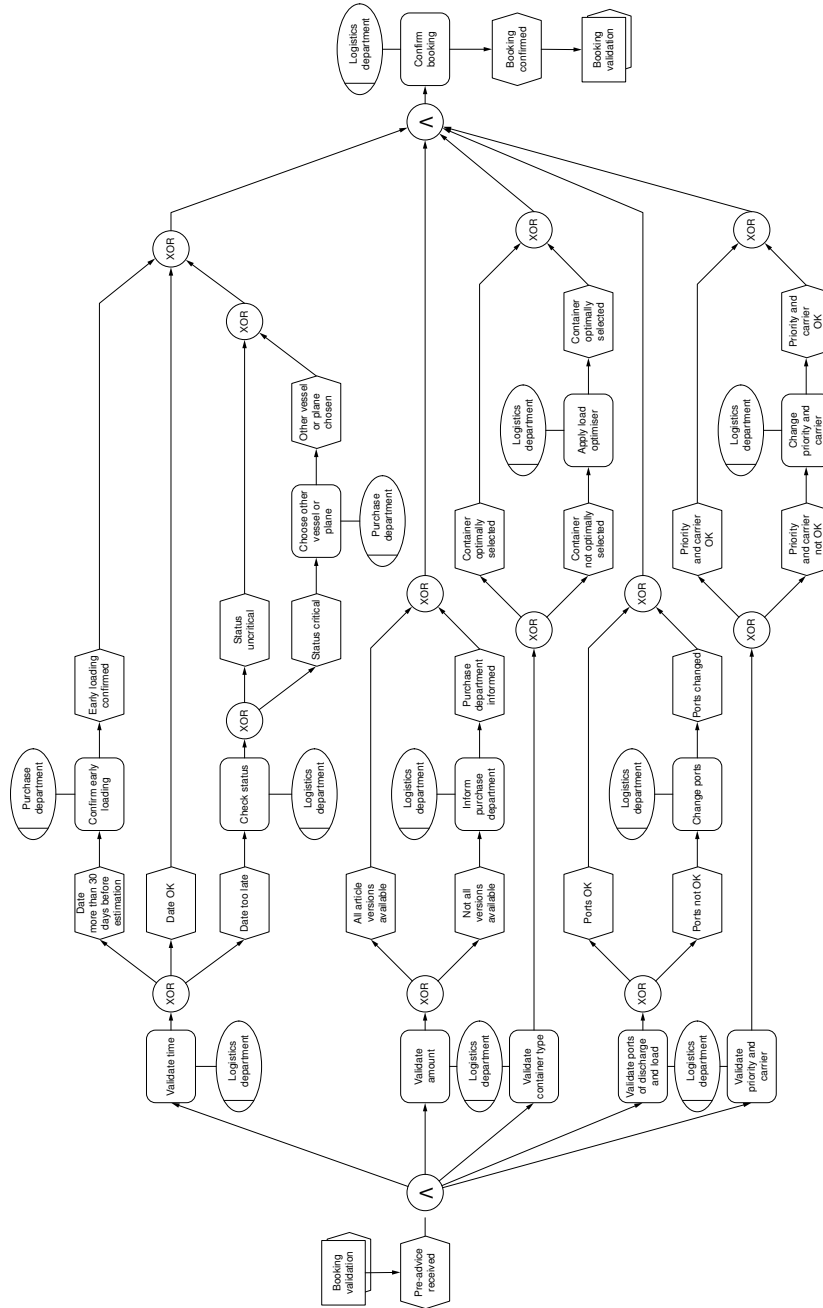


Figure 3.4: Each pre-advice has to be validated by the logistics department. Validated parameters comprise the time, the amount and type of containers, the ports of loading and discharge, as well as the chosen priority and carrier

even a plane should be chosen. In this case it is even possible to choose vessels that do not belong to a preferred carrier. Whenever the vendor is responsible for the delay, the additional costs for faster transportation have to be paid by him. Not only late delivery, but also early delivery can pose a problem. This is especially against the background of arising costs for warehousing. If delivery is more than 30 days before the estimated time of delivery, Tchibo's purchase department has to confirm the early loading. In this context it has to be decided whether Tchibo pays the additional costs of warehousing or passes on the charges to the vendor.

The second parameter to be validated is the amount of cargo that is shipped within one shipping. Especially, it has to be checked whether or not all versions of the article are available within one shipping or not. Furthermore, it is necessary to validate the container type that is chosen by the vendor. Whenever a container is not optimally selected, it is possible to apply a load optimiser which assists in choosing a more appropriate one.

Afterwards, also the chosen ports of loading and discharge have to be validated. The port of discharge is of special interest for Tchibo. It is always either Bremerhaven or Hamburg in Germany. Which port is actually chosen depends on the type of cargo and, to a minor degree, on the capacities of the warehouses. In general, all cargo that can be auto-palletised is stored in the high-bay warehouse in Bremen. The shortest and also cheapest way to Bremen is to discharge these containers in Bremerhaven and to transport them by barge directly to the high-bay warehouse. A second, but considerably more expensive way of transporting goods from Bremerhaven to Bremen is by truck. All cargo that is not auto-palletisable is routed to the port of Hamburg. From here, the cheapest way of transporting goods to Bremen is by train, alternatively trucking is also an option. Finally, it has also to be checked whether all containers are assigned a correct priority. Additionally, the logistics department validates whether or not the chosen carrier belongs to the group of preferred carriers.

After the confirmation by Tchibo's logistics department, the booking agent finally places the booking at the carrier. As soon as the carrier has confirmed the booking, the booking agent notifies vendor about the scheduled departure of the booked vessel.

3.2.2 Shipping

As soon as the cargo is ready for shipping, the shipping process itself starts. As depicted in Fig. 3.5, this process is initiated by the manufacturer, who checks whether or not the scheduled vessel can be reached. If he finds, that he will miss the selected vessel, the booking agent has to be informed by sending him a new suggestion, so that the booking agent can start a new booking process. In this case, the current shipping progress is finished temporarily. Otherwise, i. e. if the vessel can be reached, the containers have to be prepared for shipping (Fig. 3.6). This subprocess comprises the provision of empty container equipment which is done by the booking agent. The pickup of the empty containers can either be accomplished by the manufacturer himself or be delegated to the booking agent. In the latter case the fee for this service has to be paid by the manufacturer or the vendor respectively.

When the empty containers are available, the manufacturer can start filling them with his goods. Some products demand to be shipped in fumigated con-

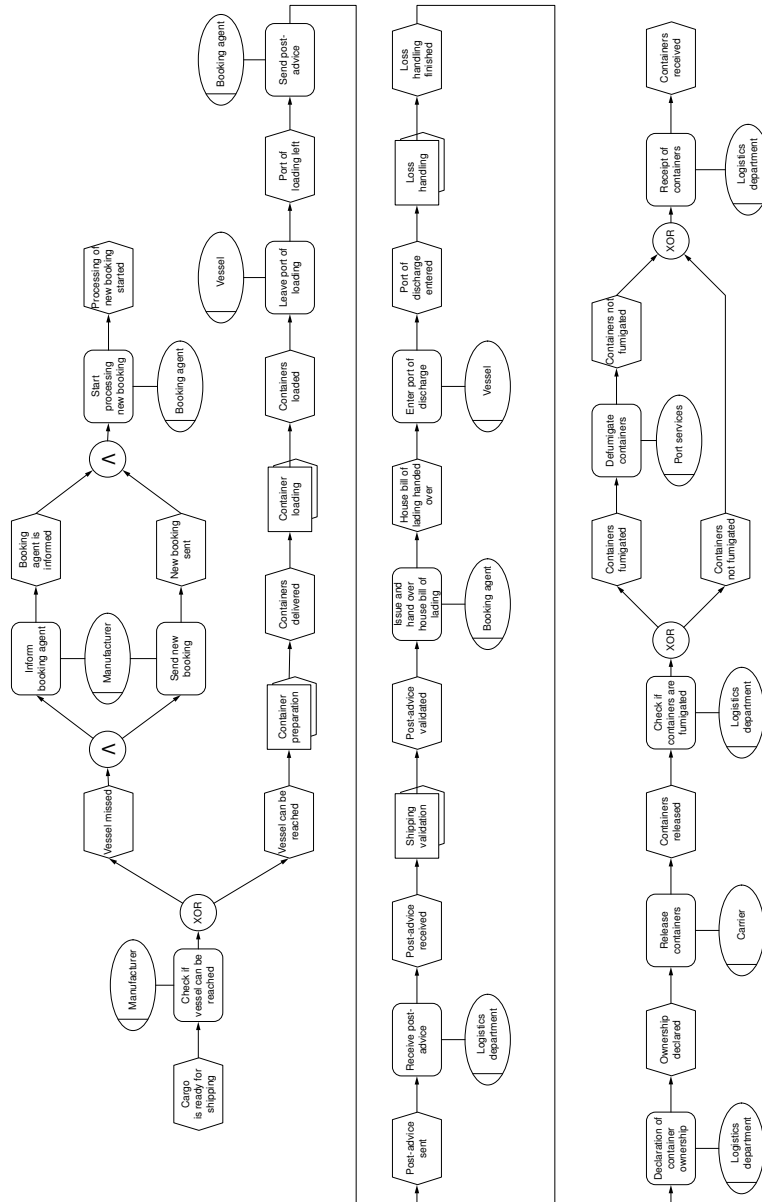


Figure 3.5: The process of shipping containers from Far East to Europe. The event-driven process chain starts with the vendor's preparation of containers and ends with their final arrival in Europe

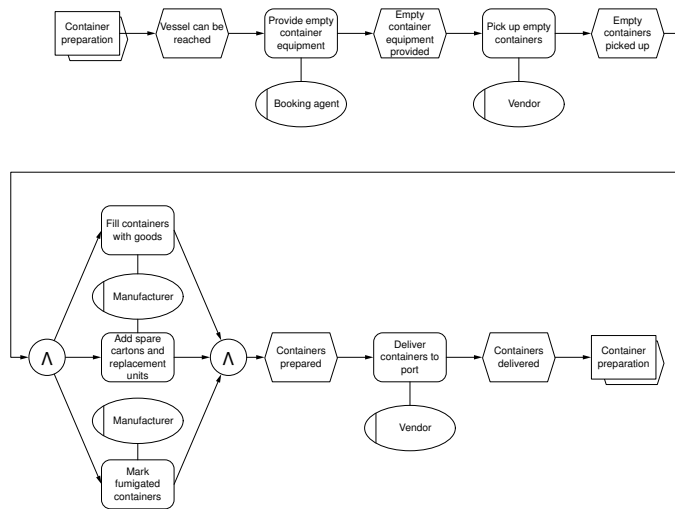


Figure 3.6: The process of container preparation comprises the ordering of empty containers, their filling, as well as their delivery to the port of loading

tainers. For instance, this is the case when transporting wooden products that have to be protected from bugs. Whenever a container is fumigated, it has to be marked accordingly. Proceeding this way ensures that it is ventilated after its arrival in Europe. After finishing the preparation of the containers, they are delivered to the port either by the manufacturer himself or by the booking agent. Besides the purchased products themselves, it is obligatory for the vendor to deliver spare cartons and replacement units for each project. Spare cartons are used in the case of a transportation damage. They are applied whenever only the carton of a product is broken while the product itself remains undamaged. Replacement units comprise articles that are interchanged as a whole in the case of a guarantee, parts which may be missing in the carton of a product, as well as parts that are necessary to repair damaged products. After their arrival, Tchibo delivers the replacement units to a service centre which is responsible for the whole process of guarantee handling.

After the containers' arrival in the port it is the task of the carrier to load them on the scheduled vessel (Fig. 3.7). In order to do so, he has to check whether or not there is actually enough space on the vessel. Sometimes it may happen that not enough space is available. In these cases the priority of the affected containers has to be checked. If their priority is hot or even very hot, it is important that they arrive on schedule in order to meet the planned main sales phase. In this case, containers have nevertheless to be loaded, e.g. by unloading other ones. Otherwise, if the containers have a normal priority, they can be rolled to the next vessel. Whenever containers are rolled to another vessel, a black list has to be transmitted to the booking agent, who in turn informs the logistics department. In order to confirm the new vessel it is validated by applying the same criteria as outlined above.

In the context of loading the freight on the vessel it is worth taking a short look on the relevant selling terms. In the context of Tchibo, the Incoterms 2000, which have been defined in the year 2000 by the International Chamber

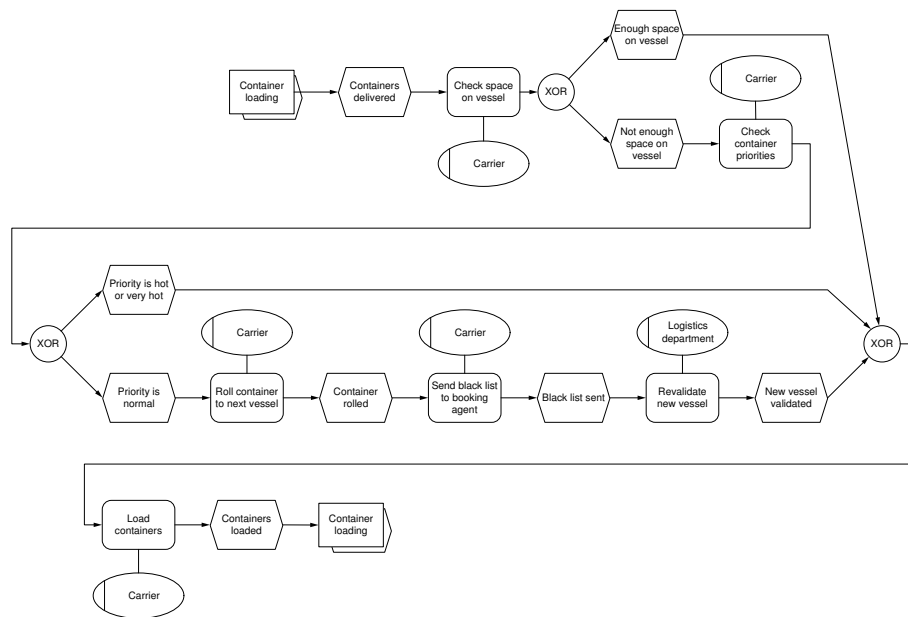


Figure 3.7: During the process of container loading the carrier has to determine whether or not there is enough space on the respective vessel. Whenever this is not the case, it may be necessary to roll them to another vessel

of Commerce, are of interest. Especially, the FOB term is applied:

“Free on Board (. . . named port of shipment). Free on Board means that the seller delivers when the goods pass the ship’s rail at the named port of shipment. This means that the buyer has to bear all costs and risks of loss of or damage to the goods from that point. The FOB term requires the seller to clear the goods for export. This term can be used only for sea or inland waterway transport. [...]” (DHL Express Vertriebs GmbH & Co. OHG, 2005, p. 697)

Besides, Tchibo applies the so-called Tchibo Term (TCT) which extends FOB with some Tchibo-specific agreements. These extensions comprise the responsibility of the vendor for any quality loss during transportation, e. g. due to rust or mould. In return, Tchibo agrees to perform the product testing within ten days after delivery. Independently from the chosen term, the booking agent creates a post-advice from the already existing pre-advice shortly after the vessel has left the port of loading. This again has to be validated by the logistics department in order to synchronise it with their own system. In doing so, the booking agent’s notes, article availability, container types, and the number of containers are checked (Fig. 3.8). Additionally, it is validated whether or not spare cartons and replacement units are also shipped. After the validation of the post-advice by the logistics department, the booking agent issues the house bill of lading and hands it over to the vendor.

The bill of lading represents a substitute for the actual goods in the exchange process (Wood et al., 1995, p. 246). The goods covered by a bill of lading are owned by the consignee that is named in the document. The vendor hands over

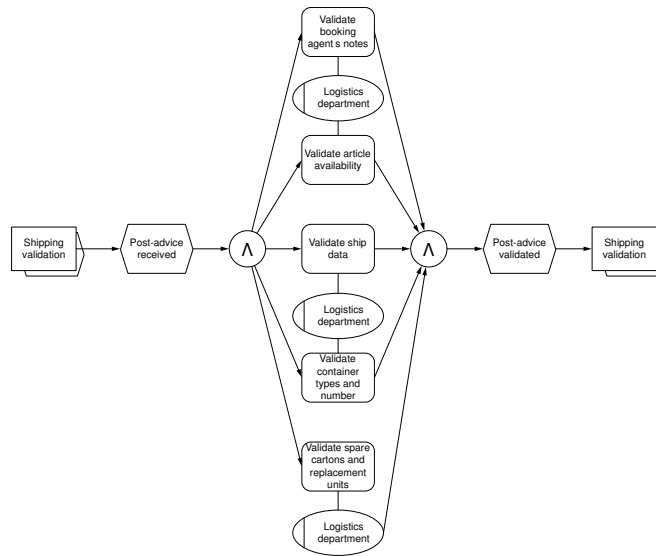


Figure 3.8: As soon as a pre-advice has been received, the logistics department validates the actual shipping parameters in order to synchronise them with their own system

the bill of lading to his bank in order to get paid for the goods. Subsequently, the bank sells the bill of lading to Tchibo. After the vessel's arrival at the port of discharge, the logistics department needs the bill of lading in order to declare their ownership of the shipped containers. Therefore, the bill of lading is handed over to the carrier, who releases the containers in turn. Before the containers can finally be received by the logistics department, it has to be checked whether or not they have to be defumigated before further handling.

It is not always ensured that all containers which have been loaded on a vessel in Far East actually arrive in Europe. Due to multiple reasons, e. g. bad weather, it may happen that containers get lost during the transport. Additionally, it may also be necessary to unload containers on high sea by throwing them overboard in order to prevent vessel and crew from further damage (DHL Express Vertriebs GmbH & Co. OHG, 2005, p. 361). In each case the carrier has to inform the logistics department about the loss of containers, which in turn informs its insurance (Fig. 3.9).

3.3 Delivery from the Port to the Warehouse

Subsequent to their arrival in the European ports, Tchibo's containers await their further handling. This section describes how the delivery from the port to the warehouse is managed by the land forward logistics division. This task is influenced by a great many parameters. For instance, the nature of the article itself affects the choice of the warehouse as not all warehouses are capable of handling all types of articles. Additionally, the warehouses' capacities have to be taken into consideration. Finally, it has also to be decided how a container is supposed to be transported to its respective warehouse. Thereby, the fluctuating

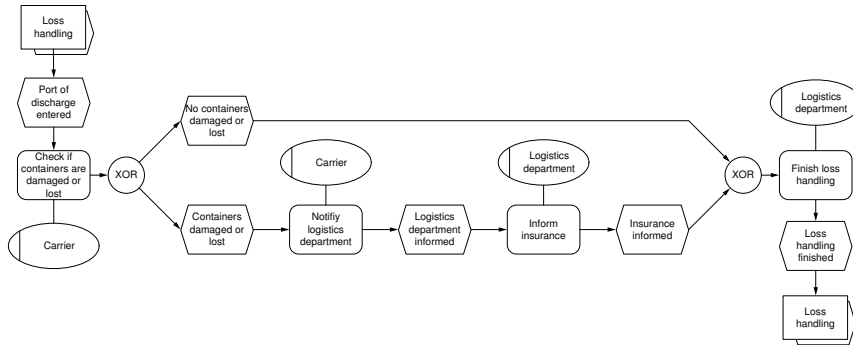


Figure 3.9: The carrier has to inform the logistics department in the case of the loss of containers. In turn, the insurance is informed by the logistics department

number of containers per week is challenging. As for the transportation by vessel this number directly influences the required transportation capacity. In this context, it is worth mentioning that Tchibo's logistics department is mainly responsible for assigning containers to warehouses and transportation relations. The transportation itself is executed by an external service provider. In the following the process of disposing containers is investigated in more detail.

3.3.1 Disposition

The process of disposition (Fig. 3.10) is conducted everyday for all containers that have not yet been disposed. It starts with checking the respective container's release status (Fig. 3.11). This is due to the fact that a container can only be handled if it has already been released by the carrier. In general, each container that has been handled by the sea forward logistics division should already be released. However, this does not hold for all containers. For instance, sometimes the house bill of lading does not arrive on time. As a consequence, the carrier cannot release the respective containers in such a case. Otherwise he would risk that he is made responsible for any unauthorised release by the container's lawful owner. If a bill of lading is not available on time, the logistics department has to check if it is already on its way to Tchibo. Whenever the respective articles are needed urgently and it is estimated that the bill of lading will arrive soon, the purchase department can decide to deposit a security for such a container. This security covers the worth of the cargo and it allows the carrier to compensate the actual owner if the container has been taken unauthorised. In this case, the respective container can be released immediately. By contrast, if the current location of the bill of lading is unclear, depositing a security coincides with a high risk. Therefore, the container cannot be handled and its disposition has to be delayed.

In general, the quality assurance department examines samples of all articles at the earliest when they arrive in their respective warehouse. Apart from that, an increasing number of goods is already pre-examined in Far East by Tchibo's subsidiary in Hong Kong. Therefore, it may already be known that major parts of a project will be rejected due to insufficient quality (Fig. 3.12). In this case, the cargo is not routed to one of Tchibo's warehouses. By contrast, it

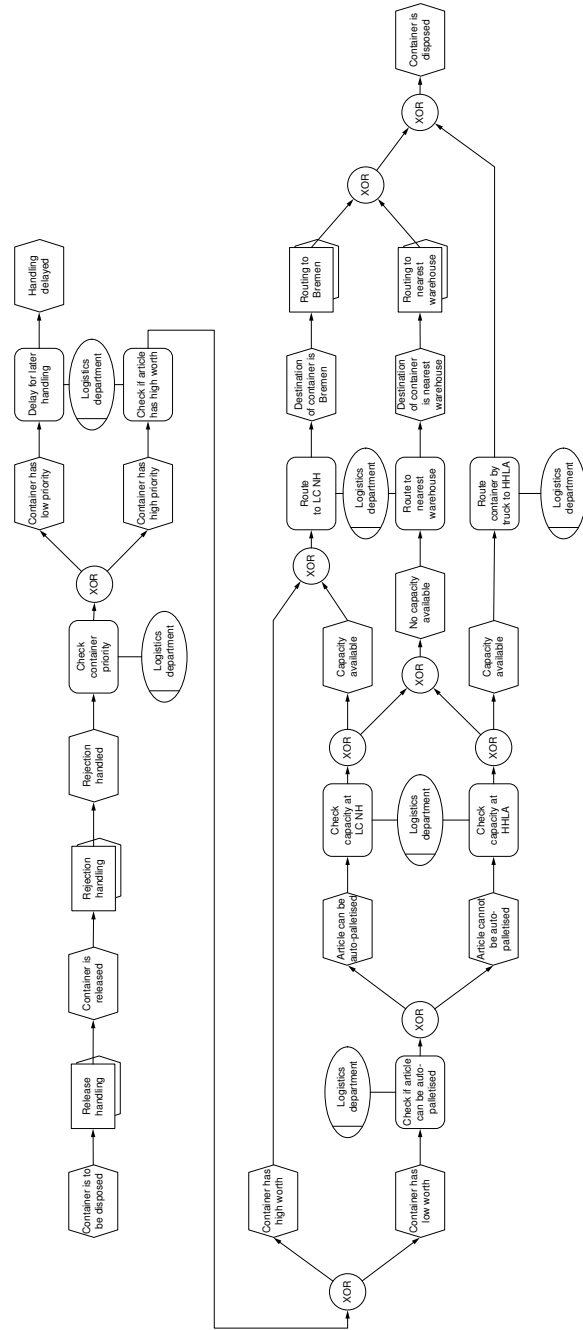


Figure 3.10: The disposition process is performed every day for all containers that are not already disposed. It starts with handling a container’s release and generally ends with the container being disposed

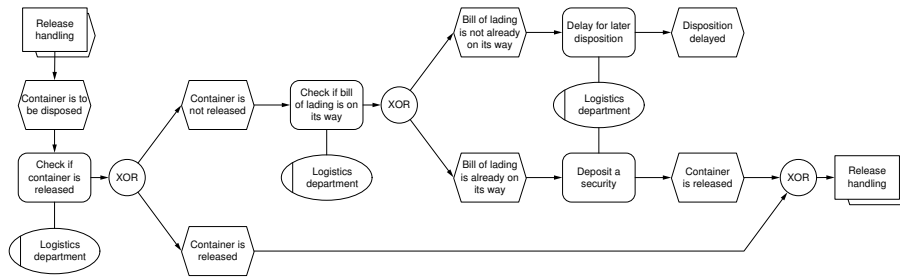


Figure 3.11: For each container it has to be checked if it has already been released. If a container is not yet released but its bill of lading is already on its way, it is possible to deposit a security in order to handle it soon

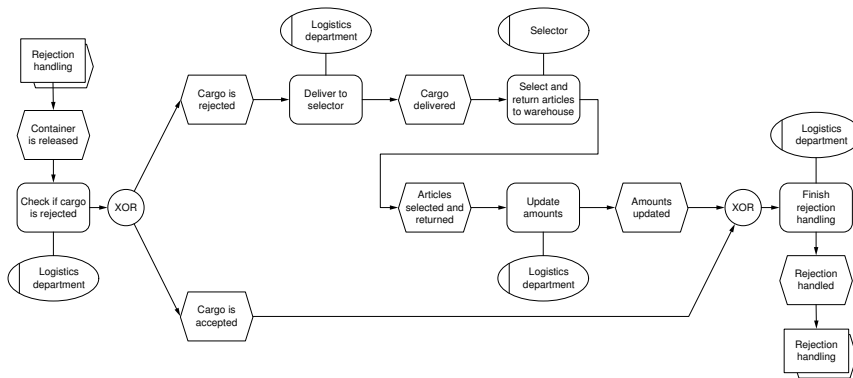


Figure 3.12: If it is already known that major parts of a project will be rejected due to insufficient quality, the articles are generally directly delivered to a selector who refines them

is directly delivered to a selector. This service provider refines the quality of the concerned projects by removing broken articles or repairing damaged ones. Following this process the cargo is returned to the warehouse. Subsequently, the logistics department has to update the amounts of the respective articles as they generally decrease.

Having completed release and rejection handling, the container’s priority is checked. If a container has only low priority, e.g. because there remains some time until its respective main sales phase starts, it is delayed for later handling. Since all containers are manually disposed, proceeding this way allows concentrating on containers with high priority. The most important question for each container is whether or not its content is of high value (Fig. 3.10). All containers having high worth are directly routed to Tchibo’s logistics centre at the Neustädter Hafen in Bremen. For all the remaining containers it is checked whether or not their content can be auto-palletised. This is the precondition for all articles that are stored in Tchibo’s central logistics centre. Since it is an automatised high-bay warehouse only goods that are placed on pallets can be handled. If the LCNH has free storage capacities the respective containers are routed there. Otherwise, they are routed to a warehouse that is near to the container’s current location. In general, the reason why an article cannot be

auto-palletised is its size. In this case, the respective container is routed to a warehouse in Hamburg that is operated by the Hamburger Hafen und Logistik AG (HHLA). However, if this warehouse does not have enough capacities they are also routed to another warehouse nearby.

Whenever a container's destination is set to Bremen (Fig. 3.13), its current location has to be determined. As elaborated above, this can either be Hamburg or Bremerhaven. If the container is located in Hamburg, it can be disposed for train or truck transportation. As one might expect the train forms the cheaper alternative. However, since trains are not always available it has to be checked, if a train departs on time. This depends for example on the number of containers available. If there are not enough containers waiting for transportation, ordering a train is too expensive. Furthermore, not all container terminals offer train departures on all days of the week. Even if an appropriate train has been found, it has to be checked whether or not it has capacity for further containers. Only if capacity is available, a container can be assigned to the respective train. As an alternative, it can be checked whether or not another container that is already assigned to the train has a lower priority. In this case it may be rolled so that capacity becomes available for the container to be assigned. Whenever there is currently no capacity the priority of the container has to be checked. If it has only a low priority it may be disposed for a later transportation. Otherwise, it has to be transported by truck to Bremen. Containers located in Bremerhaven have to be handled in a similar way. Bremerhaven is not connected by train to Bremen. By contrast, it is possible to transport containers by barge on the Weser river directly to the port of Bremen where Tchibo's central high-bay warehouse is located. In general, capacity does not pose a problem in the context of barge transportation. Like a train also a barge can only carry a limited number of containers at once. Nevertheless, a barge can depart multiple times a day since it is not necessary to reserve a railway in advance.

Whenever there are no capacities available at the LCNH or at the HHLA the respective container is routed to a warehouse nearby (Fig. 3.14). Therefore, it is first checked whether or not the container is the first part of its project. This is due to the fact, that each project is supposed to be kept together in order to simplify its handling during the distribution. If the container is not the first part of the project, the location of the other parts has to be determined. If they are already routed to the same warehouse that is scheduled for the current container no further steps have to be taken. By contrast, if the other parts' destination is another warehouse it has to be checked if a rerouting is still possible. Subsequently, the other containers are rerouted to the same warehouse as the current one. Whenever it is not possible to proceed this way, the current container is not routed to the nearest warehouse but to that one in which the other parts of the same project are already kept.

The customs handling for each container takes place whenever it arrives at its respective warehouse. Due to their number the containers are generally not investigated by the authorities themselves. In general, the process of customs handling comprises only the transmission of the respective documents. Also subsequent to their arrival at the warehouse the containers' content undergoes an examination by the quality assurance department.

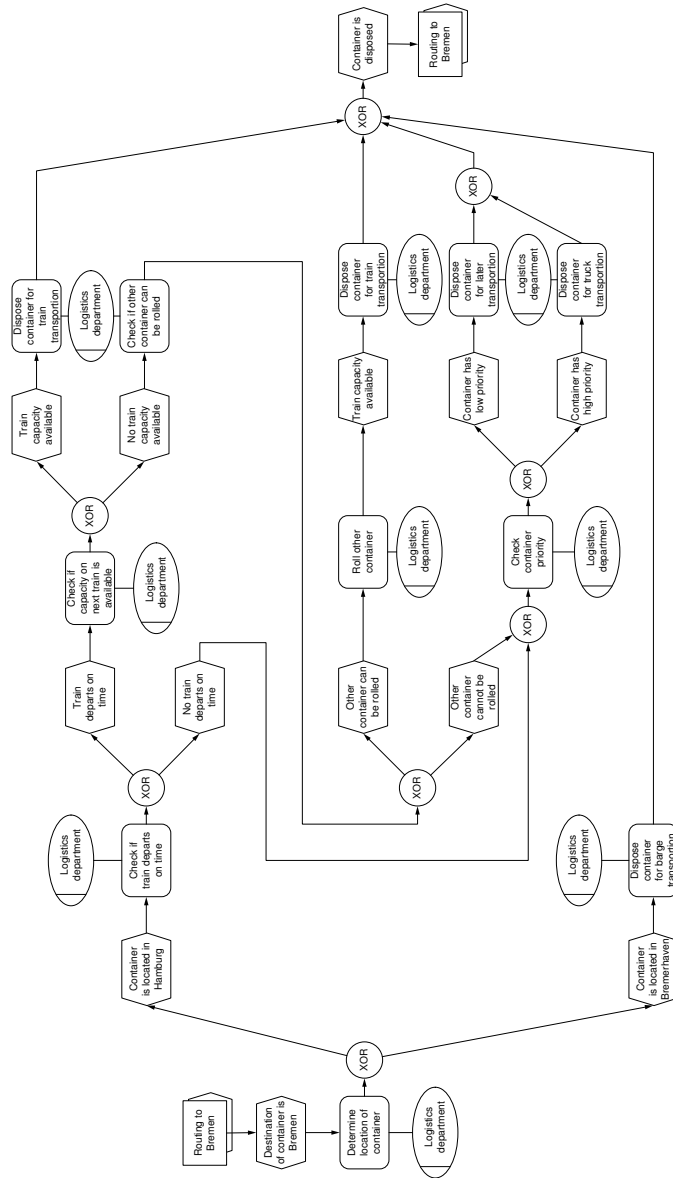


Figure 3.13: There exists multiple possibilities for routing a container to Bremen. Which one is chosen depends e. g. on its current location

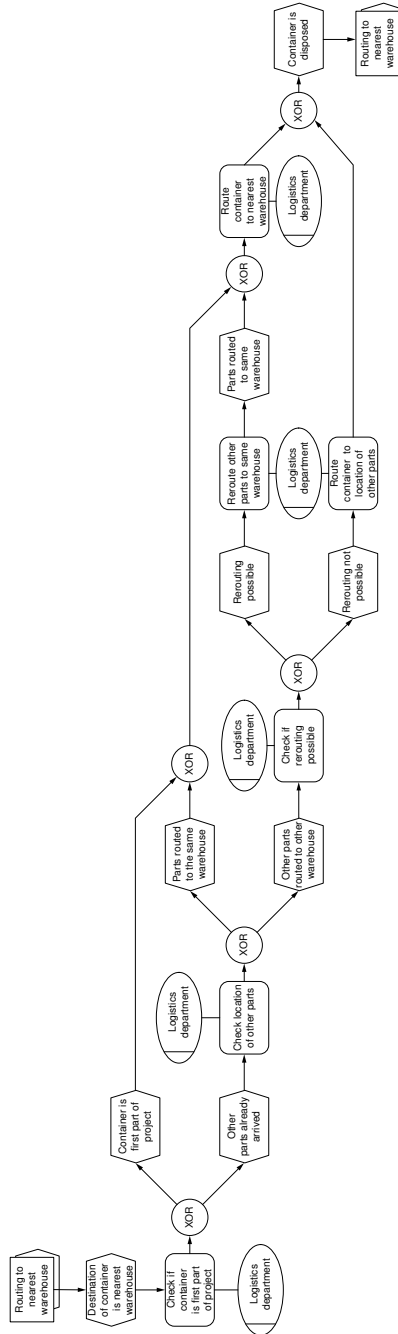


Figure 3.14: Containers are routed to the nearest warehouse if no other capacities are available. In this case it has to be checked where other parts of the same project are located in order to keep them as close together as possible

Chapter 4

Participating Entities

After the examination of Tchibo's forward logistics processes, the main participating entities are identified and characterised in this chapter. Thereby, especially those participants are regarded that are directly involved in container transportation from the ports to the warehouses. This is especially important with a view to modelling these processes later. It is rather obvious that the containers themselves are the most important entities in this scenario. Further participants are the involved ports and warehouses, which form the sources and drains respectively. Finally, the relations connecting ports and warehouses for container transportation are also considered. In the following each of these entities is discussed together with a list of questions that have to be answered during the process of disposition.

4.1 Containers

The containers involved in the disposition process are mainly characterised by their content. All articles carried by a container belong to a specific project. From this project follows the date of the respective main sales phase. This date defines the deadlines for the arrival at all points between the port in Far East and the outlet in Europe. Further questions concerning a container's content are whether or not its cargo can be auto-palletised and whether or not it needs special treatment due to its worth. Apart from their cargo, containers can be distinguished by their ports of loading and discharge. In this context it is especially interesting when the container is scheduled to be returned to the carrier after discharge. In general, this topic depends on the involved carrier. The framework agreement with the preferred carriers allows a longer timeframe than it is for example granted by other carriers. Furthermore, the costs for a later return are more moderate for the former group of carriers. This is an important point for the decision which containers have to be disposed and received first in order to reduce costs. On average Tchibo receives a number of about 300 containers per week. The following questions have to be answered for each of them in the process of disposition:

- When is the estimated time of departure (ETD) in Far East?
- Which is the port of loading (POL) in Far East?

- When is the estimated time of arrival (ETA) in Europe?
- Which is the port of discharge (POD) in Europe? At which terminal?
- Does the container arrive later than estimated? Is it late?
- When is the main sales phase supposed to start?
- Is the container the first part of its project?
- Did other parts of the same project arrive already before?
- What is the location of the recent parts?
- Is the article carried valuable?
- Can the article carried be auto-palletised?
- How many pallets emerge from one container?
- Is the container already released?
- What is the rejection status of the container?
- When has the empty container to be returned to the carrier?
- Which fee has to be paid for returning the container late?

4.2 Ports of Discharge

As already elaborated above, Tchibo has restricted its ports of discharge in Europe to Bremerhaven and Hamburg, both of them located in Northern Germany. Their geographical location directly supports a fast transportation of incoming cargo from the port to the central warehouse in Bremen. However, not every carrier serves both ports. Some of them are only connected to Bremerhaven or Hamburg respectively in order to reduce demurrage, which is the fee to be paid for detention in the port. Despite of the restriction to two ports the actual number of involved container terminals is higher. This is due to the fact that both ports comprise container terminals which are operated by different companies. Especially, these are the Eurogate GmbH & Co. KGaA, KG based in Bremen and the HHLA in Hamburg. Eurogate is a subsidiary of the Eurokai KGaA and the BLG. The HHLA is owned by the Free and Hanseatic City of Hamburg.

Tchibo's containers arriving in Bremerhaven are handled by Eurogate's Container Terminal Bremerhaven (CTB). For containers delivered to Hamburg there exist four alternatives. These comprise Tollerort Container Terminal (TCT), Container Terminal Altenwerder (CTA), and Container Terminal Burchardkai (CTB), which are operated by the HHLA, as well as Eurogate's Container Terminal Hamburg (CTH). While all container terminals in Hamburg are located at the west side of the Elbe river, TCT forms an exception as it is located on the eastern riverside. This fact is a disadvantage as it makes it difficult to combine containers from multiple terminals onto the same train. As discussed above, transportation by train is cheap and therefore generally desired. From this follows, that containers located at TCT have to wait several days until a

full train can depart from this terminal. The only alternative is the more expensive transportation by truck. Therefore, Tchibo has reduced the number of containers arriving at TCT through the selection of its preferred carriers.

The container terminals are not only paid for loading and unloading containers. Furthermore, a fee has also to be paid for the storage of containers at the terminal until they are collected by their owner. From this follows that Tchibo is interested in collecting their containers as soon as possible in order to store them at their own logistics centre until they are unloaded. The following questions are of interest when disposing containers:

- How long does it take to unload a container from the vessel?
- Which fee has to be paid for leaving a container at the terminal?

4.3 Warehouses

Tchibo applies a number of warehouses of different types. The range of warehouses comprises conventional single-storey warehouses as well as high-bay warehouses. At the time this case study is conducted Tchibo uses in total 15 warehouses. They are mainly located in Northern Germany, most of them in the area of Bremen.

The warehouses can be distinguished w. r. t. their type (Vahrenkamp, 2005, p. 178–183), i. e. whether they are single-storey or high-bay warehouses. This also influences the type of cargo that can be stored. For example, an automatised high-bay warehouse can generally only store palletised articles. Apart from these physical limitations also political restrictions can be established, e. g. storing all valuable goods in a secured warehouse. A further distinction can be made regarding the storage capacities as well as the capacities at receiving and shipping. The costs for a warehouse depend on two parts. One of them is the fixed basic charge for the service of providing capacities. A variable part depends on the amount of cargo that is actually stored in the respective warehouse as well as the turnover at receiving and shipping. As already mentioned above, Tchibo's central warehouse is the logistics centre at the Neustädter Hafen in Bremen. Apart from the LCNH, Tchibo applies two other high-bay warehouses. A second one in Bremen serves mainly as a storage for coffee, while the warehouse in Gallin today mainly receives and handles articles returning from the outlets. All other ones are single-storey warehouses that serve as alternatives if the central logistics centre does not have sufficient capacities. Thereby, the HHLA warehouse in Hamburg especially handles oversized articles.

The following questions concern the process of container disposition:

- Which warehouses should be filled with priority?
- Which types of articles can be collected? (e. g. valuable, auto-palletisable)
- Which fill level does a warehouse have? (today and in the future)
- Which other sources demand warehouse capacities?
- Which capacities for receiving and shipping are available?
- How much basic charge has to be paid for a warehouse?

- How much time does receiving a container take?
- Which fee has to be paid for receiving and shipping of goods?
- Which fee has to be paid for storing a pallet per day?

4.4 Relations

As already discussed in Sect. 3.3 there exist different methods of transportation in the context of onwarding carriage. These comprise barge, train, and truck. Barges connect Bremerhaven to Bremen. They are the cheapest way for the transportation of containers from the port to the central high-bay warehouse in Bremen. This is due to the fact that each barge can carry a great many containers per way. However, they are only available between Bremerhaven and Bremen since they demand inland waterways, which is in this case the Weser river. By contrast, there exists no such connection from Hamburg to Bremen. Nevertheless, that connection is served by another method of transportation that also offers good rates: the train. Trains potentially depart from Hamburg on multiple days per week. However, a train is only applied if there are enough containers available. Whenever there is no barge or train available, containers have to be transported by truck from both Bremerhaven and Hamburg. This leads to highest costs, because of the limited capacity of trucks compared to trains and barges. The contract between Tchibo and its transportation service provider includes fixed rates for the transportation of containers on each relation. The disposition demands answers for the following questions:

- Which transportation relations connect a terminal and a warehouse?
- Which transportation capacities are available at a given time?
- Which fee has to be paid for transportation from terminal to warehouse?
- Which is the cheapest transportation relation available?
- How much time is needed for transportation?

Chapter 5

Conclusion

This case study examines real world logistics processes which are hitherto centrally organised. It is intended to serve as a foundation for further research on autonomous cooperation in the observed processes. In this context the choice of Tchibo's forward logistics processes as subject of investigation can be motivated by their complexity and the demanded flexibility. The considered processes comprise the shipping of Tchibo's products from Far East to the ports in Europe, as well as their further transportation into the warehouses in Northern Germany.

Today, the assignment of containers to warehouses and the respective transportation relations is conducted centralised by Tchibo's logistics department. This organisation demands monitoring the total system which is a complex task due to the number of 300 containers that have to be disposed per week. Furthermore, each of them comprises a great many of interrelated parameters that have to be taken into consideration for the disposition (see Sect. 4). This is even more challenging as the disposition is conducted manually to a major extent. The support for the employee responsible for fulfilling this task is rather limited. Despite of a computer application supplying all relevant information, it is nevertheless the human's task to combine them for disposition. The amount of parameters for each container implies that it is rather impractical to take all aspects into consideration for the manual disposition. By contrast, currently only some questions are regarded while the rest of them is simply abandoned (see Sect. 3). Furthermore, the disposition is restricted to those containers with the highest priority, while the other ones are delayed for a later handling. Another challenge is the low redundancy of the process of disposition. As elaborated above, it is a highly specialised task that is accomplished only by a very limited number of employees. Problems arise for instance in the case of holidays, illness, as well as transfer of personnel.

In this context it seems promising to support the employees by automating at least standard situations. Proceeding this way allows them to concentrate on handling exceptions which demand more attention. Especially, it has to be investigated to which extent an autonomous self-control of the participating entities decreases the complexity of the disposition. Thereby, each entity would mainly resort to its own parameters and try to optimise them by cooperating with other involved participants.

Acknowledgement

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