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Addressing quality problems in 3PL processes

A case study in 3PL Company

Master of Science in Supply Chain Management

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Abstract

As a consequence of technology developments and globalization shippers are increasingly outsourcing their logistics activities to third party logistics providers whose activities efficiency and effectiveness are responsible for the success of shippers' business. At the same time shippers decrease the number of 3PLs they use making the competition tougher for logistics providers. To enable 3PLs to stay competitive this master thesis shows that 3PLs can improve their customers' satisfaction by studying their operational processes from a Lean perspective.

Previous research have shown that Lean applied in manufacturing and service environments such as hospitals, carrier or retailer industries, enable to decrease operational costs and increase customer satisfaction. As 3PLs are facing these issues the adoption of Lean tools and principles seem appropriate. However few studies focus on the application of Lean in a pure service environment where no tangible product exists. Since 3PLs are information intensive companies, this master thesis adapts Lean tools and principles to this specific environment.

Through a literature review, interviews of 3PL practitioners and the study of a customer survey released by a large multinational 3PL company, three major quality problems faced by customers when relying on 3PLs were identified. A toolbox was then developed composed of a workshop and a root cause analysis to identify wastes in the 3PL operational processes and understand how they lead to the quality problems experienced by customers. The toolbox was tested and validated on three internal processes belonging to the same large 3PL company that carried out the customer survey.

The application of the toolbox revealed that most root causes of the quality problems are either due to a lack of routine or a lack of clear responsibility or a lack of training on the IT system. These three issues can be addressed by 3PL without any expensive investment and can increase customer satisfaction.

The purpose of this thesis is to identify customers' quality problems that stem from 3PLs' core operation wastes in order to enable the company to later on solve these problems directly to the root and continue its Lean journey.

Key words: Lean, 3PL, process mapping, workshop, waste, customer satisfaction

Table of contents

List of Figures

List of Tables

1 Introduction

1.1 Background and motivation of thesis

Over the last decades, the activity of logistics has tremendously evolved. From a simple activity that moves goods from the shipper to a consignee; the Council of Supply Chain Management (CSCMP, 2010) gives the following definition of logistics:

> *The process of planning, implementing, and controlling procedures for the efficient and effective transportation and storage of goods including services, and related information from the point of origin to the point of consumption for the purpose of conforming to customer requirements. This definition includes inbound, outbound, internal and external movements.*

3PL companies represent important actors of this network that contribute to shippers' success by improving their logistics efficiency and effectiveness. It is widely accepted that the outsourcing of logistics services aims at enabling the creation of strategic and operational value such as inventory and logistics cost reduction, order fill rate and accuracy increase, and order cycle time reduction (Langley and Capgemini, 2010) (Large, Kramer and Hartmann, 2011). For these reasons a majority of shippers, 64%, are increasingly using 3PLs. The activities outsourced account for 5% of the shippers' sales revenue (Langley and Capgemmini, 2012). Among the activities outsourced, domestic and international transportation, warehousing, customs brokerage and forwarding are the most common. The business model of 3PL is essentially based on the creation of customized logistics services which enables 3PLs to differentiate from the traditional transportation market and access higher margins (Large, Kramer and Hartmann, 2011). If activities provided by 3PLs are the same, as mentioned above, they are delivered in a unique manner to fit customer particular characteristics and requirements.

From the customer side, the trend is a reduction or consolidation of the number of 3PLs used (Langley and Capgemmini, 2012). This puts pressure on 3PLs to find ways to increase their efficiencies and to differentiate from their competitors in order to maintain their competitiveness and better create customer value. Nevertheless, 3PL's customers are today facing a number of quality issues, for instance, 55% complain about 3PLs IT systems as the information is not available and visible when required or 46% of shippers complain about unrealized service level in terms of timeliness (Langley and Capgemini, 2009) where timeliness is defined as "the ability to keep promises regarding timeframes" (Tian, Ellingen, 2009). On the other hand, as 3PL's customers increasingly rely on external partners located worldwide, the number of locations and actors involved is growing calling for 3PLs to manage them through control towers, "a central repository for all event data" (Langley and Capgemmini, 2012). In that context 3PLs must face the challenge of handling increasingly complex information flows and making them visible to shippers (Stefansson, 2006). As a result logistics providers have seen their internal processes increased in complexity while the quality problems that 3PL's customers face today, are still numerous (Liu et al., 2010).

To cope with these quality issues, tools from the Lean philosophy and process management have been originally developed for manufacturing environment and recently adapted to service companies. By applying Lean principles, Åhlström (2004) has shown the decrease of wastes in four different service companies: one dedicated to road maintenance, another to railways, a school and a hospital while Pierce and Rich (2009) have demonstrated improvements in operational costs and customer

satisfaction in three call service centers. Adapting Lean tools and philosophy to 3PLs' context seems adequate to solve the quality problems encountered by shippers.

1.2 Problem area

In the 3PL market, costumers' expectations are high, from operation efficiencies (cost reduction, cycle time reduction) to more strategic development (free up tied up capital, reach new geographical market). To reach these benefits the literature stresses the importance of the cooperation between logistics service providers and shippers and provides information on the establishment of the relationships (Fugate, Davis-Sramek and Goldsby, 2009) and the characteristics and outcomes of the different levels of partnerships (Knemeyer, Corsi and Murphy, 2003). Nevertheless after few years of strong coordination, customers are still facing a number of quality issues with their 3PL that impact 3PL's overall performance and customers' satisfaction (Liu et al., 2010). Customers' perception of 3PL performance has long been discussed in the literature (Large, Kramer and Hartmann, 2011) but according to the authors' best knowledge, no study exists attempting to link the quality problems faced by customers with the internal inefficiencies and wastes of 3PL organizations.

Quality is defined by the international standard for quality management systems ISO 9000:2005 as "*the degree to which a set of inherent characteristics fulfils the requirements, i.e. needs and expectations that are stated, generally implied or obligatory*". As in this report quality is considered from a customer point of view and in a service environment the previous definition is adapted and gives the following definition of quality issues: quality issues of a service are its inability to satisfy the needs and expectations of the customer.

Lean manufacturing has been the standard for production practices in manufacturing industries since the eighties. Many studies have highlighted the social, financial and environmental benefits of focusing on value-adding activities and reducing wastes. Pierce and Rich (2009) underline that Lean approaches in the product-service context have been validated but the application of the Lean philosophy in the pure service environment is still largely untested. Indeed the implementation of Lean in the service environment such as in hospitals or in retailer industries is documented and analyzed in the literature. However these two types of companies can be described as "service contexts where a physical product exists" (Pierce and Rich, 2009) as in the healthcare sector the patient moves along the process. This similarity with the manufacturing environment has made the adaptation of Lean principles possible. However, very few research articles deal with Lean in pure service environment or information intensive service; only call centers services seem to have been studied (Pierce and Rich, 2009). Such companies only create, manage, store or exchange information or data but no goods are directly associated to the creation of value that makes challenging to application of Lean thinking to this environment.

Then, based on one of the Lean principles, defined by Liker (2004) "the right process will produce the right quality", the present study aims at linking quality issues faced by customers to internal wastes and inefficiencies of 3PL processes.

1.3 Purpose

Derived from the above discussion, this research aims at defining quality problems faced by 3PL customers and developing a toolbox based on Lean philosophy and Lean tools to explore and identify wastes in 3PL processes and visualize how these wastes lead to the quality problems previously defined. The purpose of identifying customers' quality problems that stem from 3PL's core operation wastes is to enable the company to later on solve these problems directly to the root. In this report,

customer refers to the shipper, i.e. the transport service buyer signing the contract with the logistics provider. Regarding 3PL processes the focus of the study is on internal, operational processes that are administrative and information processes.

1.4 Research question

In order to fulfill the purpose and organize the research of this thesis, the authors have identified three research questions. They are presented and described in this section.

RQ1: What are the quality issues faced by a 3PL customer today?

The first question aims at identifying what type of quality issues need to be tracked down into the 3PL company. From the literature review and empirical data from practitioners, the purpose is to define what quality problems 3PL customers experience to better define the boundary and the process study.

RQ2: How to identify 3PL internal processes wastes/inefficiencies?

By adopting a Lean perspective RQ2 aims at developing and testing the toolbox used to study current processes. Lean tools and principles have been combined and adapted to design the toolbox. The objective of the toolbox is to establish a systematic good approach when drawing the map to ease the understanding of processes and help raising hidden problems.

RQ3: How do these wastes/inefficiencies identified at the operational level lead to the quality issues faced by customers?

Research question 3 purpose is to conduct a root-cause analysis of the quality issues identified in RQ1. Each problems identified by customers are analyzed to identify which waste/inefficiency surfaced at the operational level in RQ2 is responsible for customers' dissatisfaction. Visualizing the link of cause and effect is also part of the research question's goal.

1.5 Delimitation

The thesis focuses on understanding and mapping processes as they are today. The case study aspect of the current research should be considered as such. However, a strict process is followed to enable the use of the findings and the process itself for future investigation in this area.

Regarding the processes studied, the focus of this research is on the planning and follows up of the transportation work for their customers and thus consists of only administrative and information processes. The interactions with other departments may be of interest if their outcomes affect the operational process studied, nevertheless their own processes are considered as out of scope.

The eventual aim is to find the root causes of the quality issues experienced by customers that stem in operational processes. The authors are aware that external causes can also be responsible for the problems faced by customers but they are outside the scope of this thesis.

2 Research Method

This chapter offers an overview of the methodology used for this thesis. First the general research strategy is explained to give a clear understanding of the process work followed. Then the different sources of data used are introduced before discussing the reliability and validity of the thesis.

2.1 Research Strategy

The general research methodology for the project is composed of the following steps:

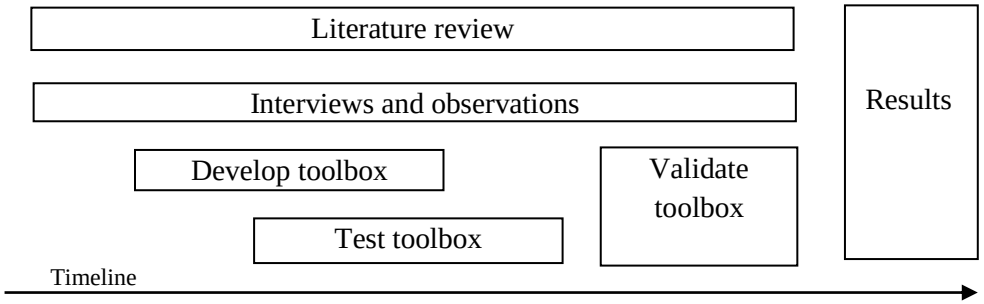

Figure 2-1: Research strategy used in the master thesis

This thesis consists of witnessing the gaps between 3PL customers' needs and requirements and their satisfaction level and revealing the wastes in forwarders' daily operations. The eventual goal is to establish the links between the quality issues faced by customers and internal inefficiencies. A case study method is "often chosen because the researcher wants to know how the context of the phenomenon of interests affects the outcomes" (Ellram, 1996). In this thesis, the case study method is used on a single case to explore customers' needs and operational dysfunctions in service information intensive companies. To perform the case study, first a literature review was conducted to get a deep understanding of the problem context and collect state of the art scientific data knowledge. In parallel interviews of experts and company employees from different levels and departments were performed to complete the lack of available literature and develop a better understanding of the case. All this primary data collection enabled to develop a toolbox and a visualization tool that were then tested and validated. The goal of the toolbox is to structure and ease the study of the internal company processes and then explain how they lead to quality issues faced by customers. Observations and interviews were still performed during the development and test of the toolbox as this should fit the company requirements. Once the toolbox was tested it was validated by applying it on two other processes from different departments in order to address quality problems in 3PL processes.

2.2 Data collection

In the literature there are two different types of data: qualitative and quantitative. A qualitative method which consists of studying soft data from interviews, observations and discussions enables to gain holistic knowledge and get precise explanations of a phenomenon while a quantitative method aims at analyzing the relations between numbers through surveys and secondary data analysis (Ellram, 1996). The present project consists of analyzing customer satisfaction and current 3PL internal operation processes. Therefore both quantitative and qualitative data are used from the literature study, interviews, survey and observations.

2.2.1 Literature review

First an analysis of the existing literature regarding our area of research gives an understanding of our research field and the latest researches and findings. A large number of published articles from scientific journals as well as books were covered to wider the authors' knowledge and increase the accuracy of the study. The outcome of the literature study is presented in the section 3.

The following area of research with their associated search term was done:

Table 2-1: List of area of research with their associated search terms

Area of research	Search Term
Third party logistics	3PL customer value, 3PL performance, 3PL efficiency
Lean in administration	Lean, Administration, Office, Service, Waste
Process	Process, Map, Flow chart, Business process reengineering, value stream mapping, Information flow, Process management
Methodology	Case Study, Root cause analysis, Problem classification, Qualitative study
Workshop	Team management, Workshop, Group dynamics

These terms were searched in Google scholar and in the following e-journals:

- Journal of Business Logistics (JBL) (ISSN: 0735-3766)
- International Journal of Logistics (IJL) (ISSN: 1367-5567)
- International Journal of Logistics Management (IJLM) (ISSN: 0957-4093)
- International Journal of Physical Distribution and Logistics Management (IJPDLM) (ISSN: 0960-0035)
- Logistics and transportation review (LTR) (ISSN: 0047-4991)
- Logistics Management (LM) (ISSN: 1540-3890)
- Transportation Journal (TJ) (ISSN: 0041-1612)
- International Journal of Integrated Supply Management (IJISM) (ISSN: 1477-5360)

The articles were selected to be further studied based on their titles and abstracts.

2.2.2 Interviews

To fill the lack of literature in certain areas or to gain a holistic view of a third party logistics provider's environment, different interviews with experts, practitioners within the industry and consultants were done. The interviewers followed semi-structured interviews with open-ended questions which were adapted to each category of interviewees in order for the authors to reach their objectives. This explorative open form of interview helps at developing models and acquiring knowledge of a particular phenomenon (Kvale, 1996). A case study protocols that can be found in Appendix 1 was followed for 83% of the interviews.

The interviews of this thesis were shared into two main groups:

- Most of the interviewees are currently practitioners within a third party logistics provider. National managers of different departments were interviewed for a better understanding of the competitive environment, internal settings and objectives of the business. Forwarders and operational managers were also interviewed before and during the creation of the toolbox to deeply understand the needs of 3PL companies. These first interviews helped to identify and formulate the problem. It guided in the authors to develop the toolbox so that it fits with the

context of the industry. The overall purpose of these qualitative research interviews is to "obtain descriptions of lived world of the interviewees with respect to interpretations of the meaning of the described phenomena" (Kvale, 1996).

- A second type of interview was carried out with experts and consultants, to develop the toolbox. These interviews helped the authors to get the state of the art of current practices in mapping, surfacing and analyzing problems in information intensive areas based on lean philosophy.

All interviews conducted in this thesis are listed in Table 2-2, and more detailed information is available in Appendix 1.

Table 2-2: List of interviewees

Designation used in the report	**Area of expertise**
Operational manager 1	Process owner
Operational manager 2	Process owner
Operational manager 3	Process manager
Operational manager 4	Process manager
Operational manager 5	Process manager
Operational manager 6	Process manager
Key account manager 1	Management of customer relationship
Key account manager 2	Management of customer relationship
Key account manager 3	Management of customer relationship
Key account manager 4	Management of customer relationship
Lean expert 1	Green belt in a 3PL company
Lean expert 2	Lean and change management

The semi-structured interviews were complemented with group discussions in workshop. For more details see section 5.2.1.

2.2.3 Observations

In addition to the literature review and the interviews, the authors had the opportunity to do direct observations of the operations on site at a third party logistics provider. These observations helped at understanding the company environment, the industry culture and the social reality (Bryman and Bell, 2007). Sitting on site, enabled the authors to approach the issues faced by the company with "fresh" eyes and new perspectives. It also helped to develop closer relationships with forwarders that lead to a better interaction and comprehension of their work. Moreover direct observations are in alignment with the Lean philosophy adopted in this thesis since the *Genchi Genbutsu* principle emphasizes the need to "go and see by yourself" (Liker, 2004).

In addition to these direct observations, the researchers used indirect observations reported by forwarders during the workshops' sessions. Bryman and Bell (2007) argue that observations are a valuable method of data collection and it enables the observers to interact with the workers and deeply understand the processes.

2.2.4 Customer survey

A customer survey released by a large multinational 3PL company was used to gather data on customers' perceptions of the services offered and their expectations of 3PLs. The survey was constructed by a professor in statistics specialized in econometrics and time series analysis and a consultant in human behavior in order to generate data that can be used in a proper way. The professor helped structuring the customer survey and gave advice to the company on how to analyze the answers. He also helped the consultant in human behavior to design the questions. The survey is established to measure customers' satisfaction and expectations with the final goal of finding areas of improvements and align the 3PL strategy with the necessary improvements.

The survey study was conducted from the 24/01/2012 to the 01/03/2012. The population studied is made of current customers of the 3PL company and potential customers, i.e. prospects, all considered in a specific geographical area: Sweden. The population data was retrieved from the internal sales support database. An e-mail was sent to the 2291 selected addresses present in the database on the 24/01/2012 with a link to the online survey. Two reminders were sent on the 03/02 and the 17/02. In the end 215 answers were obtained which represents 9% of the population and enables statistical possibilities to analyze customers' satisfaction and expectations. Among those who answered:

- 28% are important customers as they belong to the 7% of the 3PL customers that represent 80% of the gross profit
- 23% decided to stay anonymous
- 8% were prospects, some of them have since become customers
- 41% are medium and small customers

The reliability of a survey is defined as the ability to replicate the study and obtain the same results (Flynn et al., 1990). The population is provided from a database in which all individuals were selected, therefore the population is easily reproducible. Besides, the questionnaire was developed by professionals to avoid.

The validity of the survey is defined as the ability of the survey to measure what it is supposed to measure (Flynn et al., 1990). To increase the validity a 7 point Likert scale was used in the questionnaire.

As the purpose of the survey is to analyze customers' satisfaction and expectations and define area of improvements, the analysis of the results should reflect these objectives. The respondents were divided in three groups:

- One group made of really satisfied customers that are assumed to be reflected by only the two top levels of the 7 point Likert scale.
- One group that gathers customers that expect more from the services offered. These customers have answered the third best grade. As the goal of the survey is to find area of improvements these customers are considered to be not fully satisfied and there might be a risk that they go to another service provider if an opportunity arose.
- One group made of customers that are not satisfied and graded using the remaining worst grades.

2.3 Reliability and Validity

In this section, the authors take a step back to analyze the reliability, validity and objectivity of their case-part of the study.

2.3.1 Reliability

A reliable study is the first step for a valid outcome. A research can be qualified as reliable when it would offer the same result if repeated. It means that the purpose of reliability is to minimize errors and increase objectivity. Ellram (1996) mentions that the reliability of the research is dependent on the case study database and the case study protocol. The case study database is composed of the literature review, interviews, observations, a customer survey and different form of secondary data such as internal company reports or presentations. As mentioned in 2.2.1 only published articles from scientific journals and academic books were used. The way data were found is explained in Table 2-1. Interviews followed a standardized protocol presented in Appendix 1 - Case Study Protocol. The Case Study Protocol helped the authors to well structure the interviews by preparing beforehand the background, the purpose and the questions. The protocol makes the interviews repeatable. Besides, different people at the same position in the company were interviewed and some were interviewed twice. It enables the duplication of the information and the comparison of the interviews outcomes participated to increase the reliability of the data obtained. The interviews were all recorded and the recordings were compared afterwards to the transcriptions to increase objectivity. All the secondary data were confronted with primary data to ensure the accuracy of data.

2.3.2 Validity

Ellram (1996) defines validity as "the establishment of proper operational measures for the concept studied". He states that construct validity is ensured by three elements: "using multiple sources of evidence, establishing a chain of events, and having key informants review the case study research".

To ensure validity the authors relied on triangulation which is the use of different techniques to study one phenomenon. Indeed, as many relevant documents as possible were analyzed such as internal company memos, procedures, customer surveys and KPIs reports. In addition, the authors interviewed different persons with the same position or knowledge but with different backgrounds and point of views. It gives the authors a large source of data collection that, combined with observations, was confronted, compared and analyzed to corroborate verbal information (Yin, 2003). External company sources were also interviewed to avoid information biased. The second element chain of events is related to "the ability of the reader to follow the case study data and analysis from its initial formulation of the research questions to its final conclusions" (Ellram, 1996). This report was reviewed by three external sources that commented on the comprehensibility, the flow and the content that enabled to increase the chain of evidence. Besides, the empirical data obtained were checked by the sources to ensure the accuracy of the facts stated.

As regards the external validity that refers to the possibility of generalizing the results outside this case study, the authors acknowledge that conducting one in depth case study may not be sufficient to firmly ensure the generalization of the results. However the toolbox was successfully tested on a 3PL internal process and validated on two other different processes that evolve within different constraints, set up and transport modes. Besides the literature review and the interviews of the 3PL practitioners, which have for 40% of them worked before in another 3PL provider, revealed that third party logistics tend to face the same issues and follow the same processes. For these reasons the authors argue that the toolbox will still be adequate and useful in another 3PL.

3 Frame of Reference

3.1 Third party logistics (3PL)

Before digging into the 3PL operation, it is of great value to picture the current environment in which a 3PL company evolves. A short description of its role and position on the market is made in that section followed by the definitions of their customer expectations and value.

A 3PL company aims at achieving a complete set of logistics activities to its customers (Virum, 1993). Langley *et al*. (1999) offer the following definition:

> *A company that provides multiple logistics services for its customers, whereby the Third-party logistics provider is external to the customer company and is compensated for its services*

3.1.1 Third party logistics' context and environment

A third party Logistics Company is part of a whole environment usually called supply chain management (SCM). SCM is the management of a network of interconnected businesses involved in the ultimate provision of product and service packages required by end customers (Harland, 1996). It encompasses all activities from the raw material supply to the distribution of finished goods to the point of consumption. In this context, logistics is defined as *"that part of supply chain management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customers' requirements"* (CSCMP, 2012).

Many definitions are available in the literature to describe 3PL activities. The Council of Supply Chain Management Professionals (CSCMP, 2010) defines third party logistics provider as "*a firm which provides multiple logistics services for use by customers. Preferably, these services are integrated or "bundled" together by the provider. These firms facilitate the movement or parts and materials from suppliers to manufacturers and finished products from manufacturers to distributors and retailers. Among the services which they provide are transportation, warehousing, cross-docking, inventory management, packaging and freight forwarding"* (CSCMP, 2010). Due to its nature, a 3PL company affects the relation between shippers and consignees and takes over some part of the primary parties' role (Stefansson, 2006).

3.1.2 Role of 3PL in its environment

3PL's role in the distribution set up differs depending on the level of outsourcing of their customers, from pure transportation work organization to a complete integrated-logistics value-added services and global management of the customers' logistical set up (Langley et al., 2004; Lieb and Bentz, 2004). In this configuration, 3PL's companies act as a control tower of logistics activities dealing with the flow of goods and information between different actors as Figure 3-1 illustrates. They coordinate the flow of information (dotted lines) while organizing the flow of physical goods (Stefansson, 2006).

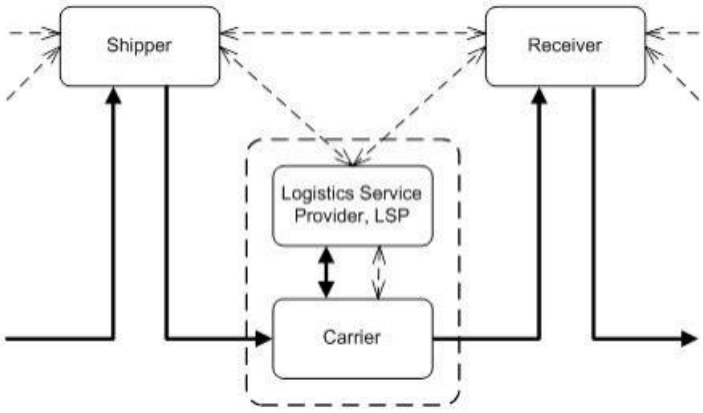

Figure 3-1: Role of Logistics service providers (Stefansson, 2006)

3.1.3 An information intensive service company

This research thesis focuses on the administrative processes of 3PL companies. Their key position as intermediaries for logistics activities and their use of the control tower concept leads 3PL companies to deal with important quantity of information. Therefore in order to better understand the challenges and nature of such services; it is important to define the characteristics of information intensive service company in terms of service and information management in this set up.

SERVICE

A service is an intangible and perishable product, that can't be stored and should be used at the time of creation. For these reasons strategies developed in the manufacturing context cannot be used directly to the service environment (Apte and Goh, 2004). Another particularity of the service sector is that it is "labor intensive" as described by Fitzsimmons and Fitzsimmons (2004). Indeed it relies a lot more on people than in the manufacturing environment. Services are characterized by flow of information and unlike products that flow in one direction, information can go in "both directions", "back and forth" between different actors or systems (Apte and Goh, 2004). The flow of information is therefore more complex and larger than the product flow.

INFORMATION MANAGEMENT

Using Hicks (2007) definition, information management adds "value to information by virtue of how it is organized, visualized and represented" and enables "information to flow to the end-user through the processes of exchange, sharing and collaboration". For service companies, it is critical to understand the different role of information in processes. Apte and Goh (2004) distinguish three major roles in information-intensive services. First the information can be seen as an output, i.e. it is created by the activity. Second it can act as an enabling factor meaning that the information enables to measure and follow the process. Finally the information can play a critical supportive role in the process as it helps in the decision making process. The main challenge faced in information management is "to collect the right information at the right time and use it correctly" (Apte and Goh, 2004).

3.1.4 Value and customer expectations

The creation of value is a prerequisite for companies to be on the market but to be competitive companies must strive to create customer value (Bergman and Klefsjö, 2010). All movements that aimed at improving businesses such as Lean, TQM or process management emphasize that identifying

customer value is the first activity that must be performed. Customer value is defined by Womack and Jones (1996) as what the customer values in products and services. It encompasses all the incentives that make a customer buy a product to satisfy his needs, requirements and expectations (Bergman and Klefsjö, 2010). As regards to logistics, customer value can be defined as "receiving the right product or service in the right quantity, in the right quality, in the right place, at the right time, delivering to the right customer, and doing this at the right cost (the seven R's)"(Shapiro and Heskett, 1985). All these criteria constitute common, general values that should be created by all logistics providers to customers. However every logistics provider should further assess their individual customers' needs in order to customize their services (Bergman and Klefsjö, 2010). Defining who the customer is for 3PL companies is not that obvious as the one ordering the service may be different from the one using it and the one paying for it depending on the Incoterms and the agreement between the shipper and the consignee. However to make it easier to identify customer's expectations and to have a common vision in this report, 3PLs' customers are considered to be transport service buyers often referred as shippers, the ones establishing contracts with 3PLs and following that the agreement is being honored. When customers' expectations and needs are not fulfilled it can be said that customers experience quality problems and are dissatisfied by the services offered.

3.1.5 Current 3PL situation

Today there are two major trends on the 3PL market. On the one hand shippers are increasingly relying on 3PL services and on the other hand they are reducing the number of 3PL companies they use (Langley and Capgemmini, 2012). As a result 3PLs struggle to retain their customers and must differentiate even more from their competitors in order to attract new customers. The business model of 3PL is essentially based on the creation of customized logistics services which enables 3PLs to differentiate from the traditional transportation market and access higher margins (Large, Kramer and Hartmann, 2011). Therefore understanding customer expectations and needs and fulfilling them is of great importance. It is often reported that 3PLs' customers expect that logistics outsourced activities result in reduced logistics costs, reduced cycle times and more efficient handling of exceptions (Knemeyer and Murphy, 2004)(Langley and Capgemmini, 2012). The reliability of delivery in terms of timeliness, i.e. ability to respect time frames, and quantities are also very important criteria in the eye of the shipper (Liu et al., 2010) (Tian, Ellinger and Chen, 2010).

However the results and findings of the 14th, 15th and 16th annual third-party logistics studies underline a number of quality issues experienced by shippers and that endanger the relationship between shippers and their 3PL logistics providers. The problems encountered by shippers are shown in Table 3-1 below. It can be seen that there is a gap between shippers' experience and what 3PLs think they experience. Among the major issues reported by shippers, 3PLs acknowledge that they perform worst on three of them: service level commitment not realized information technology capabilities not sufficient and cost reduction not realized.

Problems	**Reported by shippers**	**Reported by 3PLs**
Lack of continuous, ongoing improvements and achievements in offerings	46%	19%
Service level Commitments not realized	46%	31%
Information technology capabilities not sufficient	43%	31%
Cost reductions not realized	36%	34%
Lack of project management skills	35%	17%

Unsatisfactory transition during the implementation stage	31%	25%
Lack of global capabilities	30%	21%
Benefits not achieved in a timely manner	25%	18%
Promising premium services that they do not have	25%	Not asked
Lack of business process integration across regions and Supply Chain services	26%	26%
Lack of industry-specific knowledge	20%	11%
Inability to form meaningful and trusting relationships	12%	13%

Table 3-1: Shippers and 3PLs report a number of continuing problems with 3PL services (Langley and Capgemini, 2009)

These three main issues are also mentioned as reasons why non-users do not use 3PLs; 17% state that cost reductions would not be experienced, 14% state that it would be too difficult to integrate their IT systems with the 3PL's systems and 12 % claim that the service level commitment would not realized (Langley and Capgemmini, 2012). By Service level shipper designate order fill rate and order accuracy and cost reduction refers to logistics and inventory cost reduction and logistics fixed asset reduction.

3.2 Lean

3.2.1 Lean origins and history

Originating from the Japanese automotive industry, Lean Manufacturing is a production philosophy developed in Toyota's Japanese plants. The term Lean was first introduced by Krafcik in 1988. The outstanding achievements of the philosophy in terms of productivity and quality initiated a strong interest from the westerns academics and practitioners to understand its fundaments. As a consequence many researchers have defined their own conception of what Lean is. The Lean concept was made popular by Womack et al. (1990) and Liker (2004) conceptualized a set of fourteen Lean principles and described Lean as:

> *"[A] sophisticated system for production in which all of the parts contribute to a whole. The whole at its roots focuses on supporting and encouraging people to continually improve the process they work."*

Lean is a comprehensive philosophy that emphasizes the creation of customer value at the strategic level and the elimination of wastes at the operational level (Hines, Holweg and Rich, 2004). Earlier, Womack et al. (1990) made a clear distinction between lean principles and practices. Principles are the foundation of the Lean philosophy while practices are the activities undertaken to change the organization in order to achieve the desired performance (Dean and Bowen, 1994).

3.2.2 Lean Principles

A common mistake faced by company is to focus on practices and ignoring the underlying principles. Many researchers have attempted to highlight the underlying and invisible principles necessary to start a sustainable Lean journey. To help companies of different sector in Lean transformation, an initial set of five Lean principles were defined and described by Womack and Jones (1996):

- *Specify value*: Identify and define value precisely from the perspective of the end customer.
- *Indentify the value stream*: Identify the entire value stream for each product or product family and eliminate waste
- *Make value flow*: Ensure that products and information seamlessly flow from start to finish of the value stream. Remove inventory and increase flexibility of the workers.
- *Let the customer pull value*: Ensure that all activities are initiated and pulled by the customer
- *Pursue perfection*: Strive for continuous improvement by chasing waste.

Womack and Jones (1996) introduce Lean manufacturing by focusing on value creation for the customer and the identification and the elimination of wastes. Liker (2004) developed a 4P model that encompasses a comprehensive approach of Lean philosophy:

- *Philosophy*: build a long term philosophy
- *Process (eliminate waste)*: the right process will produce the right result
- *People and Partners*: add value to the organization by developing you people and partners
- *Problem Solving*: Continuously solving roots problem drives organizational level

Liker (2004) emphasizes the need to respect each and every principle to be successful in implemented Lean. Many companies think they are Lean while they are not because they focus only on processes (Liker, 2004). All this principles form the basis for a strong development of Lean thinking within companies. In the Lean philosophy it is common for companies to do workshops through brainstorming session and Kaizen event.

Traditionally, Lean production was developed in industries with high volumes, steady demand and a low degree of customer integration (Monden, 1983). Later the application of Lean thinking to other business areas has been discussed and justified by Swank (2003). Today, several studies have been performed from different industries such as call service centers (Marr and Parry, 2004), customer relations (Womack and Jones, 2005), information management (Hicks, 2007), sales (Kosuge et al., 2009) or healthcare (Jacobsson, 2010). Apt and Goh (2004) justify the applicability of Lean in an information intensives or pure service organization. Åhlström (2004) motivates the need to translate Lean production practices into service operation set up. The word "translation" highlights the importance of interpretation of original principles to fit with new environment (Åhlström, 2004).

3.2.3 Lean in information intensive services

This sub section aims at studying how Lean manufacturing principles have been translated to be applicable to information intensive services.

VALUE STREAM

As for Lean manufacturing, the deep understanding of the existing process is a first step to start an improvement journey. A particularity apply to information intensive services; when studying the value stream to better understand the value adding activities on the information, a particular focus should be on understanding the flow of information (Apte and Goh, 2004). As Apt and Goh (2004) state:

> *Analyzing operational processes in information intensive services is particularly challenging, given the intangibility of information and the difficulty in analyzing the critical role that information plays in creating and delivering such services.*

Once identified, it is of a great importance to build a process flow pulled by the customer that decreases the cycle time (Apte and Goh, 2004). However, contrary to goods production, a pure service cannot be stored, as the consequence, they are always characterized by pull instead of push.

MULTIFUNCTIONAL TEAMS

As Johnston and Clark (2001) explain, pure services are people-based, that means that the development of competences and their roles into the creation of value is more important than in a manufacturing set up. While multifunctional team is a prerequisite for obtaining a good flexibility and a better repartition of the workload(Liker, 2004), it might be difficult and time consuming for companies to establish such teams, depending on the characteristics and the complexity of the service (Åhlström, 2004).

WASTE

Waste in its broadest sense means all kind of activities that do not bring value to the product from a customer point of view (Monden, 1983). From the industry, the pursuit of eliminating waste is one of the key aspects of the Lean philosophy (Åhlström, 2004). Wastes are usually classified under three Japanese terms, *muri*, *mura*, and *muda*.

Most companies focus on *muda* which is the most known and used form of waste defined as "*activities that lengthen lead times, cause extra movement to et parts or tools, create excess inventory in any type of waiting*" (Liker, 2004). Usually subdivided into seven "plus one" wastes in a manufacturing set up – named as over production, unnecessary transportation, waiting, over processing, unnecessary transport, defects, excess inventory, unused creativity – (Liker, 2004), Hicks (2007) reduces it to four types of wastes for information intensive environment. First *failure in demand* (e.g. over processing) that includes extra activities and resources required to fulfill a lack of information. Second, *flow demand* (e.g. waiting) represents the time and resources required to identify the information elements that need to flow. Third, *flow excess* (e.g. over production) gathers resources necessary to overcome excessive information. Fourth and the last, *flawed flow* (e.g. defect) includes resources and activities that are necessary to correct or verify information.

Muri is explained by Liker (2004) as "pushing a machine or person beyond its natural limits. Overburdening people results in safety and quality problems". This definition is transparent for information intensives services

The last waste, *mura*, means unevenness. It reflects the loss in set-up time caused by unstable or uneven production schedule. It surfaces "at times [when] there is more work than people or machines can handle" and vice versa (Liker, 2004). Mura is accepted to be a source of *muda* and *muri* and therefore, should be to prior target.

3.3 Process management and improvement

Different movements such as Lean, Total Quality Management (TQM) and process management all agree that understanding processes, by writing them down, is the first step that leads to improvements.

3.3.1 Processes

3.3.1.1 Definition of processes

Palmberg (2009) found out in her literature review that there is not a unique definition of process but that the majority of definitions mention the following characteristics of a process:

- Input and output
- Interrelated activities
- Horizontal intra-functional or cross-functional
- Purpose or value for customer
- The use of resources
- Repeatability

Most definitions encompass several features mentioned here but none gathers all of them. For instance Bergman and Klefsjö (2010) describes the process as "*a network of activities that are repeated over time, whose objective is to create value to external or internal customers*", while Egnell (1994) states that "*using resources from the organization, a process adds value to an object, producing a result for an internal or external customer*". Using all the characteristics found in the definitions and stated above Palmberg (2009) offers its own definition of a process: "*A horizontal sequence of activities that transforms an input (need) to an output (result) to meet the needs of customers or stakeholders*". This definition is used in this report as it is the most exhaustive one.

3.3.1.2 Different responsibilities in processes

Two responsibilities are assigned when managing a process: process owner and process manager (Bergman and Klefsjö, 2010) (Palmberg, 2009). The process owner is responsible for the strategic decisions concerning the process, the improvement work of that process and all the resources in the process while the process manager must support the work of the process owner on the operational side (Bergman and Klefsjö, 2010)(Bergman and Klefsjö, 2010)(Palmberg, 2009) and his role consists of taking rapid decisions regarding priorities and temporary resource reinforcements.

Bergman and Klefsjö (2010) underline that the ownership must be assigned very clearly otherwise working on the process may result in an "internal power struggle". Moreover, in major processes there can be many process managers as the process is divided in several sub-processes that can take place in separated locations. However there is and there can be only one process owner.

3.3.2 Process management

Liker (2004) focuses on process to hence quality. The necessities to closely understand and manage process have then initiated the creation of the process management methodology.

3.3.2.1 Definitions

In her literature study Palmberg (2009) highlights two different definitions corresponding to two different movements. On the one hand there is process management for single process improvement which is defined as "*a structured approach to analyze and continually improve the process*". And on the other hand there is process management for system improvement which is referred by Pritchard and Armistead (1999) as "*a more holistic manner to manage all aspects of the business and as a valuable perspective to adopt in determining organizational effectiveness*". Regarding the boundaries and the purpose of this thesis the first definition targeting single process improvement is the one used throughout the report.

3.3.2.2 Purpose of process management

Many different philosophies, methods and movements emphasize the importance of studying processes. In the Lean philosophy of eliminating waste, observing and mapping the processes are the basis to separate activities that add value to customers from non-value adding activities. Liker (2004) recommends that companies willing to apply the Toyota Production System start with studying their processes. One principle of Quality Management is *focus on processes* (Bergman and Klefsjö, 2010)

as it is argued that focusing on *how* instead of *what* is the basis to implement improvements in activities.

From the literature review she has performed on process management, Palmberg (2009) summarizes all the purposes of process management in the following statements:

- To remove barriers between functional groups and bond the organization together
- To control and improve the processes of the organization
- To improve the quality or products and services
- To identify opportunities for outsourcing and the use of technology to support business
- To improve the quality of collective learning within the organization and between the organization and its environment
- To align the business process with strategic objectives and customer needs
- To improve organizational effectiveness and improve business performance

3.3.2.3 Methodologies and tools for process management

In quality management, the process management procedure consists of four steps (Bergman and Klefsjö, 2010). First, *organize for improvement* by appointing process owners and a process improvement team. Second, *understand the process* by defining the inter-faces and investigating who the customers and suppliers are. In this step the process is also mapped. Then control points are established and regular measurements are implemented during the stage *observe the process*. Finally *improve the process continuously* through the use and analyze of the feedback from the measurements.
The Lean philosophy considers that the right process will produce the right results mainly by creating a continuous process flow (Liker, 2004). Liker (2004) proposes a five steps methodology to create flow in both service and manufacturing organizations. First *identify who the customer is* for the processes and the added value they want delivered. Second *separate out the repetitive processes from the unique*, one-of-a-kind processes and learn how you can apply TPS to the repetitive processes. Then *map the flow* to determine value added and non-value added before *designing the future-state value stream map* by thinking creatively about applying the broad principles of the Toyota Way to these processes. Finally *start doing it and learn by doing* using a PDCA cycle and then expand it to the less repetitive processes.
Another methodology of process management comes from the business process reengineering (BPR) movement. BPR strives to analyze and redesign processes to reach dramatic improvements superior to 10 % (Grover and Malhotre, 1997). In order to lead to radical changes the methodologies suggests five steps: *prepare for reengineering*, *map and analyze as "as is" process*, *design "to be" processes*, *implement reengineered processes* and *improve continuously*.

It can be seen that many different systematic approaches have been developed for single process improvement and Palmberg (2009) summarizes all of them in the following five steps framework:

- Process selection. Based on analysis of the value chain identify customers and suppliers, collect data and target process.
- Process description and mapping. Understand and defining the process, key activities and the process architecture.
- Organize for quality. Establish ownership of the process, define and appoint process owners.
- Process measurements and quantifications; identify performance measurements and targets for controlling the process.
- Process improvements. Identify process improvements base on measurements and take corrective actions.

3.3.2.4 Process mapping

The simplest way to map the process is to identify activities and represent them according to their chronological order in successive squares. This result is called a flow chart. Sometimes the activities can be divided in the flow chart to identify who is performing them or where it takes place in the company. This second map is called a block diagram. Other more detailed tools have been developed through time to map processes. The ones of interest are presented below.

SIPOC

SIPOC is a methodology used to visually show the process from suppliers' inputs to outputs created for customers. The name SIPOC comes from the headlines of the different columns of the maps: Suppliers, Inputs, Process, Outputs and Customers. This methodology forces to focus on the inputs and outputs of the process as well as on the customers' requirement.

VALUE STREAM MAPPING

The Lean tool to map the process is Value Stream Mapping (VSM). Its purpose is to map the value flow in order to identify the seven wastes and ways to reduce or eliminate them (Hines and Rich, 1997). VSM enables to give an overview of the intercompany or intracompany processes as it stays on the process level and does not describe sub-processes. Hines *et al* (1998) discuss this tool in the wide context of Supply Chain and underline two major drawbacks of this mapping method. First VSM does not enable to identify all wastes that can exist such as wasted energy or wasted human potential and second much of the subjective data is lost. Manos (2006) states that the main advantage of VSM is that it enables to develop a simple and common language inside a company as it uses standardized symbols and signs to draw the map.

The VSM methodology consists of four main steps that can be carried out during a Kaizen event (Manos, 2006). First *the process family*, which is a group or products that pass through the same steps, is determined. Second the *current state map* is drawn by walking the flow and interviewing people doing the job. Then the *future state map* is determined and drawn, and finally a *plan* to reach this future state map is established.

SUPPLY CHAIN OPERATIONS REFERENCE MODEL

The Supply Chain Council (2008) defines the SCOR model as "a unique framework that links business processes, metrics, best practices and technology features into a unified structure to support communication among supply chain partners and to improve the effectiveness of supply chain improvement activities." The model enables companies through the use of a standardized language to communicate, compare and learn from competitors and other industries. The SCOR model is composed of three levels: a top level describing process types, a configuration level describing process categories and a process element level that decomposes processes. At the top level the model is based on five distinct management processes: Plan, Source, make, Deliver and Return.

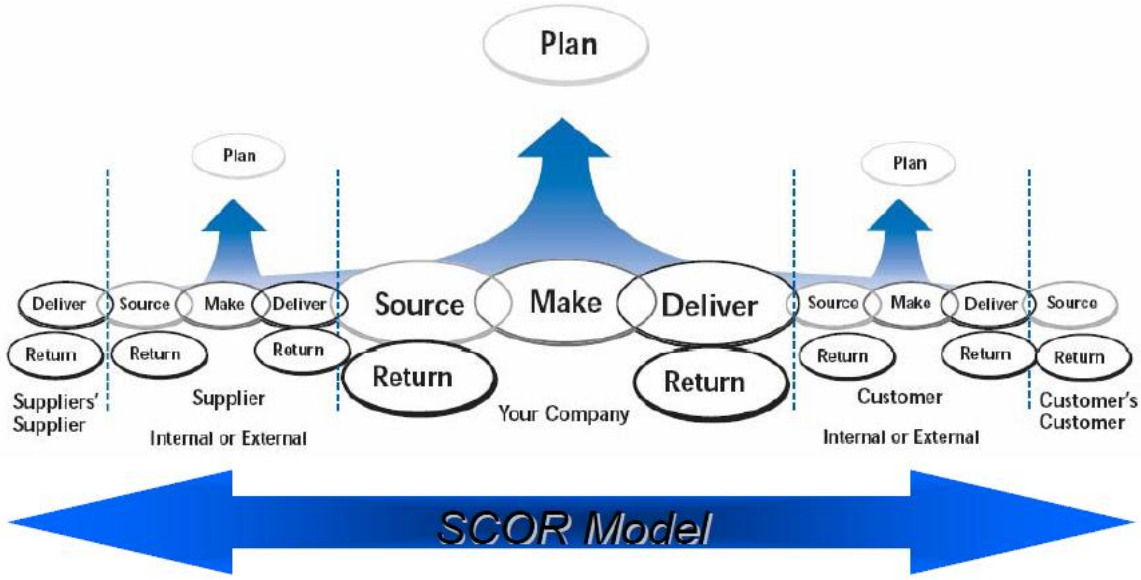

Figure 3-2: SCOR Model (Council of Supply Chain Management (2008))

3.4 Root cause analysis

Root cause analysis is an investigative process in which both qualitative and quantitative data are collected and analyzed to identify the fundamental causes that have led to a major adverse event with the purpose of defining actions and preventing any reoccurrence (Staugaitis, 2002). The adverse event is defined as any undesirable incident or unwanted effect that triggers customer dissatisfaction (Finlow-Bates, 1998)(Staugaitis, 2002).This type of analysis is praised by many quality and improvement programs such as TQM or Lean and has particularly been applied for patient safety in hospital environment (Staugaitis, 2002)(Bergman and Klefsjö, 2010)(Liker, 2004). Staugaitis (2002) claims that in practice root-cause analysis is used to discover what happened, why and how it can be prevented. Both Staugaitis (2002) and Finlow-Bates (1998) agree and insist on the fact that the focus of the process is on understanding problems and not on blaming people.

3.4.1 Methodology

Finlow-Bates (1998) presents the following methodology in 6 steps which consists of a list of questions and recommendations in order to carry out a root cause analysis:

- Step 1: What is the unwanted effect (symptom)?
- Step 2: What is the direct physical cause of this effect?
- Step 3: Follow the direct physical line of cause to establish the causal chain.
- Step 4: Who owns the problem at each step?
- Step 5: Where can I intervene in the causal chain so that I can affect a long-term solution?
- Step 6: Which of the long term solutions on offer is the most cost-effective?

Following this process is likely to reveal "truly root cause: the step in the tangible cause-effect chain where the owner of the final undesired effect can make an economically justified intervention to produce a long term removal of the undesired effect" (Finlow-Bates, 1998).

Staugaitis (2002) presents a different 7 steps process especially developed for medical environment.

- Step1: Clarify the issue.
- Step 2: Set up primary team.

- Step 3: Collect documents.
- Step 4: Assess policies and procedures against standards.
- Step 5: Select sample cases.
- Step 6: Initiate root cause analysis.
- Step 7: Provide findings and recommendations.

The author suggests gathering people from several departments as their different backgrounds and knowledge can result in a more thorough analysis. As regards step 4, assessing the consistency between established standards and current processes followed can explain the occurrence of the problem and thus unveil potential causes. Step 5 consists of gathering different cases in which the same adverse event occurred to make sure that the problem is recurrent and to analyze the common factors of each case that may have contributed to the result.

3.4.2 Problem identification

Root cause analysis always begins with the identification of a problem, i.e. an adverse event. Finlow-Bates (1998) mentions that first it is the symptom of a problem which is visible such as customer complaints and then a first analysis has to be carried out to find the associated problem which could be parcels late. Most authors mention to map the process and then to measure it to find which problems occur and where they are located (Liker, 2004) (Finlow-Bates, 1998) (Staugaitis, 2002). In the literature the Lean philosophy suggests to report on the map the measurements. Among them Liker (2004) mentions the lead time: time the products stays in the system, the value added ratio: sum of the value added time divided by lead time, the travel distance of the product, the travel distance of people doing the work, productivity: people hours per transaction and the quality rate: percent of products that go through the process the first time with no defects. Other measures can be reported on the VSM such as the number of operators, the cycle time, the takt time, the change over time, the percentage of scrap, the number of shifts, the size of the production batch and the number of items in inventory. In an attempt to adapt this measurements from a manufacturing to an information intensive service environment, Apte and Goh (2004) underline different metrics such as the satisfaction level of customers, the workload, the closing rates, the average closing age and the distribution of age of the open files that corresponds to the cycle time.

In addition to these quantitative data, the literature argues that qualitative data can be gathered through observation (Aldowaisan and Gaafar, 1999) (Staugaitis, 2002) (Liker, 2004). The Lean philosophy argues that by creating a one piece flow the problems will surface by themselves (Liker, 2004).

3.4.3 Tools

Making the distinction between the symptoms, the real problem, causes and root causes can be difficult and confusing. The links that exist between these different elements of root cause analysis have been represented by Liker and Meier (2006) through the following model:

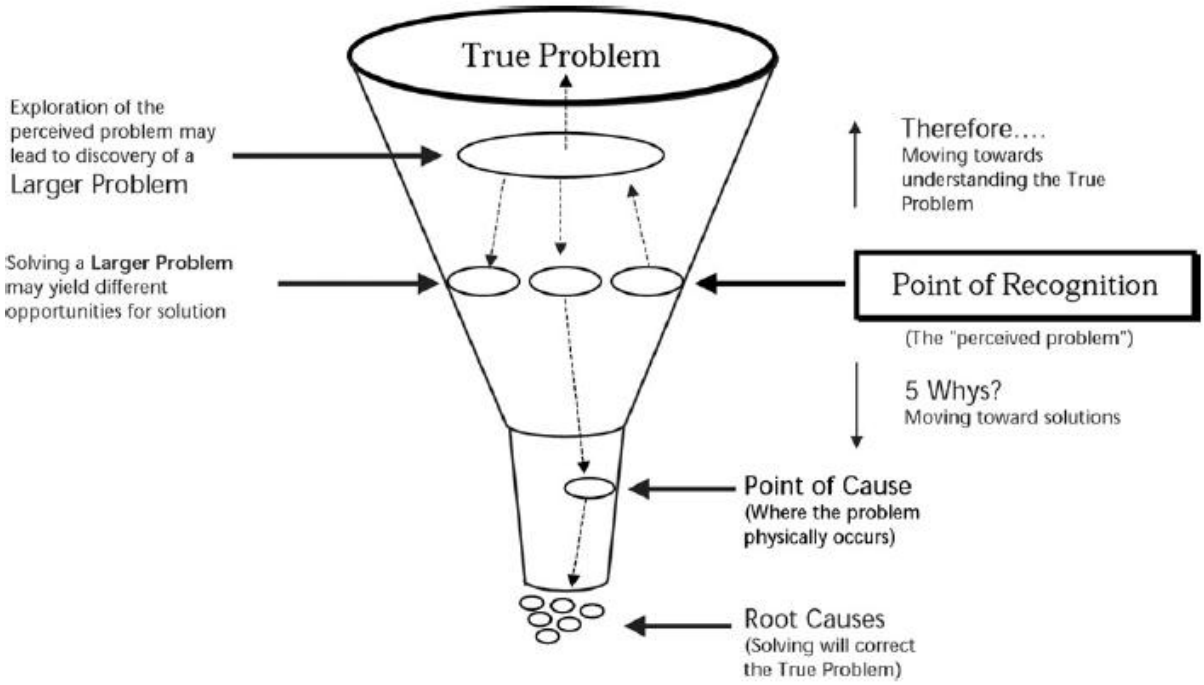

Figure 3-3: Relationships between root cause analysis terms (Liker and Meier, 2006)

This model suggests that the analysis of the root causes should start from the perceived problems. Some tools have been developed to support the identification of root causes. One of them is the 5 whys analysis which consists of asking why five times (Liker, 2004). However Finlow-Bates (1998) claims that this tool is "weak and confusing" as the fundamental cause can be find after two whys and can still remain undiscovered after five iterations. In that respect, Staugaitis (2002) recommends users to ask why until it no longer makes sense. Cause and effect diagrams such as tree or fishbone/Ishikawa diagrams are also mentioned in the literature (Bergman and Klefsjö, 2010) (Staugaitis, 2002). According to Staugaitis (2002) the tree diagram enables to explore the cause and effect relationship which is one goal of root cause analysis while the fishbone diagram as well as the affinity diagram gathers causes into clusters and facilitate the discovery and placement of ideas. Bergman and Klefsjö (2010) suggest grouping ideas by type of causes that can possibly produce the perceived problem. They argue that the causes of a quality problem can be classified into any of the following categories: management, man, method, measurement, machine, material and milieu. Staugaitis (2002) claims that the fundamental reasons can be gathered into six contributory factors that lead to the problem: communication, training, scheduling, environment and equipment, rules/policies/procedures and barriers. Barriers represent a system or process that can reduce the probability of an adverse event; it could be the use of different color or shape codes (Staugaitis, 2002). This author also suggests using checklists of common factors that trigger problems. Among them the author mentions workload: there was not an adequate number of staff to carry out the assigned duties in the expected timelines; awareness: employees were not aware of what tasks they needed to do and when those tasks were to be performed; prioritization: employees or supervisors did not set priorities for multiple tasks and responsibilities; training: there were inadequate policy requirements for training; distraction: the environment was noisy and contains distractions that compromised the ability of staff to perform properly tasks. Staugaitis (2002) adds that these checklists can both identify proximate causes and root causes. The author also presents the five following standard rules that have been adapted from the National Council on Patient Safety and are useful when establishing the link between causes and effects:

- *Causal statements should clearly show the "cause and effect" relationship.* Describe the linkage between the stated cause and the outcome so that the reader will automatically understand the relationship.
- *Do NOT use negative descriptors in causal statements.* Avoid using words such as "inadequate" or "poorly written" that can be perceived as inflammatory.
- *Each human error should have a preceding cause.* Most problems include human error but the goal of root cause analysis is to understand why the error occur and thus never only list the error.
- *Each procedural deviation should have a preceding cause.* It is the same as human error, one should understand what caused and contributed to the deviation in order to have an influence on it.
- *Failure to act is not causal unless there is a clear duty to act.* If someone does not do something that lead to an adverse event then make sure that there is in practice standards or established guidelines duty to perform the action.

Respecting these rules make the identification of root causes easier and clearly highlight areas of improvements.

4 Empirical data

This chapter presents the results of a customer survey run by a large multinational 3PL company and a series of 12 interviews that were performed to expand the knowledge gained through the literature review on Lean processes and the 3PL industry. More details about the customer survey were explained in the section 2.2.4 and the case study protocol used for the interviews is presented in Appendix 1. This chapter is divided in three sections corresponding to the three research questions described in the introduction. In each section, the empirical data have been gathered into four categories according to the sources of the data: 3PL key account managers, 3PL operational managers, Lean experts and 3PL Customer survey.

4.1 Customers needs, expectations and quality problems

As quality problems are defined in this report as the inability of the service to satisfy the needs and requirements of customers, it is necessary to first understand the expectations of customers and then identify the quality issues they face. Both topics are presented below nevertheless it is important to mention that all the observations presented in this section are from a 3PL perspective and that no customer was directly interviewed by the researchers. However, the survey studied counts 215 answers from different customers and has been considered to fairly represent the voice of the customer.

4.1.1 Customers needs and expectations

Table 4-1: Empirical data on customer needs and expectations

3PL Customer survey	- It is very important that the price is the lowest on the market → 40% - It is very important that the lead times are respected →26% - It is very important that the 3PL can offer different lead times according to the price →27% - It is very important that the 3PL actively participate in the environment work →17% - It is very important that the 3PL is eco certified ISO 14001 or its equivalent →13% - It is very important that the 3PL is certified AEO →7% - It is very important that the 3PL give me quick answers when I call to have information about the transportation →31% - It is very important that the 3PL provides information on departures during the whole transportation journey →46% - It is very important that the 3PL has a developed information management system →22% - It is very important that the 3PL has a local presence →9% - It is very important that the 3PL visits me personally →8% - It is very important that the 3PL has a global coverage →21%
3PL key account managers	- Increase visibility - Know when the shipment physically leaves and arrives - Be informed when deviations - Respect of delivery dates and transit time - Increase flexibility - Reduce logistics costs - Have more services and direct deliveries with same costs

All 3PL key account managers agree that customers have different needs and expectations when relying on the 3PL, except that they all want their goods to arrive at the right destination. All 3PL key account managers state that the majority of customers want to know information on the treatment of the order such as when the pick up and the carrier is booked and, information on the physical movement of the shipment such as when the shipment is loaded and unloaded. They add that usually customers who want to have visibility on their shipment have access to the 3PL customer interface that gather all the milestones of the shipment journey whenever a forwarder update a status in the operational system. 3PL key account manager 1 and 2 also mention that sometimes in addition to the interface the customer wants to receive notification of pick up or departure via e-mail or phone calls. All 3PL key account managers agree that most customers want to be informed as soon as possible when there are deviations on the shipment and then a deviation report explaining the reasons for the deviation must be issued and sent to the customer on a weekly or monthly basis according to the agreement.

3PL key account managers 2 and 3 explain that main customers want to receive weekly or monthly reports containing the transit time, the number of on time deliveries (OTD) or the number of on time digital date of proof of deliveries (IOD) that reflect the date when the forwarder actually enters that the goods physically arrived at destination. As customers have set targets on these KPIs they expect the 3PL to reach them and report their performance through these records. 3PL key account manager 2 mentions that some customers have very specific KPIs and deviation codes and want the 3PL to be able to measure and report them.

3PL key account manager 3 reports that important customers, in terms of volume and revenue, want the possibility to ship their goods when they are ready and in the quantity that fits their convenience regardless of the service level agreement. It is not uncommon that customers agreed upon specific departure days and quantities (in weight) in the contract but that they expect the 3PL to deliver the goods even if the quantity is higher. He explains that the capacity is already pre-booked according to the contract agreement and that extra capacity requires extra work for the forwarders and if the shipment cannot fit on the airplane for instance then a new carrier has to be found. Thus customers expect to gain flexibility by outsourcing their logistics activities.

3PL key account manager 4 describes that one of his customers decided to outsource its warehousing and transportation activities in order to decrease its logistics costs. Indeed the customer wanted to suppress his logistics department and with the same amount of money spent in that department he wanted to access more services by using of a 3PL. The manager mentions that through the use of the 3PL, direct deliveries were now possible as the logistics provider can use its network to consolidate the goods. As a result the customer went from a decentralized organization with several warehouses in Europe to a centralized organization with one warehouse located in Sweden. It enables the customer to decrease its costs even more and to increase its visibility as only one actor, the 3PL, deals with the transportation and the warehousing activities today.

As regards the customer survey, one section is dedicated to criteria for selecting logistics service providers and is the focus of this part. Customers were asked to answer using a scale from 0 (not important) to 5 (very important). It is considered that answers 3-4-5 mean that the criterion is important in the eye of the customer. The results show that customers want to be informed and get information on the shipment whether it is on departures (46%) or on more specific questions about the transportation (31%). The visibility need is summarized by the fact that 46% of the customers expect their logistics provider to have a developed information management system. Costs and lead times are

two other criteria customers are interested in. Indeed, 40% state that getting as lowest price as possible is one of their goal and that the respect of lead times is something they are expecting (27%).

4.1.2 Quality problems faced by customers when using 3PLs

Table 4-2: Empirical data on quality problems faced by customers

3PL customer survey	- Our lead times correspond to what is agreed? →13% disagree, 22% expect more - As a 3PL we can customize our services according to your needs and requirements →29% disagree, 28% expect more - As a 3PL we offer a higher quality than similar providers →41% disagree, 33% expect more - As a 3PL we offer competitive rates→30% disagree, 29% expect more - As your 3PL we have an interest in your company and your products→35% disagree, 28 % expect more - AS A 3PL we are a proactive logistics partner →33% disagree, 29% expect more
3PL key account managers3PL	- On Time Delivery (OTD) target set by customers are not reached - IOD: the digital date of proof of delivery set by the customer is not reached - Customer complains that he is not always informed when deviations
3PL operational managers	- OTD not always reached - IOD often entered late

3PL key account managers are in charge of developing and following the weekly or monthly report with the customers. The content of these reports vary slightly between customers but they usually contain the service level reached by the logistics provider in terms of OTD, IOD and transit time and they are compared to the targets set by customers when the contract was made. The OTD represents if the goods arrive when agreed at destination and thus represent the physical flow of the shipment while the IOD represents the information flow as it measures if the forwarder has reported the arrival in the time agreed. Depending on the contract, forwarders have between 24 and 72 hours to report the arrival of a shipment in the system and indirectly to the customers that have access to the customer interface. It is not uncommon that the IOD is entered a couple of days after the goods have physically been delivered according to 3PL operational managers.

3PL key account manager 1 explains that his customer IOD and OTD targets of 95% are hardly ever met on a monthly basis. He mentions that the forwarders must update the *status 3000* that means that the shipment has arrived at destination, i.e. IOD, the same day as the delivery takes place. As there is no direct communication between the carrier driver and the forwarder, this one has to chase the information and enter it manually which is admitted to be rather time consuming. For that specific customer the 3PL must pay penalties if their performance is far from the target. 3PL key account manager 2 states that for the customer she follows that accounts for 44% of the volume treated by the airfreight department, the OTD target is not always reached on a monthly basis. She explains that OTD is measured against the required day of delivery which is entered manually by the forwarders. Therefore, when the forwarders forget to enter this status in the system the shipment is considered as late even if it was physically on time.

All 3PL key account managers report that customers are very keen on being informed when a deviation occurs. If the customer discovers the deviation before the 3PL tell him, then he is very dissatisfied. The managers state that today the information about deviations is not always transmitted and it should be improved.

In their customer survey, the 3PL has proposed a series of affirmations and has asked customers to answer how much they agree using a scale from 1 to 6. It is considered that answers 1-2-3 correspond to customers that disagree, answer 4 corresponds to customers that expect the 3PL to more in that respect and answers 5-6 correspond to customer that fully agree and thus are fully satisfied with the criteria. Among the results, 13% of shippers complained that the lead times agreed when contracting the service were not respected and 22% expected more. One of the cornerstones of 3PLs is to deliver services, especially goods, at the right time and therefore having 35% of customers facing late deliveries or paperwork is huge. Besides, 41% estimated that the quality offered by the 3PL was not superior to the one of other logistics providers and 30% reported that the 3PL rates were not competitive meaning that the same services could be bought from on other logistics provider at lower costs. These two last questions are considered as very important for the management team according to the 3PL key account manager 1 as they position themselves as logistics providers of very high quality and justify their higher costs than competitors due to this premium quality attribute. However the customer survey reveals a gap between what the company believes it offers and how the customer perceives what is offered. This gap is the starting point of customer dissatisfaction in terms of costs and quality as they consider that there is a mismatch between the costs paid and the quality offered. One reason for this gap can be explained by one survey answer that states that 35% of customers feel that the 3PL is not interested in their company and products.

Customers (57%) also claim that the 3PL is not flexible enough in the sense that it cannot at all (29%) or always (28%) customize its services according to their needs and requirements. Another complaint reported by 33% of customers concerns the 3PL inability to be proactive, meaning that the logistics provider does not anticipate problems and has not built deviation scenarios with actions to be performed to correct them. 29% of customers expect the 3PL to be more flexible in that respect.

4.2 Waste identification

The interviews revealed different ways to identify wastes that have been gathered into the four following categories: process mapping, communication and observation, identification and understanding of data and workshop.

4.2.1 Process mapping

Table 4-3: Empirical data on process mapping

Lean experts	- Focus on the information flow - VSM is a good tool but can become complex to read when dealing with large information flows - Keep it simple, flow chart is a good basis, adapt it to your processes - The order of activities is very important in administrative processes - Represent the time dimension, the moment at which each activity is performed
3PL operational managers	- Focus on the interaction with other actors to understand constraints and identify bottlenecks - Represent the sequence of activities

3PL operational managers and Lean experts recommend using process mapping to identify wastes. The Lean experts agree that mapping the processes is a prerequisite to study processes as it enables to have an overview of the activities performed. Both Lean experts suggest focusing on the information flow as it is the main flow of 3PL internal processes and most of the wastes and inefficiencies are to be found in the way the information is received, used and dispatched.

Lean expert 2 states that VSM is a good tool to use but he admits that the map can become complex to read if the information goes back and forth very often. Lean expert 1 believes that process mapping should be kept as simple as possible since it should be shared later on with the forwarders. Indeed she argues that the maps can help to develop a shared and common vision of the process and can also help forwarders to position themselves. Therefore she thinks that using flow chart is a good basis to identify processes inefficiencies and it should be adapted to fit the characteristics of the process studied.

Lean expert 2 also mentions that the order and moment of the different activities performed in the process are very important. Thus the time dimension should be visible on the map.

4.2.2 Communication and observation

Table 4-4: Empirical data on communication and observation

Lean experts	- Go and see what happens by yourselves - Talk to as many actors intervening in the process as possible - Be close to the forwarders doing the job everyday - Clearly explain the purpose of the waste identification - Use standard protocol when observing - Keep critical thinking
3PL operational managers	- Go with the forwarders and team leaders - Keep critical thinking as wastes identified by forwarders may not be real wastes

3PL operational managers and Lean experts state that the best way to identify wastes is to observe them. Thus, they both recommend following the forwarders and being close to them to understand their ways of working.

They also both advice to remain critical and always weight what is observed or heard against what should be done and the motives for it. The Lean experts believe that talking to many different actors intervening in the process such as forwarders, sales persons, local and national managers is a good way to gain an overview of the whole business and help thinking with a critical mind. 3PL operational managers claim that forwarders tend to report time consuming or difficult activities as problems or wastes while they are not necessarily. Thus, they recommend explaining clearly to forwarders the purpose of waste identification and the definition of wastes.

Both Lean experts suggest using standard protocol when observing since it makes it easier to analyze after and it enables to focus on specific areas. Indeed, they mention that observing may result in a waste of time if no clear delimitations and phenomenon have been identified and defined before following the forwarders.

4.2.3 Identification and understanding of data

Table 4-5: Empirical data on identification and understanding of data

Lean experts	- Compare interview results coming from different actors - Review historical records - Conduct root cause analysis
3PL operational managers	- Use report with data extracted from the system - Understand real meaning of KPIs - Compare Standard Operational Procedure (SOP) with actual work performed by forwarders - Use benchmarking

According to Lean experts and 3PL operational managers studying historical and current records such as completed order paper files and performance reports, enables to identify wastes in the process. 3PL operational managers suggest analyzing reports made of data extracted from the system on a monthly basis. These data are based on the update of status in the system. As forwarders are manually updating some status, 3PL operational managers 1 and 2 recommend understanding what happen at the forwarder level to know how and when the status update is made. They explain that the KPIs they use to assess the performance of the process are based these reports. Therefore it is important to understand the real meaning of KPIs and their consequences in order to make the right conclusions regarding wastes.

To identify wastes both Lean experts and 3PL operational managers agree that a comparison must be performed between what is done and what should be done. Both Lean experts suggest interviewing different actors such as forwarders, sales persons, local and national managers and then analyze the gaps that may exist between the interviews. The 3PL operational managers 1, 2 and 5 state that the SOP must be compared with the actual work performed be forwarders. This should enable to identify which activities forwarders are doing but are not required by the customer and thus can be considered as wastes.

3PL operational manager 1 also recommends benchmarking other offices of the third party logistics provider in order to better grasp the constraints and limitations of the system. This should avoid the confusion between pure waste and necessary waste to overcome the system deficiencies.

Lean expert 1 believes that root cause analysis should be conducted on the problems surfaced by the study of the process in order to reveal hidden wastes.

4.2.4 Workshop

Table 4-6: Empirical data on workshop methodology

Lean experts	- Involve people in waste identification - Use people to reveal invisible flow of information - Build team spirit - Use pen, paper and post-its - Gather a couple of person from the same process - Clearly explain the purpose of the workshop, “as is” vs. “supposed to be”

All Lean experts agree that conducting workshop is a good way to identify wastes. Indeed, it enables to involve people in the waste identification and to make them more familiar with the notion of wastes.

As stated in the process mapping part, most wastes are to be found in the information flow, however this flow is very complex and hard to grasp according to Lean experts. Therefore they recommend using workshops to make people reveal the information flow and potential wastes. When it comes to the methodology to be used during the workshops, the Lean experts suggest keeping it simple by using pen, paper and post-its that allow more flexibility. They also advocate gathering two persons working on the same process to enable constructive discussions and increase objectivity. This can at the same time contributes to build team spirit among people from the same process which is a very positive outcome. Both Lean experts insists that it is very important at the beginning of the workshops to clearly explain the purpose of the workshop, especially the fact that "as is" maps are expected to be drawn and not "supposed to be" maps. If this rule is not respected there is a risk that most wastes will not be identified.

4.3 Root cause analysis and visualization tool

The interviews revealed that it is very important to identify and understand the sources of a problem before trying to solve the problem. They recommend conducting a root cause analysis of each problem identified and then to present it to all actors involved to start thinking about the improvement work that needs to be done. Their comments and suggestions regarding these two ideas are presented below.

4.3.1 Root cause analysis

Table 4-7: Empirical data on root cause analysis

Lean experts	- Use 5 whys - Use some of the 7M tools - Understand strategy of the company - Go and see how customer orders are treated - Think out of the box

To find root causes of problems Lean experts recommend using the 5 whys methods which consists of asking people why a problem occurs and then keep on asking why four times after every potential cause they state. Both Lean experts mention that sometimes the real cause of the problem is reached after 3 or 4 whys and therefore advice asking why until it no longer makes sense. Lean expert 1 mentions the 7M management tools and underlines that among them the affinity diagram can be a great tool to identify all the problems and their direct causes, and the tree diagram also known as the cause and effect diagram is particularly adequate when it comes to investigate all possible reasons that cause a problem.

Both Lean experts state that the tools help to structure the data collection and thus the data must be collected first. They recommend following an order from the signature of the contract until an order is placed and then completed. They explain that it is very interesting to sit with people from different departments that are involved in the same process as it may reveal some gaps that can account for the problems experienced by customers. They also say that understanding the global strategy of the company and then its translation on national, regional and department levels is something that is likely to reveal fundamental causes. Lean expert 1 adds that it can be helpful to "think out of the box" by building scenario that can lead to the problem before being involved too deeply in the company context.

4.3.2 Visualize the link between problems and causes

Table 4-8: Empirical data on visualization of root cause analysis

Lean experts	- Use Ishikawa/fishbone diagram - Use tree/cause and effect diagram - Link clearly causes to consequences - Keep it simple

Lean experts mention Ishikawa/fishbone diagram and tree/cause and effect diagram as the main tools to represent the link between problems and causes. Lean experts 2 explains that the Ishikawa layout enables to gather the causes into different categories such as management, man, method, measurement, machine, material or milieu which can be very helpful when it comes to the analysis. However he admits that the diagram can become complex if there are too many "bones" on the fish skeleton.

Lean expert 1 argues that the representation should be kept simple so that everybody could have a look at it and immediately understand its meaning. It is important to her that the link between the causes and the consequences is clear and visible. She advises to use a tree diagram as anyone can read and use it without any specific background.

5 Analysis

The analysis presented in this section is based on the theory coming from the literature review of academic articles and books introduced in chapter 3 and the findings of the empirical study introduced in section 4.The analysis is divided in three subsections, each of them corresponding to a research question presented in the introduction chapter. For RQ2 and RQ3, respectively presented in chapter 5.2 and 5.3*, tools have been adapted and developed for the research. They are first presented, in section 5.2.1 and 5.2.2 for RQ2 and 5.3 for RQ3 and then applied to a test case in section 5.4. The toolbox is then validated through two applications on different processes.*

5.1 What are the quality issues faced by a 3PL customer today?

In this section the finding regarding RQ1 - *What are the quality issues faced by a 3PL customer today?* – is addressed. The purpose is to define what quality problems 3PL's customers experience when outsourcing their logistics activities to a 3PL. The findings regarding the 3PL's customer needs and expectations are first presented, followed by the definition of the quality issues faced by customers that have been identified in the research.

5.1.1 Customers' needs and expectations

As quality issue is defined as the lack of customer's needs fulfillment, it is crucial to review what a 3PL customer values and expects from a logistics provider company. The empirical findings and literature review presented in previous chapters are analyzed to provide a clear vision of what is considered as valuable for the customer. Three main customers' needs and expectations have been identified.

Table 5-1: Customers' Value

Theory	Empirical Study
Assess individual customer's needs in order to customize their services (Bergman and Klefsjö, 2010)	Increase Visibility
Reduce logistics cost (Knemeyer and Murphy, 2004)	Reduce logistics cost, have more services for the same cost
Reduce cycle time (Knemeyer and Murphy, 2004)	Increase Flexibility
Efficient handling of exceptions (Langley and Capgemmini, 2012)	Fulfilling service level agreement.
Timeliness reliability (Liu et al., 2010)	

First, the literature emphasizes that cost reduction is a motive for the customer when outsourcing logistics activities to a 3PL company. This cost reduction can be achieved in different ways, by reducing the work force dealing with logistics at the customer site or by reducing the inventory tied capital through the optimization of the lead time. The willingness to control and reduce cost is the first driver when deciding to outsource. As a consequence, the cost reduction implies cost consciousness when signing with a 3PL company that has to promise an optimum service level with the lowest rate. The empirical data translates the cost consciousness of the customer when buying 3PL activities by a cost pressure on 3PL activities. The 3PLs see this cost issue as a strategy from their customer to

increase the service level while keeping the same costs. Even more, it has been noted that a large number of customers are willing to pay more the 3PL company if they see an internal benefits for them. As a consequence, it seems that the cost itself may not be the main concern; instead, the customers adopt a broader view considering the total cost of handling the logistics work inside its company versus the cost of outsourcing it to an expert. All these ideas are gathered in the first customer expectation described below:

1. **The willingness to optimize the cost of logistics** by outsourcing it to a specialist. A 3PL's customer aims at optimizing its own logistics cost when outsourcing to a specialist. Indeed, the cost of the service purchased to a 3PL is balanced by the savings achieved on the customer organization. As a consequence, the cost of a 3PL service is central when negotiating the service level agreement. Nevertheless some customers would accept to pay more to increase the service provided by 3PL and then decrease their internal costs.

Secondly, the literature review highlights the needs for customization of the service provided depending on the customer's particular requirements, geographical set up and information system (Bergman and Klefsjö, 2010). This customization aims at optimizing the interaction with the logistics service provider and should increase the visibility. On the other side, the 3PL has different customers with different IT systems and procedures. The 3PL needs to increase its flexibility in it procedure and IT systems to be able to support different customer. Moreover the capacity of adaption of a 3PL provides a better and faster integration of its activities to its customer's ones. It increases the visibility for the customer and offers him a greater liberty when planning the distribution of good that is of great value for the customer (Bergman and Klefsjö, 2010). The definition of the second customers' need that follows encompasses all these topics:

2. The willingness to have a high degree of customization to fit customer specific business and constraints. The current trend on the market is to reduce the number of 3PL used and to reinforce the cooperation. The customer wants their 3PL to fit with their internal processes and their information technology systems. The idea is to increase the visibility to the customer to quickly respond in case of deviation. The other aspect is to reduce manual work at the customer's site by reinforcing the integration of the IT system. As a consequence, customers are looking for 3PL partners that can grow with them and adapt their procedures to their business specificities.

Finally the theory emphasizes the need to fulfill the service level agreement in terms of transit time (Liu et al., 2010) and visibility (Langley and Capgemmini, 2012). The empirical study confirms it by highlighting how a 3PL company is assessed by its customer. It reveals that two KPIs were followed, one focusing on the timeliness reliability and the other on the visibility reliability. Thus the third customer expectation can be defined as follow:

3. **The need for strictly respecting agreed service level**. The service level agreement is reviewed on a regular basis between sales departments. However, on the operational field, deviations or changes may occur that render difficult to achieve the service level promised. But the customer based its Material Requirement Planning (MRP) on the lead time promised. As a consequence, customers require a strict follow up of the achievement of the service level.

Then from the literature review and the empirical data previously studied and summarize in Table 5-1, the following model of customers' needs and expectation as it has been observed is proposed in Figure 5-1.

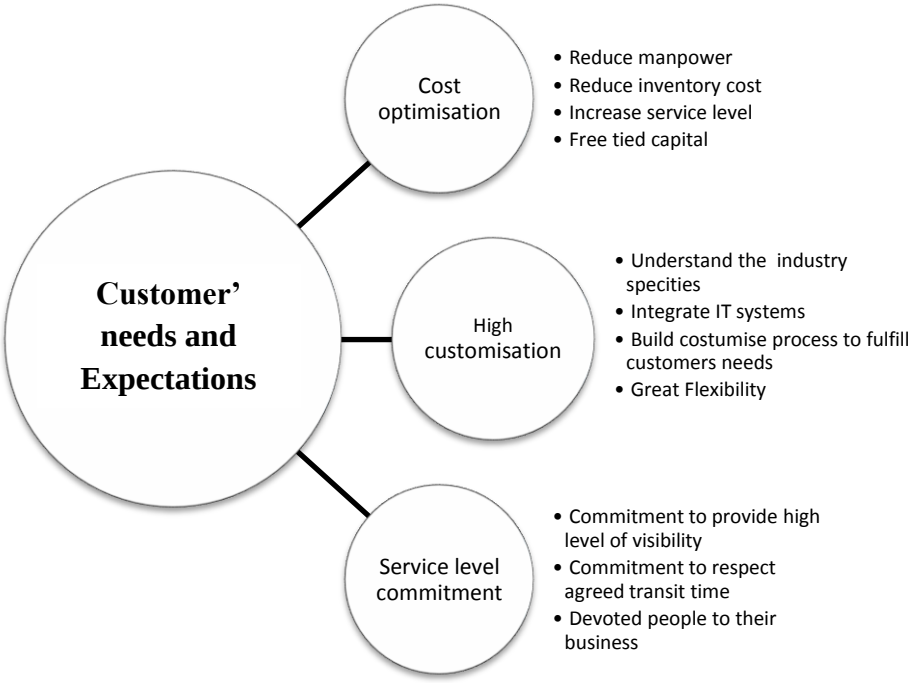

Figure 5-1: Customers' needs and expectations

5.1.2 Quality issues faced by 3PL's customers

The literature review presents different quality issues that have been observed at the customer site, while the empirical data gives them from a 3PL perspective. They are both summarized in the following table:

Table 5-2: Major quality issues faced by 3PL's customers

Theory	Empirical Study
Lack of continuous, ongoing improvements and achievements in offering	Difficulty to keep informed the customer when deviations occurred
Service level Commitments not realized Information technology capabilities not sufficient	Transit time agreed not reached
Cost reductions not realized	Difficulties to customize the service provided
Unsatisfactory transition during the implementation stage	Difficulties to be proactive
Lack of project management skills	Deviations reach the customer before the 3PL is aware of it.
	Mismatch between the price offered and the quality provided

The literature advocates that one of the major reasons for dissatisfaction is the failure in reaching the service level commitment. As developed in the previous section, the service level commitment is assessed by customers in term of visibility and transit time according to the empirical study. If the visibility is defined by the capacity to keep the customer informed, then the empirical study has pointed out the lack of pro-activity to report to the customer when a deviation occurs during the

shipment transportation. The interviews also developed the practical difficulty to reach the transit time agreed for many different reasons. As it is difficult at an operation level to fulfill the service level agreed, it becomes a major factor for customer dissatisfaction. The first quality problem is therefore defined as follow:

1. **Failure in reaching the service level commitment:** it is defined as the inability to fulfill the service level agreed in terms of timeliness and visibility. The time consciousness definition depends on the customers' requirements. Some of them are following the shipment until its arrival at an intermediate terminal where the consignee's forwarder takes over the responsibility; others follow the shipment until its final delivery address while certain 3PL's customers have requirements regarding the speed of invoicing. As a consequence, the present research adopts a large approach regarding the time dimension: the cycle time is here considered. It represents the time between the reception of the order and the sending of the invoice to the customer; it encompasses then all type of customers. For the visibility, the following definition is used: it represents the 3PL's ability to share accurate and updated information with its customer.

A second area of dissatisfaction concerns the failure to reach the cost optimization whished by the company when outsourcing logistics activities. From the theory, it is clear that customers are disappointed by the cost saved when outsourcing their logistics activities to a third party logistics provider. One reason highlighted is the lack of project management skills and adaption skills in 3PL companies that makes the implementation stage and ongoing improvements in 3PL's operations costly and time consuming. The customer faces then the need to take over some responsibilities that was expected to be outsourced to overcome the slow development of the cooperation. Also, the empirical study reveals that 3PL companies find that there is a mismatch between the price offered and the service offered. The current trend in the market is to reduce the number of 3PLs and increase the collaboration with the selected one. The collaboration development requires time and commitments that are, according to 3PL, not fully justified moneywise. As a consequence, the price is the basis of the dissatisfaction in the relationship with the customer and the second quality problem can be defined as follow:

2. **Failure in optimizing logistics cost for customer**: it is defined as the inability for 3PLs to offer a competitive set of services that is cheaper than the cost of doing the activity in-house for the customer. As presented in the previous section, the cost optimization is one of the main expectations of 3PLs' customers. Nevertheless the empirical findings demonstrate a failure in satisfying the customer in terms of cost.

A third area identified in the literature concerns adaptability. The lack of continuous improvement and the unsatisfactory transition during the implementation phase reflect the lack of flexibility and adaption skills of 3PL Company when building long term relationship. The current trend in 3PL market requires great adaption skills in its operations. As seen in the empirical study, the lead time to make booking is short and a great flexibility in terms of capacity transported regardless the service level agreement is asked by the customer. In other word, a 3PLs company should be able to fulfill any kind of customer demand. Flexibility or adaption skills at any level, to set up a new business or fulfill customer's exceptional needs, are missing skills that 3PLs should develop to sustain on the market. The third quality problem can be described as follow:

3. **Failure in being adaptable:** the adaptability is defined as the capability to adapt to change and answer any kind of demand within a limited time frame. 3PLs customers complain of the lack of

project management, flexibility or continuous improvement. This lack of adaptability is considered as a quality issue that customers face and has to be overcome.

Figure 5-2 presents the model for quality issues faced by 3PL's customers that will be used in this thesis.

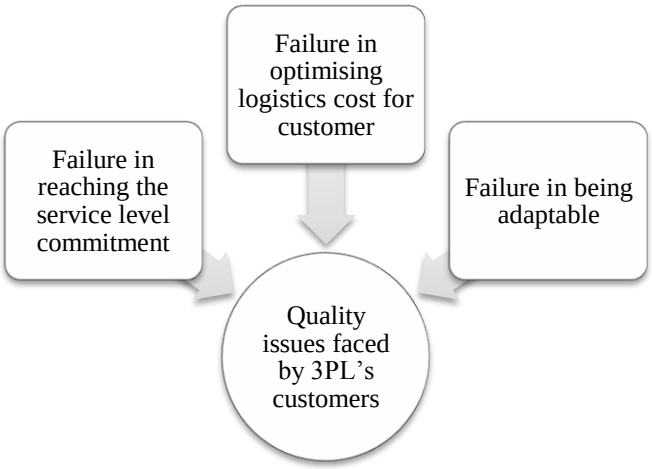

Figure 5-2: Quality issues faced by 3PL's Customers

5.2 How to identify 3PL internal processes wastes/inefficiencies?

In this section, tools to surface wastes in a service intensive environment are presented and tested. The overall methodology to apply the tools presented in this section is represented in Figure 5-3.
The Workshops and observations are guided by the interviews conducted with the executive managers. All together, the toolbox leads to identification of waste and quality concerns.

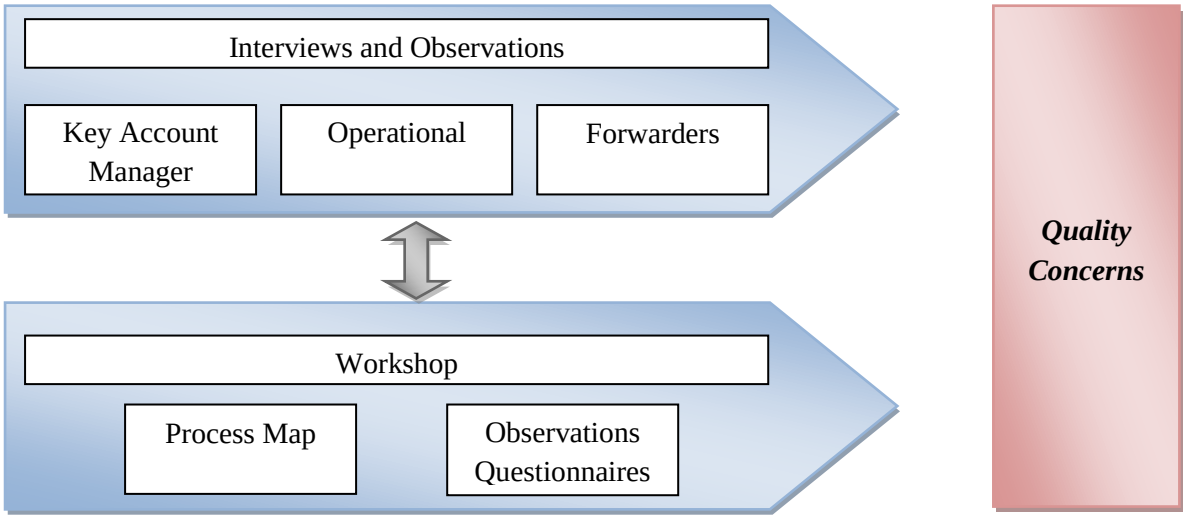

Figure 5-3: The toolbox

The toolbox is composed of two main tools introduced in this section:

1. A workshop phase, developed in section 5.2.1, gathering workers and researchers that aims at identifying the process and surfacing quality issues.

2. An Observation phase, presented section 5.2.2, that aims at validating the process drawn and surfacing new wastes.

Then, a test case is proposed section 5.4 followed by some comments and key learnings.
The aim of this section is to provide an answer to the research question RQ2 - *How to identify 3PL internal processes wastes/inefficiencies?* -. Along the coming description, the change agents are the persons responsible for the improvement work and as a consequence for deploying and applying these tools that all together constitute the toolbox.

5.2.1 Workshop methodology

The reason for developing a workshop methodology relies on the lack of methodology in the literature regarding how to surface waste in an information intensive service sector. In a service-based company, the absence of a physical product makes the flow study difficult and unclear. A workshop has then been designed with a threefold objective: to bring the flow of information to the surface by relying on workers that handle it on a daily basis, to develop and the improvement awareness in the team and also to enhance the communication between the workers and the team spirit to surface in an easy way incoherencies in the process. First the prerequisites and preparation phases are briefly described and then the workshop session is developed and finally the presentation of the results is described.

5.2.1.1 Prerequisites and preparations

This first step aims at helping the change agents to prepare the coming workshop. As it was the case for the current research, the authors recommend having basic knowledge on the processes and the information system before attempting to apply this workshop. The aim of the workshop is not only to stimulate the knowledge owned by the workers and to develop their own reflection on the process but also to make the researchers understand how the process is conducted. It is crucial that the change agents understand the technical language that is shared and used within the company.

Once the prerequisites are acquired, the preparation phase starts. It consists of organizing and defining the objectives of the workshop. As the lean experts advised, it is recommended to gather two colleagues working with the same process for an hour and a half workshop session. Preferably these two persons should have different work experiences and seniorities, to bring different perspectives on the same issues. The objectives of the workshop and the improvement project must be explained and presented to them a couple of days in advance of the time slot booked. The objectives of the workshop should encompass the definition and the boundaries of the process studied in terms of where to start, what to draw, where to stop, and what level of details to adopt. This question should be based on a trade-off between the visibility of the customer value and the visibility of the waste; a too detailed approach loses the customer value while a large approach does not surface the wastes. Also, the reason why operators are invited to the workshop session should be explained to the entire team so that the two invited operators are open for discussion when the workshop arrives and the rest of the team understand the improvement project. It is crucial to fulfill the transparency highlighted in the empirical study to make sure that none of the employee is hurt by the procedure and to increase the level of acceptation of the improvement project.

So to summarize, the preparation phase should include the following steps:

- ✓ Define the process and its boundaries
- ✓ Define what should be represented on each process
- ✓ Identify what the customer values
- ✓ Identify the level of detail of the process wanted
- ✓ Send invitation to two workers for an hour and a half workshop session

5.2.1.2 The workshop

The workshop session has been designed as followed:

1. *Review of the purpose of the study and presentation of the workshop* (5 min)

A brief review of the objectives of the improvement work is recommended to make sure that all participants share the same goals and objectives of the mission. A quick presentation of the coming workshop with its own objectives is done, explaining the different tools used and the boundaries of the process defined during the preparation phase.

2. *Activities, interactions and flow of information mapping* (55 min)

Both the empirical data and the literature review emphasize the need to keep things simple. As a consequence, this activity is performed using Post-It, pen and paper. In addition to its simplicity, Post-Its are also flexible and allows the operators to reposition them at their convenience until its right place in the process is identified. During a first step all activities performed by employees should be identified and represented as a flowchart. The focus is on the activities the operators go through when doing the process. Drawing the activity only helps at structuring the overall view of the process. For this first activity the workers should be guided but the solution should come from their discussions. If a disagreement occurs (regarding the sequence of activities for instance) it can be considered as a *Quality Concern*. *Quality Concerns* are defined as all kind of deviations, bottlenecks, wastes, or disagreements that rise during the study of the process. These *Quality Concerns* are written on separate Post-Its when they occur and are stuck aside the flowchart. When drawing the process, the interaction with other actors is also represented. For example actions required from other actors than forwarders to enable the process to continue should appear on the flowchart. If the flowchart of operators' activities is written horizontally, it is accurate to represent the interactions using the vertical dimension, and vice-versa. It increases the visibility and enables to easily identify the external actors of the process.

Finally all kind of information needed while working on the process should be identified: inputs, output, supportive information, and enabling information should be gathered but no distinction between them should be asked to the employees. The following questions, presented in Table 5-3, may help the change agents to lead this discussion.

Table 5-3: List of question to identify the information flow

Inputs	What information do you use to complete the task? What information do you need to start the task? *What information enables you to start the task?* Where do you find this information? *On a printed document, in an e-mail, in an EDI, on an excel file…*
Outputs	What is the outcome of the task? *What does the task create?* Are the input modified by the task? And How? Does the system change and send automatically the information? *Are some status updated? Automatically? Manually?* *Are EDI sent?* Is the information shared with other actors?

	Does the customer know that you have done the task? What is the form of the information? When the information is created or modified and sent? *During or after the completion of the activity?*
Enablers	Can you identify some information used by the management team to assess the process? *The quality, the efficiency and the productivity of the process?* *What status of the information is created, or changed*

This first hour focuses on activities and the information flow, trying to establish the process as it is today with the flow of information around it. The next step consists of a more general discussion about the process drawn to surface any kind of waste with the help of the operators.

3. *General discussion and problem identification* (30min)

This discussion is lead by the change agents and aims at identifying potential sources of waste in the process. A first questionnaire is based on waste regarding the information flow while the second refers to more common wastes observed in any kind of business and developed by Liker (2004).
The present research proposes then a first set a question, presented Table 5-4, to help the change agents to surface wastes at an information level. It is a tool that the change agents may use to guide their thought and lead the workers' reflections. The questionnaire developed is based on the wastes developed by Hicks (2007) that converted Liker's manufacturing wastes for information intensive service companies. The intangible character of information makes it difficult to visualize its wastes and inefficiencies. The translation of Hicks (2007) research for the 3PL industry proposed here is made to ease the study of the flow of information. One should consider the list as an extensive list. All questions do not have to be developed with the workers due to the fact that some of them may directly surface thanks to the workshop methodology used. Nevertheless, it is positive for the change agents to go through the questionnaire to have an overall understanding of the information management issues.

Table 5-4: Waste at the information level

Wastes at the informational level
Flow demand: time and resources spent trying to identify information element that need to flow Do you spend time to identify the information required for one of the activity you perform? Do you think that some tasks can be done automatically? Does it happen in your process that you miss information and you have to wait for it or perform other task to get it? Is it easy for you to identify the information you need in the documents you receive or in the system? Is it easy for you to identify and find the most updated files?
Failure demand: resources and activities that are necessary to overcome a lack of information For which task do you have to look for additional information in order to perform the task? How often do you have to go out from your main system to look for additional information in order to perform the task? At what point in your process the form of the information changes?

Do you have to sort the information you use manually?

Flow excess: time and resources that are necessary to overcome excess information
What information or document do you store and why?
Do you receive the same information many times?
Do you receive information you don't use?
Are you disturbed by the flow of information?

Flawed flaw: resources and activities that are necessary to correct or verify information
How do you know that the information you use is correct and updated?
If they are incorrect or not updated what do you do in your process?
Who do you contact to report the error?
How do you contact this person?
What do you report to this person?
Do you receive contradictory information?

The second questionnaire, presented in Table 5-5, represents a direct interpretation of the 7 wastes proposed by Liker (2004). The questions have been adapted to a 3PL environment and are positioned at an operational level. It goes beyond the boundary of the process defined at the beginning. The purpose of these questions is slightly different from the previous ones. They aim at understanding the environment in which the process evolves by grabbing the workers point of view on their own job. It is important to notice that the benefit of this workshop methodology is to show the employees that their well being is considered and heard before taking decisions for improvement. This part has the overall objectives to let the workers express themselves and their concerns regarding the work they perform every day.

Table 5-5: Waste at the operational level

	reviews – inspection of work for errors or omissions How do you follow that the shipment is going as planned? Who is responsible for checking the follow up of the shipment? How do you assess the quality of your own work?
	mistakes – errors and omissions that cause work to be redone or customer defection How do you know that a problem occurred during the process? What is the process to be followed when problems occur? *When shipment miss carrier?*
Muda	***duplication – activities in different parts of the system that could be performed together*** Do you think some tasks can be rearranged? How do you make sure that you are the only one doing the task?
	movement – transportation or movement of information or personnel that is unnecessary Does it happen that you have to leave your desk? When? Why?
	processing inefficiency – ineffective use of resources of standard processes; Do you think you have the right skills and competences to work on the process? Do you follow a standard process on a daily basis?

	resource inefficiencies –management of personnel, equipment or materials that are wasteful Do you think the system is adapted to your work? Do you think you fully exploit the potential of information systems and computers in general?
Muri	Do you work extra time? Do you feel pressure from the organization in your daily work?
Mura	Do you have the same workload every day? How do you split the orders?

Once the workshop is done, the change agents own a mine of raw data that need to be sorted to make the process visual. The coming section, development the layout used for the presentation of the results.

5.2.1.3 Presentation of the results

As developed in the empirical study, the presentation of the results should be simple and easily understandable by anyone in the company. Moreover the layout of the process map should highlight the interaction and information exchange with other actors. An adapted cross functional flowchart has been chosen to represent the process. Its objectives are to visually express the need for information exchange and the actor concerned at different steps of the process. Therefore the timeline is represented on the map. This visual process map aims at easing the study of inefficiencies in the process. A template developed for the study is presented Figure 5-4.

The template presented aims at structuring the presentation of the results in a standard form that can be shared with everyone in the company. An important quantity of information is represented to fit with the literature and the empirical study requirements:

- The different actors that impact the process studied are identified and presented into different subsections [1]. As a consequence the kind of interaction between the different actors and when it occurs is then easily visible by everyone. The company understands what is needed by others actors, when it is needed and its impact on the process. A vertical separation is also presented, it helps to follow the time dimension of the process; each separation representing a different period of time. For the 3PL industry
- In the Figure 5-4, the Actors 2 represents the company where the process is studied. The start [2] and the end [3] of the process are defined as they have been identified during the preparation phase. The sequence of activities as it is on the field is clearly represented and the link between different activities is highlighted. It reflects the work of the workers during the workshop. When different possibilities raise a diamond [6] is used to show the different paths possible. Significant waiting times are also represented [7] when the workers have to wait for an action to be performed by another actor. For instance in a 3PL industry, the waiting time may correspond to the actual transit time of goods

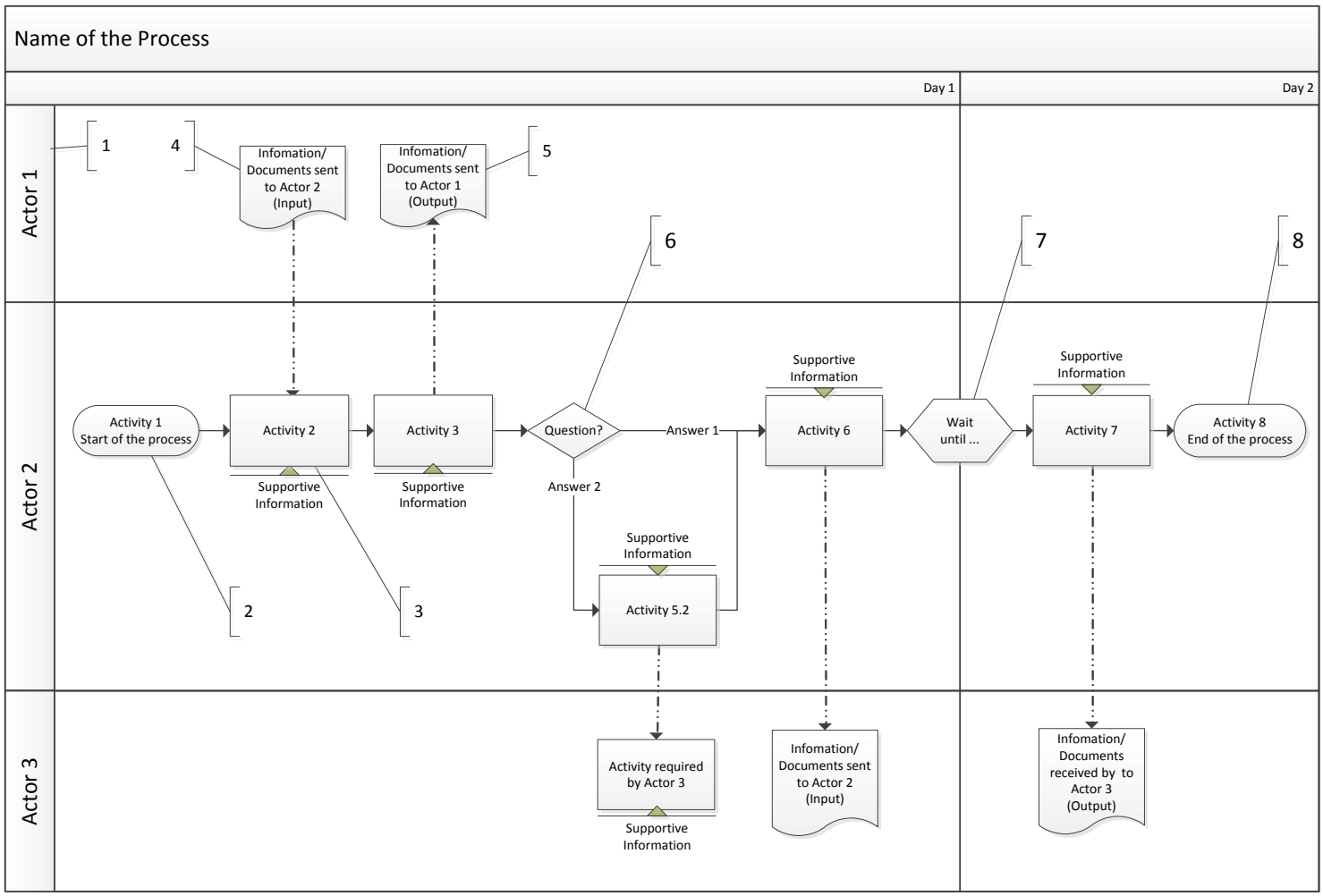

Figure 5-4: Flowchart template

- Most of the interactions with the external actors consist of information flow. The identification of the kind of information is also represented: the inputs [4], outputs [5] and supportive information that are needed to perform the task are all represented on the map.

As a conclusion the presented methodology structures the workshop done with the operators in a way that most of the information related to the process is written directly on the map. Besides the map in itself, another objective of the workshop was to surface *Quality Concerns* that may rise along the process mapping. All these *Quality Concern* Posts-Its are simply listed in a separate document with the maximum information gotten by the worker during the workshop. A template used for the list is presented in Table 5-6.

Table 5-6: Template to list Quality Concerns

#	Which Actors are involved?	Which process is concern	Description of the *Quality Concern* as it surfaced	Real problem (as the researchers analyze it)
1				
2				
…				

5.2.2 Observation phases

As described earlier, the workshop is followed for the change agents by an observation phase. This phase aims at validating the process drawn, identifying new quality concerns and finally getting a deep understanding of the process and the *Quality Concerns* surfaced. The literature and Lean experts emphasize the need to "Go and See" (Liker 2004), and the authors encourage the researchers to go where the value is created to observe and experience the dynamics between the resources, the actors and the activities. Questions shall be asked based on the different questionnaires presented before. This observation phase has several objectives:

- It represents an unbiased observation for the researchers that lead to an objective study of the process.
- It shows the workers that the workshop session has a concrete outcome, and that their participation is of a great value.
- It aims at starting the root cause journey presented later by asking questions directly to the workers.

This phase should last until the researchers believe they have a complete and deep understanding of the situation and then the root cause analysis [*see section 5.3.1*] of the different *Quality Concerns* can begin. It requires patience and commitment for all teams to lead the improvement project to its full potential.

5.3 How do these wastes/inefficiencies identified at the operational level lead to the quality issues faced by customers?

This section aims at finding and explaining the link that may exist between the quality problems faced by customers presented Figure 5-2 and the quality concerns that arose both from the workshop session and from the observation phase that followed. A checklist has been designed to be used during the observation step and ease the identification of root causes. It is presented in 5.3.1 and in 5.3.2 the tool used to visualize the results is introduced.

5.3.1 Root causes analysis

As mentioned by Finlow-Bates (1998) and Staugaitis (2002), a structured approach need to be established to conduct a root cause analysis otherwise there is a great chance that researchers mixed causes and consequences and focus later in the improvement journey on fixing small problems instead of the root causes. The pre requisite to conduct a root cause analysis is a good and deep knowledge of the environment studied. As mentioned in the previous section the interviews of different actors presented in Appendix 1 - Case Study Protocol, the workshops session with their set of questions and the observation phase enable to give change agents both broad knowledge on the 3PL strategy, goal and culture and specific knowledge on the process studied. In order to guide the change agents in their quest to understand how the quality concerns lead to the three categories of quality problems faced by customers: service level, cost optimization and adaptability, a checklist has been adapted from Staugaitis' (2002) checklist. The checklist presented in Table 5-7, was designed with the 7M in mind and gather common causes that can be found in the process. The list can be used during the observation phase or after in order to classify and order the knowledge gained.

Table 5-7: Common causes' checklist

Workload	*There is not an adequate number of forwarders that enables to treat all orders on time.*	☐
	There is not procedure to dispatch orders when the workload is high	☐
Awareness	*Different actors are not aware of the tasks they need to do, the information they need to provide and when.* *Actors concerned:……..*	☐
Forwarders Skills	*Forwarders do not have the necessary skills and knowledge to perform required tasks* *Tasks concerned:……*	☐
Prioritization.	*There is no prioritization of orders.*	☐
	There is no prioritization of activities that need to be performed in earlier stage of the order to cash process.	☐
Time Allocation	*Forwarders do not set aside sufficient time to perform priority tasks within expected timelines.*	☐
Working with Others	*Forwarders are not aware of whom they need to contact when they encounter a problem with the system.*	☐
	Forwarders are not aware of whom they need to contact when they encounter a problem with the shipment.	☐
	Forwarders are not aware of whom they can ask help with their order when the workload is too high or it is urgent.	☐
Experience	*Forwarders do not have necessary experience to perform the task efficiently.*	☐
Information	*Forwarders are missing information to perform their jobs.* *Information concerned:……..*	☐
	Forwarders cannot access the information easily. There are no documents or the documents are not located in specific places or the information is not presented in a standardized way which makes it hard to identify it.	☐
	Forwarders have access to wrong information regarding shipment, rated, route maps, customs clearance…	☐
Relationships with Other actors involved in the process (internal and external actors)	*Forwarders do not have positive and mutually supportive relationships with other forwarders.*	☐
	The communication between forwarders and other actors is not well established or not sufficient. *Actors concerned:……*	☐
	The responsibility between different actors is not well defined. *Actors concerned:……..*	☐
Motivation	*Forwarders do not have incentives for performing their job. There are no clear consequences for completing or not completing the different activities.*	☐
	Forwarders do not get feedbacks on their jobs.	☐
Management	*The process and forwarders are monitored through a set of KPIs in contradiction with customer value.*	☐

Once the researchers have enough information to answer all the affirmations contained in the checklist, they can begin the root cause analysis. First, the quality issues faced by customer presented

in Figure 5-2 are the symptoms as mentioned by Finlow-Bates (1998) and therefore should be translated into the direct and concrete problem. As an example, failure in reaching the service level commitment can be experienced through lead time issues and visibility issue that are both observed problems by customers. They are also called Point Of Recognition (POR) and are the real starting point of the root cause analysis as the questions *why* are asked from there as shown on Figure 5-5. Every time a cause is identified it becomes a consequence and the researchers should focus on identifying the causes that lead to it using the same *why* question. The goal here is to link quality issues with quality concerns observed on the process therefore every time a branch of the tree does not lead through the cause analysis to a quality concerns it should not be considered and a new branch needs to be made. There can be several iterations until the cause corresponds to a quality concern observed in the process. As these quality concerns have been observed inside processes it is considered that they are very close to the root causes and only one more iteration can be done to reveal the root causes that trigger customer dissatisfaction. During the whole process researchers should keep in mind that only causes related to internal 3PL activities and operations are pursued. Therefore a lot of causes that may be strictly linked to the carrier inability to perform well are not part of the root cause analysis.

The root cause analysis process can be separated into the following steps:

- ✓ Translate quality issues faced by customers into concrete observed problems by customer
- ✓ Start asking *why* from the concrete observed problem until the causes match with quality concerns observed in operations
- ✓ Ask why one more time to find the root causes of the customer dissatisfaction

5.3.2 Visualization tool

A tree diagram which is the simplest tool to visualize root cause analysis is used in this thesis. This tool is chosen over the Ishikawa or fishbone diagram for two reasons: first, it is the most intuitive and therefore it can be read and made by anyone, second the direct link between causes and consequences are visible starting from the quality issue faced by customers. In an Ishikawa diagram the causes are gathered in different categories and thus the link between the initial problem and the first set of causes is lost. Each branch of the tree situated on the same level belongs to the same category. The tree has been divided into five categories presented above: quality issue, observed problems by customer: POR, internal dysfunctions, quality concerns observed in operations and root cause analysis. The template of the tree is presented Figure 5-5.

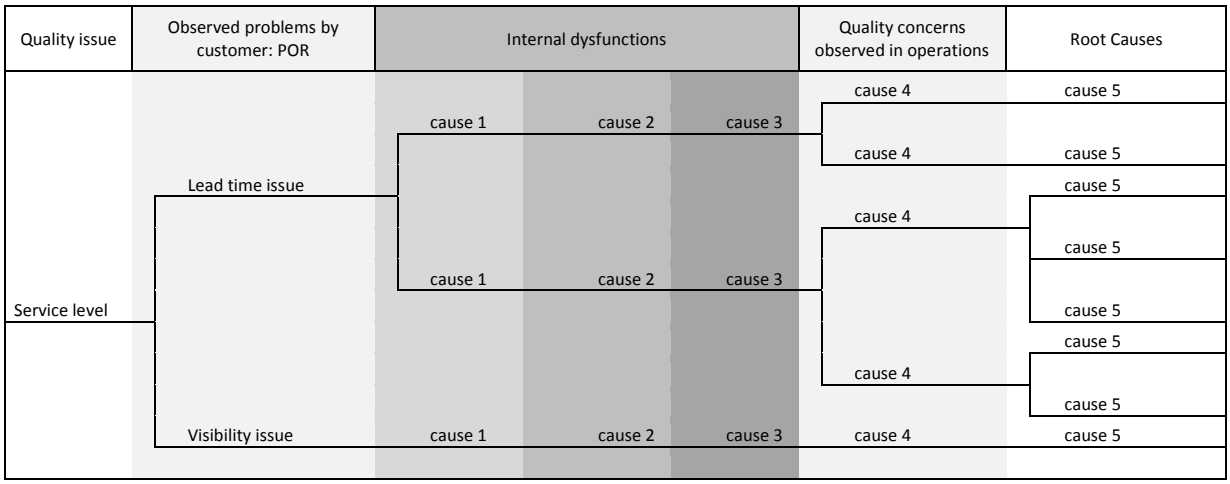

Figure 5-5: Template of root cause analysis visualization

5.4 Test Case 1

The toolbox and its outcomes have been first tested on the general airfreight import order to cash process at one 3PL office located in Sweden. The complete study from the definition of the boundaries to the establishment of the causes and consequences links considering the interviews, the one workshop session and the observation phase lasted 4 days.

5.4.1 Identification of wastes

The workshop has been followed as previously explained; two workers joined the researchers for an hour and a half workshop session. The picture below illustrates the outcome of a workshop, the clear Post-It represent the *Quality Concerns* surfaced while the others represent the flow chart.

Figure 5-6: Outcome of a workshop

From the data obtained during the workshop session, the researchers established a clear process according to the layout presented section 5.2.1.3. The process map was modified a little bit after the observation phase and the final one is presented in Figure 5-7.

A list of 8 *Quality Concerns* was identified after the workshop session and the observation phase. The list is presented in Table 5-8.

5.4.2 Root cause analysis and visualization tool

From the *Quality Concerns* presented below, a root cause analysis has been achieved thanks to interviews and observations to understand how the process wastes and inefficiencies lead to the quality problems faced by customer presented in Figure 5-2. The root cause tree in Figure 5-8 was obtained.

5.4.3 Key learnings from Test Case 1

The outcome of the toolbox developed reached the outcome expected in term of *Quality Concerns* identification and root cause analysis. Nevertheless two points have been identified as criteria for improvement:

- First, the researchers were surprised by the difficulty to make the forwarders express themselves. The Quality Concerns had to be chased, and a lot of them were found by observation after the workshop.
- Second, the cross functional flowchart required time for the worker to understand. As mentioned in the workshop methodology section 5.2.1.2 the forwarder was only asked to draw a simple flow chart and then the change agents translated it into the cross functional flowchart in order to facilitate the analysis. One forwarder did not immediately recognize the work he has done during the workshop when we showed him the final flow chart. The flowchart was felt as a barrier between the forwarders and the workers.

Except from these two remarks the forwarders were grateful to be heard. They were willing to help even if it was hard for them to answer the two questionnaires presented in Table 5-4 and Table 5-5 that aim at identifying wastes in their work.

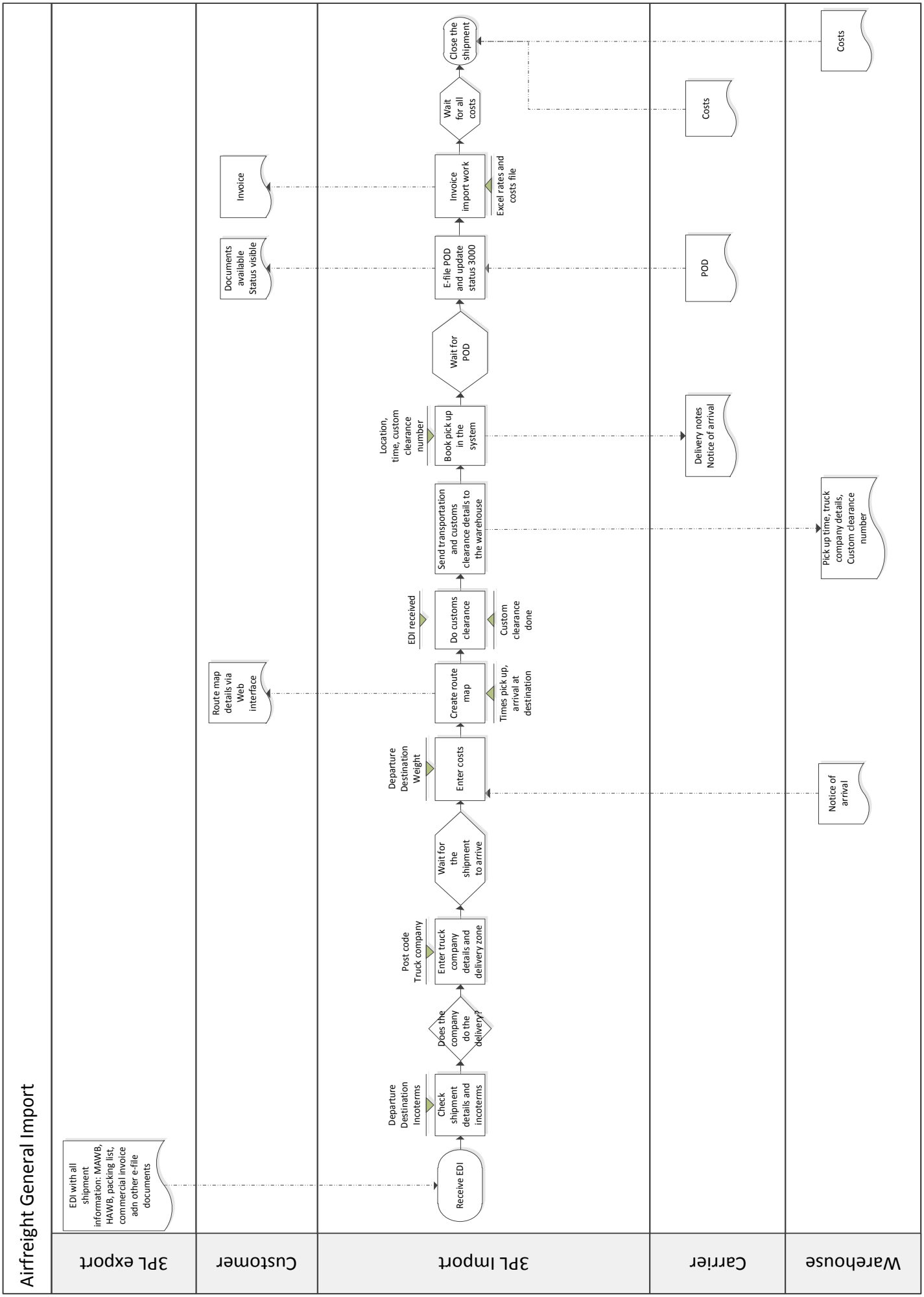

Figure 5-7: Flow Chart - Test Case 1

Table 5-8: Quality Concerns - Test Case 1

#	Which Actors are involved?	Which process is concern	Description of the *Quality Concern* as it surfaced	Real problem (as the researchers analyse it)
1	Forwarders	All	Export send all papers MAWB, HAWB and commercial invoice while they are all in the system	Unnecessary document created
2	Forwarders	Invoice	Wrong client ID in the invoice page in the system, need to be changed every time	Information manually entered in the system
3	Forwarders	Booking	Route map changed every time	Information manually entered in the system
4	Forwarders	Invoice E-file	Invoice from suppliers use MAWB number while ** use job number to e-file documents	Missing information to fulfil the order
5	Forwarders	Follow up	Update status when no information on deviations	Wait to know nothing went wrong
6	Forwarders	All	MAWB printed from e-file and used as file cover	Unnecessary document created
7	Forwarders	Invoice	Quotations not updated in the system	Information manually entered in the system Lack of training on how to enter quotations in the system
8	Forwarders	Booking	The Global Airfreight Exchange platform (GFX) is not used to book directly the capacity on the airline as it requires same manual work as booking by mail or phone	Information manually changed in the system No adaptation to new booking routines

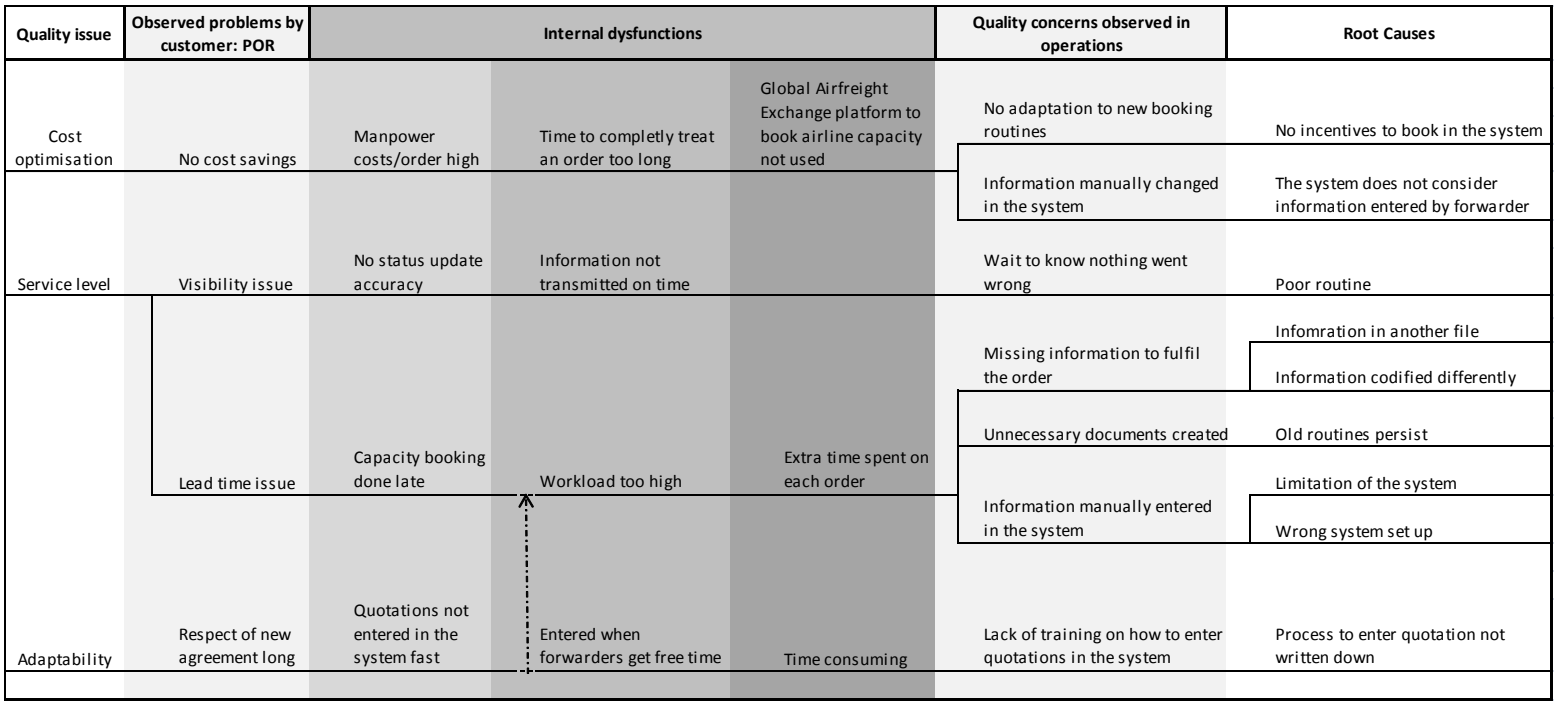

Figure 5-8: Visualisation Tool - Test Case 1

5.5 Validation

To validate the toolbox, the researchers have applied it on two other processes presented below.

5.5.1 Test case 2

A second test was carried out on the airfreight export order to cash process for one specific customer of the same 3PL provider as in test case 1. The complete study including the interviews, the one workshop session, the observation phase and the root cause analysis lasted 4 days.

5.5.1.1 Adaptations to optimize the toolbox

To take advantage of the key learnings form test case 1, it has been decided to first emphasize on the communication by reinforcing the preparation phase. The forwarders were informed two weeks ahead of the workshop session and the workshop purpose and content was briefly described to them at that moment. At the beginning of the session two weeks later the researchers took more time than in test case 1 to explain the objectives and the organization of the project. Second, the cross functional flowchart was kept for research purpose only. After the workshop a basic flowchart corresponding to the workers' work were drawn and presented to them. It aims at valorizing the workers implications in the improvement project.

5.5.1.2 Identification of wastes

A first map of the process was drawn by the two forwarders during the hour and a half session and was then modified a little bit after the observation phase as some activities were missing or done in practice in a different order. The final map is presented on the next page Figure 5-9. Adding the problems surfaced during the interviews, the workshop and the observation phase, in total 15 *Quality Concerns* have been surfaced. The results are presented in Table 5-9 using the template developed section 5.2.1.3.

5.5.1.3 Root cause analysis and visualization tool

The interviews and observations of the process enable to understand and represent the link between customer quality issues and operational problems observed according to the methodology presented section 5.3.2. The results are gathered in the root cause tree presented in Figure 5-10.

5.5.1.4 Key learnings from Test Case 2

In test case 2 all parts of the toolbox worked very well. The forwarders were eager to join the improvement program and support the researchers in the investigation of the wastes and root causes.

The key learning relies here on the communication. The workers appreciated the free and open discussions. Using a basic flowchart, when discussing with the forwarders, helped at sharing the same language and reinforced the synergy between the researchers and the workers. This second case reached the expectations of the researchers. As a consequence the few modifications presented in section 5.5.1.1 were implemented in the initial toolbox, and then, it has been used as such for the study of the other process.

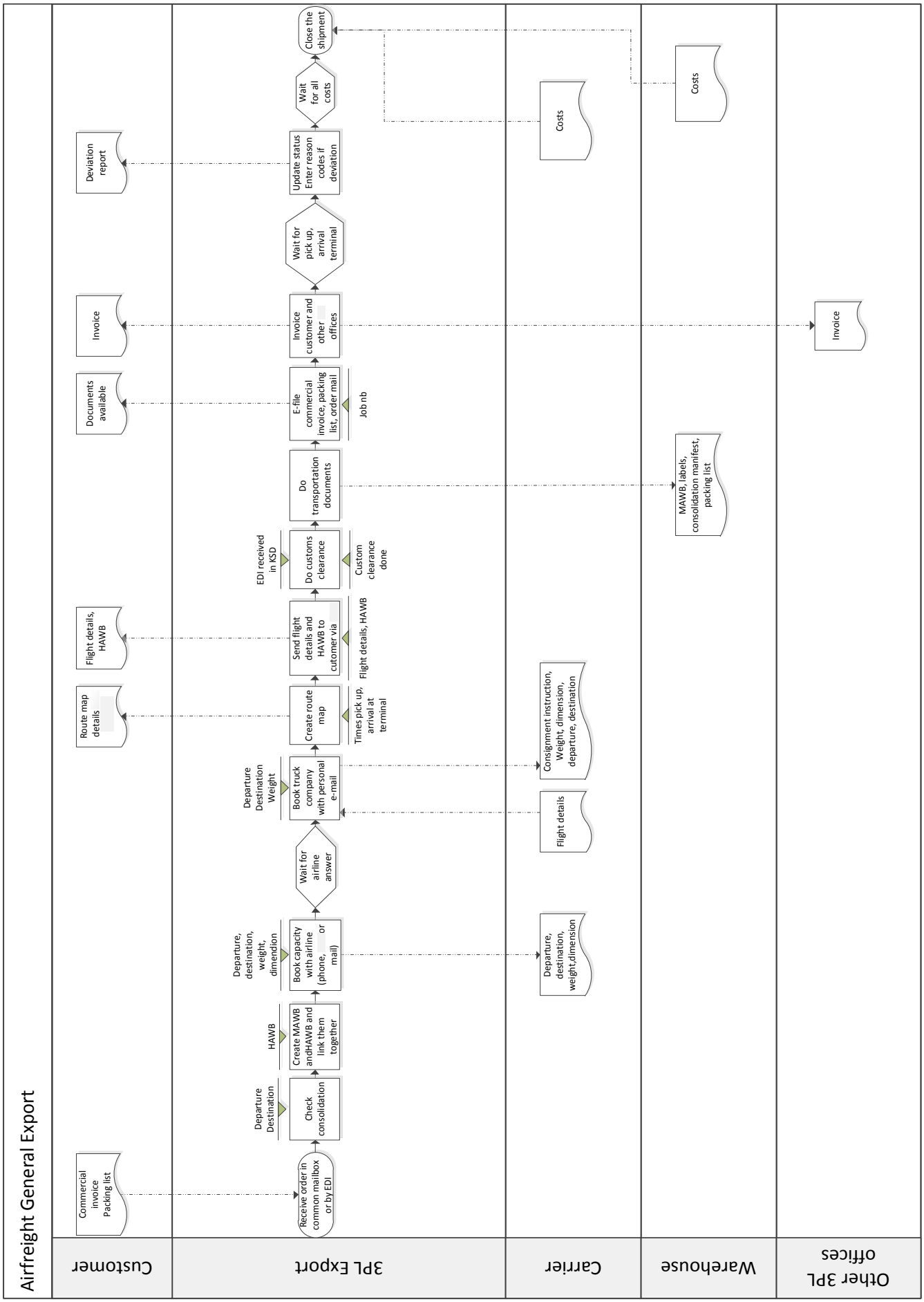

Figure 5-9: Flow Chart - Test Case 2

Table 5-9: Quality Concerns - Test Case 2

#	Which Actors are involved?	Which process is concern	Description of the Quality Concern as it surfaced	Remarks
1	Forwarders Customer	Booking	Docs from Customer SAP cannot directly be sent to personal mail box	Need to go from one system to another
2	Forwarders	Order entry	Order mail printed	Unnecessary document created
3	Forwarders Business development team	Booking	Costs for airline in consolidation interface higher than single shipment costs	Cost motives to consolidate not visible in the system
4	Forwarders Business development team	Booking	Consolidation interface belongs to another system	Need to go from one system to another
5	Forwarders	Booking	Print, scan and e-mail pre-alert to other ** offices	Unnecessary document created
				Unnecessary document scanned
6	Forwarders Key account manager	Booking	Melbourne shipment late cause only Singapore airline can deliver it and half of capacity belongs to DHL	No available capacity on carrier ever
7	Forwarders	Booking	HAWB printed twice when confirmed	Unnecessary document created
8	Forwarders	Booking	Route map manually changed every time	Information manually entered in the system
9	Forwarders	All processes	Hard to learn processes	Hard to learn processes
10	Forwarders	Follow up	Update status when no information of deviation	Wait to know nothing went wrong
11	Forwarders	Booking	Reliability of airlines not visible in the system	No information on carrier service level
12	Forwarders	Booking	Not enough information regarding the use of the consolidation program	Lack of training on how to use the consolidation program
13	Key account manager	Customer service	Responsibility to challenge route planning is not clear between the sales department and business development team	No one responsible to look for better route
14	Key account manager	Customer service	Key account managers are often specialized in one mode of transport making hard the fact to optimize route planning on their own	Key account manager specialized in one mode of transport
15	Forwarders	E-file	The e-filing of documents is always done at the end of the process while it can be done at the beginning	E-file at the end of the process

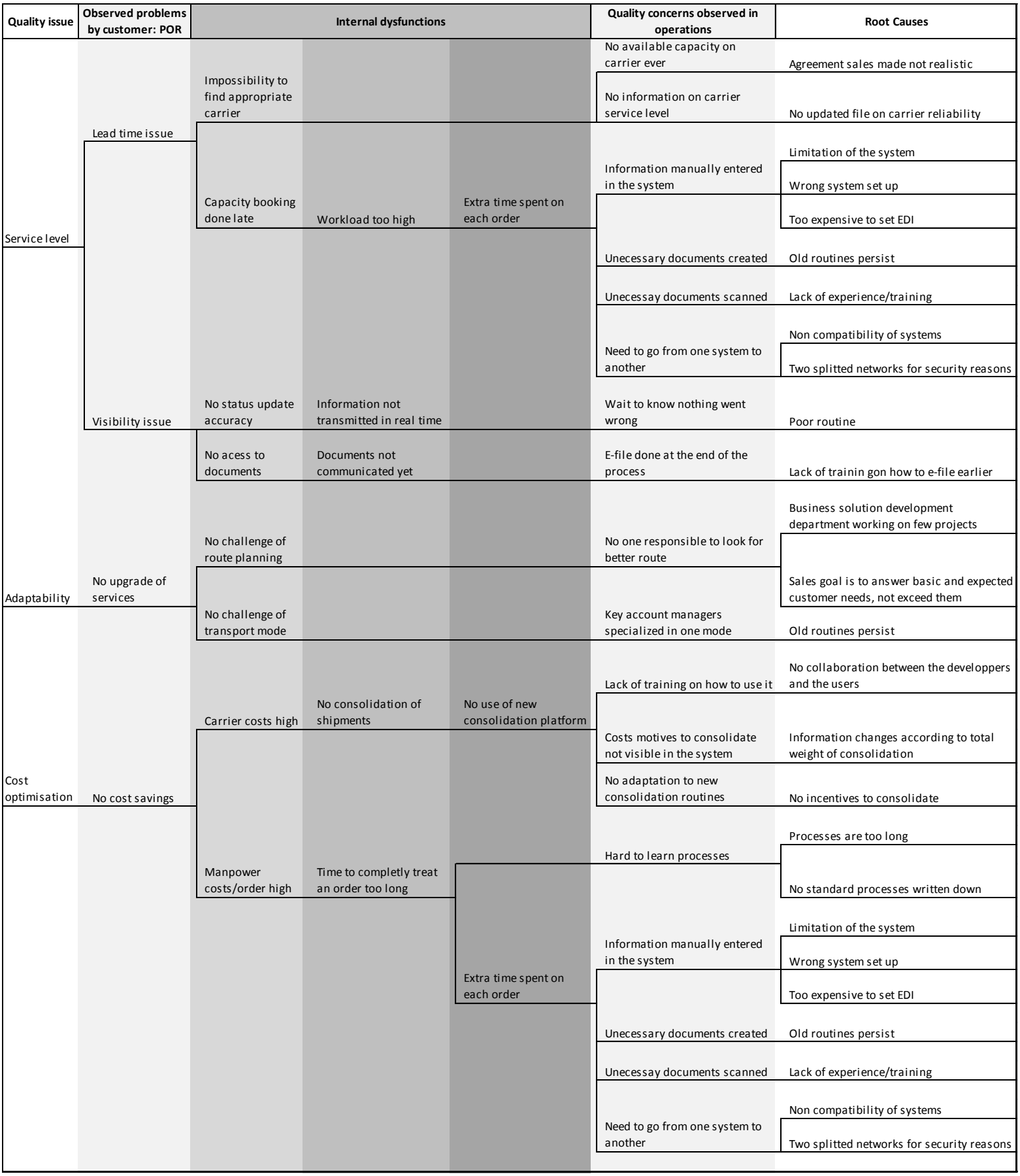

Figure 5-10: Visualisation Tool - Test Case 2

5.5.2 Test Case 3

The toolbox and its outcomes have been applied on a third process of the same multinational 3PL company which is the part load and full truck load process for road transportation in Sweden for a specific costumer. This process concerns another transport mode and was performed in a different office still located in Sweden. The complete study lasted 4 days.

5.5.2.1 Identification of wastes

The same workshop procedure as in the previous case was followed. Two forwarders dedicated to this specific process joined the researchers for an hour and a half workshop session. One forwarder has been working on the process since its establishment and development 9 month ago and the other one arrived 5 month ago as the number of shipments increased. Therefore their knowledge and experience of the process were different and stimulate the discussion during the workshop session.

The cross functional process map in Figure 5-11 and the twelve quality concerns presented in Table 5-10 were obtained after the workshop session and the observation phase.

5.5.2.2 Root cause analysis and visualization tool

A root cause analysis has been performed to understand the link between the *Quality Concerns* presented above and the quality problems faced by customer defined in Figure 5-2. The result is presented in the root cause tree in Figure 5-12.

5.5.2.3 Key learnings from Test Case 3

The toolbox was successfully applied in terms of *Quality Concerns* identifies and root cause analysis to this third process that was evolving in a different context and set up than the two previous ones. The interviews revealed that the specific customer is not price sensitive and is ready to pay more to get a better service which is visible in the root cause tree. It can be said that the visualization tool grasp and represent well the voice of the customer.

Figure 5-11: Flow Chart - Test case 3

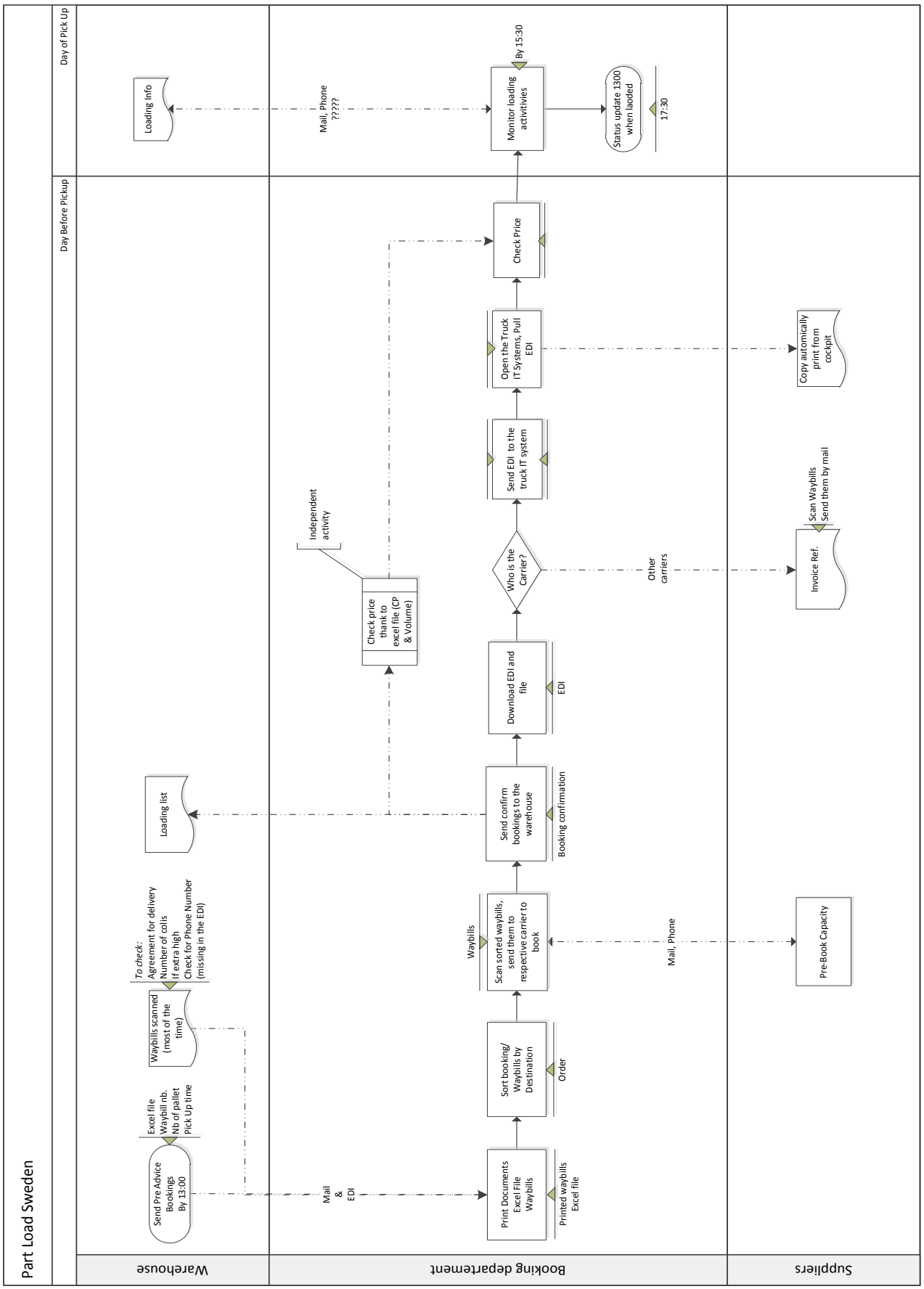

Table 5-10: *Quality Concerns* - Test Case 3

#	Which Actors are involved?	Which process is concern	Description of the *Quality Concern* as it surfaced	Real problem (as the researchers analyse it)
1	Forwarders	All	Forwarders go back in the system several times to work on the same file as they are distracted from their order	New information treated as soon as it arrives
2	Forwarders Warehouse	Order entry	Scanned Waybills received from warehouse only for double check	Unnecessary document created
				Double check performed
3	Forwarders	Booking	The EDI triggers status when pulled but it is pulled at the end of the process while it should be as soon as it is received	Status updated through EDI pulled at the wrong time
4	Forwarders	Follow up	Forwarders have to chase the POD	No communication between forwarders and carriers
5	Forwarders	Follow up	Status updated at the end of the day	Status update only per batch
6	Forwarders	Booking	Waybills are printed, scanned, and sent.	Unnecessary document scanned and created
7	Forwarders	Invoice	The invoice is always credited to the shipper address while he is not always the one paying	Information manually entered in the system
8	Forwarders	Booking	Cockpit price and route not accurate and require manual intervention	Information manually entered in the system
9	Forwarders Warehouse	Follow Up	Status "Departure from warehouse" is updated without knowing that goods have been loaded	Wait to know nothing went wrong
				No communication between forwarders and the warehouse
10	Forwarders Warehouse	Booking	The capacity in Pallet is not sent from the beginning and may cause rework	Rework performed
11	Forwarders	Booking	A lot of communication back and forth occur between actors when booking transportation	Many information to forward, treat, and sort
12	Forwarders	All	Forwarders always treat an order from the beginning to the end	No exchange of orders between forwarders

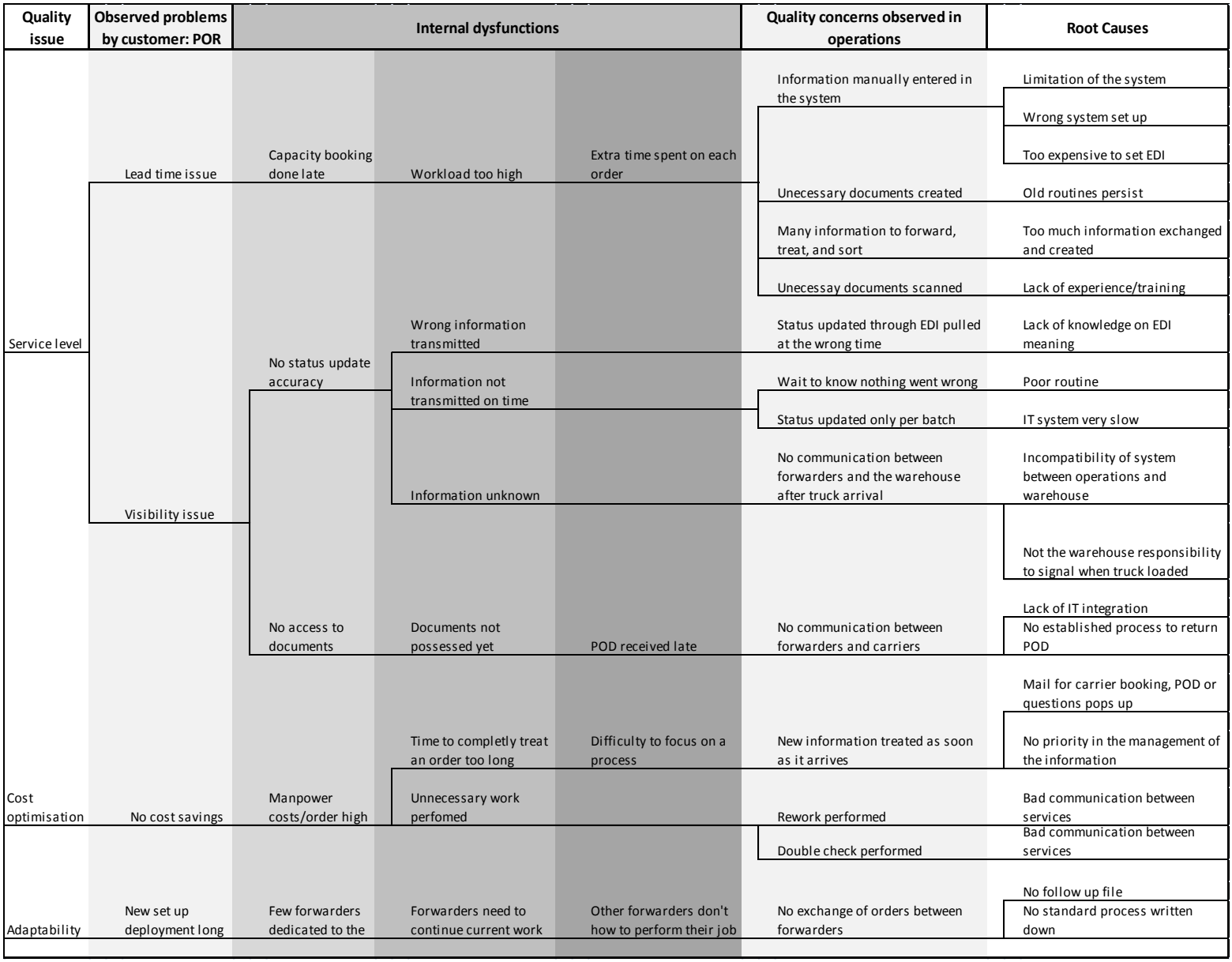

Figure 5-12: Visualisation Tool - Test Case 3

5.5.3 Key learnings from the validation

In both cases the application of the toolbox enabled to surface *Quality Concerns* during the workshop and the observation phase. Presenting only the simple flow chart that was drawn during the workshop to forwarders as suggested after the test case 1 was a good idea. Indeed forwarders recognized their work immediately and retrieved a great satisfaction from that. The two visualization tool could be drawn and were understood by everyone.

As the two processes were specific to particular customers and concerned different transport mode it can be said that the toolbox is flexible and work in different settings.

6 Concluding Discussion

This chapter presents a discussion of the results of this research and suggests future research before concluding the study.

The activity of a 3PL in the supply chain and its interaction among actors has long been discussed over the years and the main focus was on the integration of IT system across the companies involved in the chain and the development of long term and trusted relationships. Nevertheless 3PL's customers still face today several quality issues when outsourcing logistics activities that impact their overall performance and satisfaction level. The purpose of this thesis was to adopt another point of view by investigating the wastes in internal processes of a 3PL company and linking them to quality problems faced by 3PL customers. The study was conducted in a global 3PL company located in Sweden. Three different processes were followed in two different departments and two locations.

The study of the processes is based on Lean thinking. Previous research have shown that Lean in manufacturing and service environment such as hospital, carrier or retailer industries enable to decrease operational costs and increase customer satisfaction. As 3PLs are facing these issues the adoption of Lean tools and principles seems adequate. However, only few studies have focused on the application of Lean in a service environment where no tangible product exists. As a consequence, Lean tools and principles were adapted for the purpose of the thesis to fit with this specific third-party logistics environment.

6.1 Managerial implications

The current set up of 3PL companies involves a large number of both, internal (operational forwarders, key account managers, internal warehouses or other offices) or external actors (carriers, warehouses and others). The well-functioning of such numerous actors require a tight organization and strict responsibility assignment. The study has revealed that a lack of clear boundaries between the responsibilities assigned to the different actors lead to inefficiencies and ineffectiveness especially when it comes to customer care and development or continuous improvement project in hand with the customer. A better coordination of cross-functional project, a clear and respected set of responsibility and finally a shared vision across the company would develop a positive synergy within the company and reduce double work and overlapping of activity. In practice, the establishment of clear standardized procedure with responsibility boundaries and the development of cross-functional team would lead to a better integration of the different actors toward the same objectives: the customer satisfaction.

At an operational level, the analysis revealed that a lot of internal inefficiencies are related to the lack of standardized routines as processes are not written down, the absence of prioritization of activities or the lack of documents to support forwarders' activities in their daily work. Developing the necessary supportive document and set an internal process to manage and update them would guide the forwarders in their daily processes and increase both their productivity and the quality of the service provided.

Finally, during the study the researchers also noticed that some problems are linked to the IT system but not because the IT system is not adequate or well performing enough rather because the deployment and exploitation of the system do not reach a complete stage. Indeed the system used in the 3PL company studied is very powerful however few users really understand how it works and how to use its full capacity. If they could have gathered data, the researchers would have found interesting

to study whether the IT solution is to blame for operational wastes such as manual work or the management that do not provide enough training and don't seek to use the full potential of the system.

As a consequence of that, few investments in trainings and standardized work procedures together with the development of cross-functional teams would help a company to structure its activities and better integrate all assets of the company, from employees to IT systems.

The present thesis also offers a Lean toolbox to the team leaders to identify and surface *Quality Concerns* in their processes and how to relate them to more general concerns. The study implies that the toolbox is a powerful tool that gives top management the opportunity to develop Lean awareness in the company. This toolbox serves as a starting point for a Lean journey by providing a list of concerns that need to be addressed. The voice of the employee is the key in a service company that creates value mainly through the work of human resources. This toolbox put the employees at the heart of the process pushing team leaders and top management to be committed to solve existing problems.

6.2 Theoretical implications

This research contributes to academia with the adaption of Lean theory via a complete toolbox to start a lean journey. It also brings new insights on 3PLs processes with their inefficiencies and quality issues thanks to visual tools developed to link internal inefficiencies to customer dissatisfaction.

As regard the toolbox, it was tested on different processes in different set ups and referring to different transport mode but only in one 3PL company, therefore its suitability should be further tested in other 3PL companies of different sizes and located in other countries than Sweden. However the toolbox developed show that Lean tools and philosophy can be powerful and useful asset in a 3PL company. The toolbox forces 3PL to focus on their customers, their processes and their employees' feedbacks and creativity which constitute the starting point a Lean journey. The different root cause analysis of the quality problems experienced by costumers lead in RQ3 and identified in RQ1, show that the *Quality Concerns* found in the processes directly affect the quality of services and thus customer satisfaction. As a consequence, the present thesis completes the highly theoretical studies available on Lean deployment in service environment with an easy-to-use and easy-to-understand tool for practical implications.

However a lot of work still needs to be performed to categorize, analyze and take advantage of the toolbox results. One criticism of the toolbox is that all causes are presented on the same level; the visualization tree neither show the degree of importance of the causes as some have in reality more weight than others nor the frequency at which the cause appear as it can happen that information is missing at each step of the process while the forwarder only print and scan a document once in the entire process. However the toolbox gives a good understanding of the daily processes and wastes, and their consequences on customers. As the goal of RQ3 was to link problems faced by shipper with wastes found in processes all causes that lead to problems experienced by shippers have not been studied. That was part of the delimitation of the study to focus on the internal processes of 3PL but there is no doubt that the relationship and the communication between the customer and the 3PL has a great role to play in the customer satisfaction.

6.3 Discussion and future research

This master thesis shows that by adapting Lean tools and adopting a Lean perspective 3PLs can make their employees surfaced wastes that stem in their daily operational processes and they can understand their consequences on the customer.

Today 3PLs are evolving in an increasingly competitive context as shippers tend to reduce the number of logistics provider they use. At the same time there are opportunities for 3PLs to grow as the trend is for customers to increase the amount of logistics activities outsourced. In this environment 3PLs should strive to increase the loyalty of their customers before trying to get new ones. The toolbox is a good tool that forces logistics provider to be more customers oriented.

Main causes that lead to quality problems faced by customers were found to be linked to a lack of routines, a lack of clear responsibilities and a lack of training people on the use of different IT tools. All these issues can be addressed by 3PLs by organizational change and don't require expensive investment. Thus potential improvements can be made to increase customer satisfaction by reducing wastes in operations processes.

Future investigation regarding how to standardize 3PL processes would be of interest to increase the productivity and better control the quality of their activity. The market requires highly customized solutions to correspond to each and every business context and therefore operational processes tend to be customized. Future research could then investigate how the standardization principle of the Lean theory can be developed and applied to a highly customized service company. The module thinking that is widely applied to the industry today could be for instance studied to investigate whether it is possible to adapt it to a 3PL organization.

A more extensive study could lead to the creation of a tool for developing an improvement plan based on a list of *Quality Concerns.* It might be of a great value to guide companies willing to start a Lean journey that often found themselves lost in this new adventure. This research would complete the toolbox presented in this paper to guide Lean entrepreneur even further.

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8 Appendices

8.1 Appendix 1 - Case Study Protocol

This appendix presents the case study protocol used in the thesis to gain knowledge about the relationship between customer dissatisfaction and internal process wastes and inefficiencies. The introduction of the topic and issues is common to all interviews and is therefore exposed at the beginning of this protocol. A description of the interviews performed for different actors are then presented.

8.1.1 Introduction of the topic and issues

8.1.1.1 Double Gross Profit.

As the result of globalization, the development of emerging regions and the current trend of customers to increasingly outsource their logistics activities, there are opportunities for Third Party Logistics (3PL) to expand their businesses. The case is based on the study of a global 3PL company defined as "*a company that takes over some logistical activities that were previously carried out by one of the principle parties, either the supplier or the buyer*". The 3PL role in the distribution set up differs depending on the level of outsourcing of its customer, from pure transportation work organization to a complete integrated-logistics value-added services and global management of the customers' logistical set up. In this configuration, the 3PL uses the concept of control tower to monitor logistics activities dealing with the flow of goods and information between different actors as Figure 8-1 illustrates. The company coordinates the flow of information (dotted lines) while organizing the flow of physical goods (continuous lines).

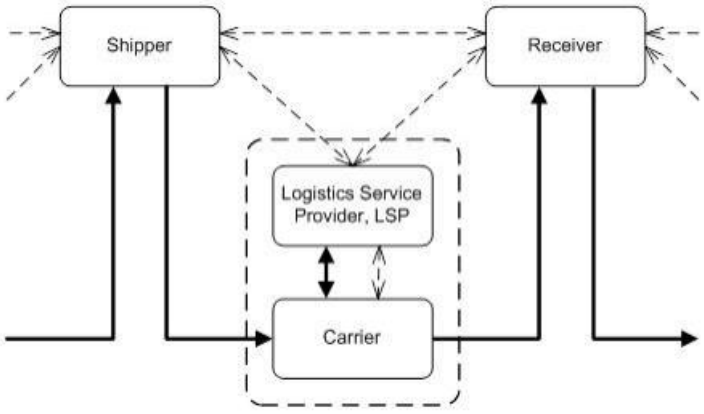

Figure 8-1: Role of Logistics service providers (Stefansson, 2006)

To sustain and embrace the current trends the 3PL company studied has set up a "go for growth" program whose objective is to double 2009 turnover for overland and contract logistics products by 2014, and to double the volumes of sea freight and airfreight products on the same period. Part of the company strategy to reach its ambitious target is to assess, question and improve its internal processes in order to free internal resources and be able to handle more orders with the same workforce. The focus of 3PL study is on order to cash processes that are operational processes carried out by forwarders. The processes can be qualified as administrative and information processes as 3PL mainly handles the information flow as Figure 8-1 shows. At the same time the company is working on

gaining new volumes and customers but it is facing fierce competition as the results of customers reducing the number of 3PL they use. In this context, customer refers to the shipper, i.e. the transport service buyer signing contract with the logistics provider. Therefore another part of the 3PL strategy consists of being more customer-oriented. In that respect the company has developed a customer survey for the first time in 2010.

8.1.1.2 Problem definition

When it comes to increase its market share, any company should try to differentiate itself from competitors especially by better understanding its existing and potential customers. In order to help the 3PL company completing its "go for growth" program, this thesis aims at finding 3PL customers needs and expectations and the quality problems they face when outsourcing their logistics activities. Quality problems of a service are defined as its inability to satisfy the needs and expectations of the customer. Another important part of a 3PL journey to increase its revenue is to study and optimize its internal, administrative processes. Most of a 3PL's works consist of receiving, transforming and creating information. Mapping existing processes is thus difficult and time consuming due to the intangible nature of information. In this thesis, methods to map and analyze information processes in order to identify wastes and bottlenecks will be studied. Improving its internal processes can enable the 3PL company to treat more orders with the same workforce but it does not ensure an increase in customer satisfaction which is the prerequisite for gaining new volumes. As a result the company should strive to understand which activities in its processes trigger the quality problems faced by customers. Establishing and visualizing the links between internal processes inefficiencies and quality issues reported by customers are the ultimate purpose of the whole study.

8.1.1.3 Purpose

The purpose of this research is to increase efficiency by addressing quality problems in 3PL processes. In this report quality is considered from a customer point of view and in a service environment. As results quality problems of a service are defined as its inability to satisfy the needs and expectations of the customer where the customer refers to the shipper, i.e. the transport service buyer signing contract with the logistics provider. Regarding 3PL processes the focus of the study is on internal, operational processes that are administrative and information processes.

8.1.1.4 Methodology

To study the case questionnaires were used as guidelines during interviews. There was still the opportunity for conversations to make the interviewees comfortable and to discuss deeper topics of particular interest for the case.

8.1.2 Interview 1, 3PL Key account managers

Respondent: 3 different 3PL key account managers and 3PL Sweden national sales manager
Company: -
Name: -

8.1.2.1 Status Report

All key account managers interviewed are working at the same 3PL company. The sales manager of the company for Sweden is considered as part of the key account manager category as the same questions were asked to him as for the others managers only responsible for specific customers. 3PL key account manager 2 and 3 are based at the location A and works with different customers purchasing the airfreight product. They were willing to express their point of view and share their experience as well as their performance report results with us. 3PL key account manager 4 is located at

the location C and working with overland customers. He was very curious about our study and happy to be part of it.

8.1.2.2 Objectives of the interview

The goal in that section is to understand the voice of the customer and the actions taken to align the company strategy with this voice. Understanding customers' needs, expectations, requirements and the agreements made with the company is part of the study.

8.1.2.3 Questionnaire

Overall questions

-When are you in contact with the customer? *(Before, during, after the signature of the contract)*
-Why do you have those contacts?
-What is your role and actions regarding customer care and follow up?

Customer value from 3PL perspective

-What is important for the customer?
-Why is that important for the customer?
-Are there big differences in requirements between customers?
-What is the percentage of customized solution compared to standard solution?
-How do you create loyalty or long term relationship with your customer?

Interfaces between 3PL and customers

-What documents or information flows create value for the customer? *(Status, custom clearance, invoice, proof of delivery…)*
-When at the latest must this information be released?
-How this information is agreed to be transmitted? *(Mail, EDI)*
-According to the contract, what kind of information is agreed to be delivered from the 3PL to the customer?
-According to the contract, what kind of information is agreed to be delivered from the customer to the 3PL?

KPI

-What KPI are used to assess the sales department?
-What are the objectives of the sales department in terms of number of clients?
-What are the objectives of the sales department in financial terms?
-Does the sales department have other objectives?

8.1.3 Interview 2, 3PL operational managers

Respondent: 4 different 3PL key operational managers and 2 3PL Sweden national product managers
Company: -
Name: -

8.1.3.1 Status report

All operational managers are working at the 3PL company. The two national product managers, one responsible for airfreight and the other for overland are considered as operational managers since the same set of questions were asked to them than to the operational managers just below them in the

hierarchy. 3PL operational managers 3 and 6 handle overland department operations respectively for the location B and the location C 3PL operational manager 3 was very keen on answering the questions and sharing his data while 3PL operational manager 6 was less comfortable probably due to the fact he was at this position for only few months. 3PL operational manager 4 is responsible for the location A airfreight department and was supportive. And finally 3PL operational manager 5 is in charge of the CL department in Location B and was a little reluctant to help at the beginning but eventually gave all the information needed to complete this study.

8.1.3.2 Objectives of the interview

The objective here is to understand how customers' orders are treated and monitored through the whole order to cash process. Getting more knowledge about how the operational department is assessed to notice a fit or a mismatch between customers' requirements and internal operational strategy is also a goal followed in that section.

8.1.3.3 Questionnaire

Strategy and goals

-What is the strategy and what are the goals of the department?
-Is it to increase the productivity? On which criteria? By how much?
-Is it to increase the quality? On which criteria? By how much?
-Is it to decrease the cycle time? By how much?
-Is it the "go for growth" financial objectives? How is it translated into operational measurement?

Customers

-Assess the nature and shape of the demand. How the demand is measured by the 3PL company?
-What date is considered as the "ordering date"?
-How is the workload repartition on yearly, weekly and daily basis?
-How orders are prioritized? *(by emergency, profit potential, customer care...)*

Current KPI

-What KPIs are followed to assess the productivity and the quality within your department?
-How do you assess the performance of your forwarders?

Assessment of the process

Responsiveness

-Which temporal measure is tracked to assess the performance of the process?
-Do you assess cycle time between action/tasks in the process?
-If yes, how those measures are taken? And between which actions?
-Do you monitor the gap between expected or contracted lead time and actual lead time?
-How long on average does it take to treat an order from receipt to delivery?
-How long does it take to update each status?
-How long does it take to do the custom clearance?

Non quality

-What do you consider as non quality in the process? (late, wrong documentation..)
-Which defects are tracked and how are they tracked?
-Do you measure the percentage of status updated ate the proper time agreed in the contract?

-Are the customs clearance not done properly measured?
-Are the number of late orders registered?
-How the customer is managed when the non quality affects him?
-Is the customer contacted when there is a problem?
Productivity
-How many orders are treated per month?
-How many orders are treated per month and per employee?
-Are the productivity measures used to assess employee performance, training and reward?

Asset of human resources

-How do you motivate your team?
-How do you assess the performance of your team members?
-Do you think this assessment fits the overall strategy of the company?

8.1.4 Interview 3, Lean experts

Respondent: 2 Lean experts
Company: 3PL, Consulting Company
Name: -

8.1.4.1 Status report

One lean expert is currently a green belt working at the 3PL. As she is involved in the company business she was very helpful and her advices were very specific to the company environment. The second lean expert is working for a consulting company specialized in Lean projects. He had a more holistic approach which was complementary with the other Lean expert perspective.

8.1.4.2 Objectives of the interview

The aim of this section is to find out the tools and methods that should be used to identify wastes in information intensive company processes and perform a root cause analysis or each problem surfaced.

8.1.4.3 Questionnaire

Waste identification

-What tools to use to map processes in an information intensive company?
-How to identify the different activities of a process?
-How to understand and grasp all the flows related to a process?
-How to identify wastes in processes?
-Which data can be used to identify wastes?

Root cause analysis

-Which tools can be used to identify root causes or a problem?
-How to identify the root causes of a problem?
-How to visualize the link between the problem and the root causes?