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Improving Quality in Transportation Process

Helsinki Metropolia University of Applied Sciences

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PREFACE

This study was the most challenging and interesting task during my professional carrier. Firstly, this study was approached as an obligatory requirement for graduation. But then the reality of the business problem at my work, with the case company planning to improve the quality in daily operations and assigning me with this task, turned into a really engaging project. The successful implementing of this thesis was difficult while working at the same time, because it requires much academic and writing work. But this study helped me to grasp the subject and understand that client is the most important party in the transportation business. The development of my own professional skills was supported and significantly improved by continuous work on assignments during my study in Metropolia and this writing period.

This study would not be possible without invaluable constant supporting and mentoring from my professors Dr Marjatta Huhta, Jari Laine and Zinaida Grabovskaia.

Thank you!

Helsinki, May 7, 2014
Denis Gerasimov

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The aim of this study is to suggest an improved transportation process through introducing basic quality tools to control transportation process. The need for this is caused by the lack of specific quality checkpoints for the delivery in the current transportation process. If misunderstandings and malfunctions occur during the delivery, they are fixed and discussed, but not documented for further improvements since no specific support tools exist for the workforce. Currently, the case company uses guidelines and working instruction but they are in several pages and rather complex. Therefore the need arose for improving the current transportation process through suggesting the quality tools.

The quality in transportation processes was approached in two stages. Firstly, it was interpreted as a number of gaps and bottlenecks in the process which can be identified, minimized and improved. Secondly, a constant use of quality tools was suggested for continuous quality improvement, to prevent the gaps from further occurring in the transportation process.

The outcome of this study is an action plan or checklist with all the quality checkpoints to address for covering possible gaps during the delivery time. This checklist is based on the improved process flow. The outcomes of the study will be used immediately in the company's transportation process. Additionally, the results will be used to develop the IT software support, where all requirements and documents for transportation are gathered in one place for better access and understanding. In the future, the checklist will be supported with updated manuals to each stage of the transportation process towards obtaining ISO 9001 Certification.

Keywords	Quality in Transportation, TQM, Checklist, Basic Tools of Quality Improvement, ISO 9001

Contents

List of Abbreviations

3PL	Third-party logistics
EDI	Electronic Data Interchange
ERP	Enterprise Resource Planning
FMEA	Failure mode and effects analysis
SPC	Statistical process control
SQI	Service Quality Indicator
TQM	Total Quality Management
TROMB	Transport Och Mobil Beording

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1 Introduction

This Thesis develops the transportation process for the case company working in logistics. The case company aims to improve the quality of its existing transportation process to comply with quality requirements put forward in Total Quality Management (TQM) and, subsequently in the future, aims towards ISO 9001 Certification. This issue has become significant for the case company due to the challenges in the current transportation process, as the workforce and clients started emphasizing quality in services due to increasing volume of goods. This Thesis aims to find suggestions to improve the existing transportation processes and implement the proposed improvements into action. The improvement of quality in the transportation process is seen as a competitive strength of the business which can only be achieved by better alignment with the customer needs to benefit all parties involved in the business. This report is a part of the TQM project started in the case company to address this need.

1.1 Case Company Background and ISO 9001 Certification

The case company works in the field of industrial transportation. This is an international mid-size case third party logistics (3PL) company situated in Vantaa, with offices in St. Petersburg and Moscow. The transportation process in the case company implies the so called door-to-door delivery. Such a process typically includes a number of items to be checked, and these items must be rechecked and confirmed in the planning phases before the transportation even starts. After a successful planning stage, the main delivery process should follow the initial plan and its checklist, ideally eliminating any unexpected challenges. In the case company, the current challenges in this scheme include the lack of correct communication flow between all involved parties and the lack of a workable simple list of the checkpoints during the delivery. The company needs some solutions to be found which can help to fix these problems. In this study, the challenges in the existing process are identified and discussed during the interviews with the case company employees, and then re-checked with the clients and experts from 3PL.

An additional reason for the company to be interested in improving its current transportation process is the fact that the case company is looking forward to ISO 9001 quality certification. Therefore, by finding and identifying the gaps in the current transportation

process and improving them, this Thesis also help the case company towards a successful ISO 9001 Certification.

To help the company prepare for adopting ISO 9000 family, this study examines the total quality management philosophy focused on two important elements: the organization's customers and its management. The customers are the reason why the company or organization exists. It is vital to understand their needs and make improvements based on customer feedback. The second focus is the company's management system. Quite often ISO 9001 leaves it up to the organization to decide how to create the system of quality management and quality improvement. At the same time, ISO 9001 manuals and working instructions provide a set of specific requirements for the management of a certified organization specified in ISO 9001 Certificate.

This study discusses the quality issues from the point of view of the total quality management approach (TQM). Although the ISO process of quality management and TQM philosophy use a variety of terms, often different for these two approaches, they basically mean the same quality issues. Therefore, the study can still focus on TQM even if aiming at ISO 9001 in the future. What is similar in both, is the use of "shall" as a universal mark of a requirement whether it is related to communication, documenting a procedure, developing a process, training personnel, keeping a record, inspection of a service or quality controls. TQM approach, however, is much more explicit in explaining *how* the required quality can be achieved. Therefore, this TQM approach is chosen in this study to improve the existing transportation process in the case company.

1.2 Research Objective and Design of the Study

The study aims to improve the quality of the current transportation process in order to avoid malfunctions in deliveries and implement quality control tools. The research question is formulated as follows:

How to develop quality control and quality assurance to support the timely transportation process?

The research design of the study is presented in Figure 1 below.

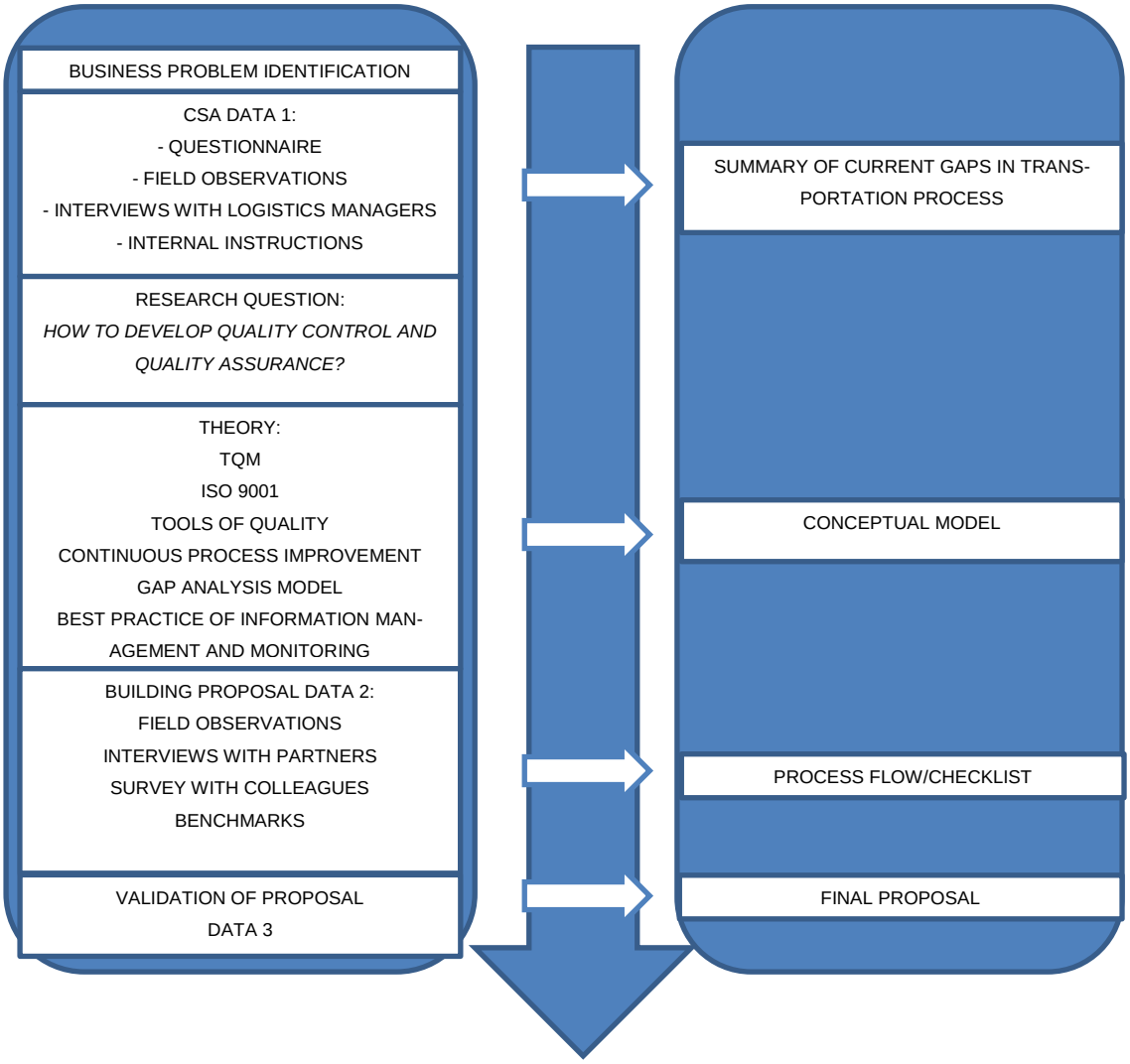


Figure 1. Research design

The research design of this study consists of the following steps. Firstly, the study conducts the current state analysis of the existing transportation process. It is done through the interviews with the employees of the case company, which identify the challenges and areas for improvement. Secondly, once the development targets are selected, more data will be collected for identifying the ways to overcome these challenges. These ideas are collected as input from the colleagues by conducting the surveys, interviews and observations. The best practice for transportation logistics are then searched from the literature, industry standards and the benchmarking transportation companies, which are involved into deliveries. Based on the finding, the conceptual framework for the study is created. Finally, by applying the conceptual framework for

the development of a proposal, the solution is built for quality improvement in the transportation process by introducing quality tools for the case company.

The output of this study contains the improved transportation process and a checklist that outlines the steps towards improving quality in the existing transportation process. This is meant to help the case organization to establish a workable total quality management approach to its transportation process, especially in view of the case company applying for ISO 9001 quality certification. Later on, each stage in the checklist can be explained in a written manner and preparation for applying ISO 9001 certification can proceed.

1.3 Scope and Structure of Thesis

This report is written in six sections. Section 2 presents the Method and Material used for data for this study. Section 3 focuses on the Currant State Analysis of the existing transportation process in the case company. It is followed by Section 4, which provides theoretical foundations for the study. These foundations include TQM theory with findings from the best practices in quality management and information sharing. It also presents the conceptual model for improving the transportation quality and the quality control system. Section 5 summarizes the suggestions from the interviews into the improved quality proposal model for the case company. The improved process flow is suggested with a virtual storage capacity for information and documents to be used for the future transportation process. In addition, a checklist for the improved transportation process is a second output for this study. At the end, Section 6 summarizes the results of this study.

2 METHOD AND MATERIAL

This section focuses on the research methodology and discusses the data collection in this study. Quantitative and qualitative data analyses were applied to identify the research problem. A questionnaire-based survey was implemented with employees of the case company and some of the clients. After that, the solutions were provided in this research grounded in the data collection.

2.1 Research Approach and Research Process in this Study

The research approach selected for this study is a single case study approach. “A case study is *an empirical inquiry* that investigates a contemporary phenomenon within its *real-life context*, especially when the boundaries between the phenomenon and the context are not clearly evident”. (Yin 2003: 13-14). The case study inquiry also copes with *the technically distinctive situation* in which there may be many variables which need to be taken into account (Yin 2003). The distinctive features of a case study include, first, the existence of a “case”. The examples of such cases can be found from the cases known from medicine, law, politics or business. Another feature of the case is that the cases cannot be separated from the context. The case starts with the researcher's interest in phenomena, and has a linear, one round logic of investigation. Researcher first explores the case rather than immediately brings action into the context. Participants in the case study provide a source of evidence which is collected through data collection. And finally, the important feature of the case consists of the learning from the case, and not only resolving it (Yin 2003). All these features point to the case study as an appropriate approach for this research.

In this study, the current transportation process is first divided into pieces and analyzed. The problems are recognized and the roots of the current problems are identified. The best practice are searched for and offered. The case study is based on a real “case”, with real materials collected from the company’s daily operations, from the participants and by observations of the completed projects.

This research is carried out by using qualitative and quantitative research analysis methods. The primary data are collected and the results of the analysis are employed to develop the solution. With the help of the chosen research methods - the observation, interviews, discussions, and examining the case company communication flow -

detailed view point of the present state of the order-delivery process is developed and improvement ideas are suggested. The research process included the following steps.

First, this study first examined the challenges in the current transportation process. The researcher started with his own observations which go back to several years of experience with the case company. The identified challenges occurred in the case company from one project to another, and sometimes the same negative occasion was repeated can by several managers. Daily conversations with colleagues confirmed this initial view, and added the views how different members understand and see the current challenges in the process. These initial observations were then collected and further discussed with the colleagues to shape the starting points for this study.

Secondly, a questionnaire was developed to re-check all the current challenges with a wider the workforce in the oral annual meeting. *How* and *why* questions were asked, as recommended by Yin (2003) for conducting the case study. The a questionnaire was conducted using a five-point Likert scale and the results further discussed in various formats, such as semi-structured and unstructured interviews and discussions.

In addition, during spring 2014, the a researcher has introduced some quality tools to collect more reliable data on the current projects of the case company. This information helped to confirm the most usual gaps in the transportation process, which usually occur during the service delivery. These results were showed and again discussed in the course of this study. Possible solutions for them were identified in these discussions.

Thirdly, the external data collection was implemented to identify possible sources of best practices from the outside and use them to improve the current process in the case company. Phone calls to partners and email questionnaires to other transportation companies were used to obtain more reliable view from other companies operating in the same business filed.

2.2 Data Collection and Analysis Methods

This study employed several sources of data collection. First, the material regarding the case company was provided by the case company's management, such as the current work related documentations, data on the previous projects and internal instructions. The company the workforce was the source of internal interviews and observa-

tions over the current transportation process. Secondly, the study also involved interviews with the customers and benchmarking companies, which became the source of the external data. The data collection study was executed in three stages with observations, interviews and the questionnaire conducted during the autumn-winter 2013 and spring 2014.

2.2.1 Observations

Qualitative research considers participative observation as a useful method in gathering primary data, and crucial in order to gather an authentic view into the internal processes. In this thesis, participative observation is used on many occasions so that a more realistic picture of the current situation can be developed. In this study, participative observation is performed by the researcher acting as an observer, which was often extended by asking relevant questions after the observation.

The researcher started with observations as the initial source of data collection. The researcher has participated in the current transportation process, conducted projects, as well as participated in company meetings face-to-face and via Skype daily. Notes from the observations have been documented in real time to revert to them later on and extend these notes from further observations on a daily basis. The limitation of this data source lies in the fact that the researcher only had a chance to upgrade the notes when informed about the meetings and project events in advance. Suddenly occurred meetings and conversations did not leave a chance to document them and were not included in the collected data.

2.2.2 Interviews

According to Yin (2003: 89), interviews make one of the most effective tools of data in case studies. Interview as a research method can provides a deep insight into the work processes of the company. This method will not, however, provide a fully realistic picture. Interviews tend to include information also about people's subjective views and feelings related to their work, rather than providing an authentic picture of what actually happens and what people actually do in the process. This limitation was taken into account and the researcher tool measures to overcome this deficiency by conducting more interviews and choosing the key participants in the process.

Both unstructured and semi-structured interviews were used in the current state analysis and the building phase of the transportation process to give a better understanding of the problem areas and possible solutions for them. The interviews were implemented as individual and group interviews, and they required a lot of planning in advance. Table 1 below lists the informants who participated in the interviews.

Table 1. Informants in transportation companies.

Position	Company	Date	Duration	Documented
Operational/Sales manager	Ramevrotrans	3.3.2014	1 hour 15 min	Field notes
Operational manager	Ewals	4.3.2014	1 hour	Field notes
Operation manager	Protect systems	4.3.2014	30 min	Field notes
Sales manager	DHL	5.3.2014	1 hour 10 min	Field notes
Sales manager	Containerships	5.3.2014	50 min	Field notes
Sales manager	TNT	4.3.2014	45 min	Field notes
Three Project managers	Case company	during spring 2014	autumn-winter 2013 and spring 2014	Field notes

As seen from Table 1, totally 9 in-depths phone interviews were conducted and these interviews can be divided into two categories: internal and external. The internal interviews collected insights and details from the colleagues, especially on the current challenges and possible solutions to resolve them. The external interviews gathered views how similar challenges were solved in other companies. They also included some interviews with the customers. In addition, the internal discussions on the transportation process challenges were conducted on a day basis during working on the study. They included unstructured and open-end discussions with the results documents as field notes. The external structured and unstructured interviews were implemented with the case company partnering companies and customers.

For the external interviewees, two main questions were asked when the interviews were conducted:

1. How is the quality of information maintained in your company?
2. What kind of tool does your company have for recording information for internal operations of the company?

The internal interviews were conducted based on the list of questions provided in Appendix 1.

2.2.3 Questionnaire

The questionnaire was used to ask respondents to provide a rating of the case company's performance using a five-point Likert scale. The respondents were asked to produce two types of rating: first, rate the areas of the case company's operations suggested on the list, and second, to mark important each item was for them. The ratings and attitudes to each variable were assessed on a five-point Likert scale shown in Table 2 below.

Table 2. The first part of questionnaire.

	Totally disagree				Totally agree
Service capabilities	1	2	3	4	5
Preparation of order					
Preparation time					
Carrier willigness to negotiate a new service					
Monitoring of delivery					
Information to client					
Promised transit time					
Delivery costs					
Carrier willigness to negotiate a new tariff					

As seen from Table 2, the first part is meant to explore performance in the case company as for the implementing variables indicated in Table 2. These nine variables were asked to be rated by the employees of the case company and the clients in autumn and winter 2013. The variables were assessed by using a five-point Likert scale, with 1 being *disagree with statement* and 5 *totally agree* with statement..

The second part of questionnaire was focused on three main stages in delivery process. The questions of this part can be viewed in Appendix 1. The first sections focus-

es on Preparing and Loading stages. The second is Delivery and The customs terminal. The third part is Unloading and Invoicing. The variables there were also assessed by using a five-point Likert scale, with 1 being *implemented worse* and 5 being *implemented very well.*

For conducting the questionnaire, the respondents were divided into three groups. The first group was made of the *employees* of the case company, the second group was *clients*, the third group was the *drivers.* This third group was asked the same questions but using oral questions not to run into the risk of missing the data due to the possible lack of time and probably skills to perform the questionnaire online. The employees and clients were asked to answer the questionnaire using a five-point Likert scale, with 1 being *never done* and 5 being *always done*.

All the employees assessed the performance of the case company in both parts of the questionnaire. A few client have chosen to give their feedback in an oral mode by phone and some face-to-face with the management after the annual meeting in the case company.

2.3 Reliability and Validity

Reliability and validity are considered as important key elements of any research. *Reliability* is viewed as confidence in the collected data which can be trusted and relied on. *Validity* can be described as the correctness of the selected tools used in data collection or designed to obtain the desired level of results.

To increase validity and reliability the business problem must be approached from various perspectives. In addition, different data sources and different tools can be used. Data triangulation involves using different sources of information in order to increase the validity of a study and ensure that the same results can be obtained if the study is conducted at the different point in time or by different researchers (Quinton and Smallbone 2006: 130-131)

This research tries to minimize the current errors in the study of the transportation process. To achieve this goal the research is designed and carried out in such a way as to preserve correctly all the research procedures for data collection and data analysis. The study conducted with the aim to increase the learning about the case, and also to

become an example for further investigations on the same process which may be conducted by other employees from the case company in future. Management of the case company is also interested in the research process and data collection being reliable and valid. So that the data is collected and analyzed properly and correctly, and the end users may have trust in the research results (Yin 2003: 38-39).

To increase reliability, the business problem is approached from two perspectives: from the internal perspective of the case company and from the point of view of the clients. Several types of data collections are employed to ensure triangulation of the data sources. These data sources include interviews with colleagues and partners, observations, monthly statistics from the internal tools on the transportation process from the case company, reports and instructions, and some benchmarks from similar companies. These data collection methods are used to achieve variety of sources and perspectives. After the data were collected data on the current state analysis, it was shown back to the colleagues and management, verified, analyzed and involved in building further improvements. When the conceptual model was created based on the insights from the colleagues and findings from the best practices, the results were again demonstrated and explained to the colleagues and included immediately into the further improvement developments.

3 CURRENT STATE ANALYSIS

This section describes the case company within its operation field and identifies the current challenges in the transportation process. These gaps exist in the operational functions between the involved parties in the transportation process. This section presents the results and analysis based on the internal survey in the case company, which can help to compare the current state of the case company against the targeted state.

3.1 Transportation Logistics

The case company is a middle-sized transportation and 3PL company that provides "one-stop shop" efficient transportation logistics and freight forwarding services for industrial companies. Its main office is located in Vantaa with two other offices in Russia. It focuses in large and heavy industrial goods and machines with deliveries from all over the world to CIS countries.

Presently, quality control in transportation processes is challenging because the company does not have any tool to control all the needed details. The company must clarify them in each stage of delivery and support with constant information flow to the customer, end user and other parties involved in a certain project. The present and occurred malfunctions are not well discussed and documented. Presently, the case company has general instructions for the workforce which can be improved and updated. The instructions however are not followed well, something can be forgotten and implementation of the delivery process continues incorrectly, although the instructions are needed for successful transportation. The work instructions can only be followed, if the management reminds to the workforce or asks about the delivery status. The most usual challenge is thus, first, to have the incorrect information on goods obtained from the driver, customer or shipper, which is not reconfirmed or analyzed in time, before the delivery even starts, or the problems occur over the loading time or lately. Secondly, vital information can vanish during the delivery process, or not informed to the case company. At the same time clients are demanding for a perfect service with low-cost delivery fees. Therefore, the solution seems to be to establish the *tool to control transportation process*.

That was done, first, though identifying the gaps in the existing process and then suggesting solution how to overcome them. The analysis of the current process was done based on the survey and interviews in the case company.

3.2 Survey

Annual survey 2013 shows that the results of the case company are below from the performance of the year 2013. Managers were asked how they define and evaluate the current logistics performance by identifying its most important component. Totally eight different components were mentioned. The results are showed in Figure 2 below and Appendix 1.

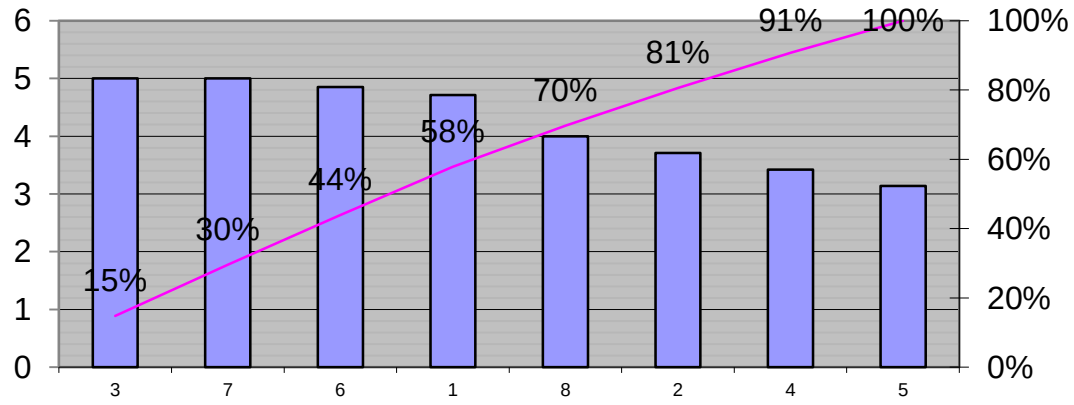


Figure 2. Evaluations of the case company's eight steps of performance.

In Figure 2, the identified eight steps included: 1. Preparation of order, 2. Preparation time, 3. Carrier willingness to negotiate a new service, 4. Monitoring of delivery, 5. Information to client, 6. Delivery costs, 7. Carrier willingness to negotiate a new tariff, 8. Promised transit time.

The evaluations of responses ranked the "willingness of case company to negotiate a new service" and "a new tariff" as the most valuable and well implemented variables. In case the client's feedback was negative, because of a high tariff of service, the new tariff is re-checked with new possibilities to reduce rate and re-check different routes of delivery.

"Monitoring of the delivery" and "Information to client" were assessed as the worst implemented in the season 2013. Human factors, lack of time, lack of staff and lack of documentation were mentioned as the excuses. Importantly, the lack of tools was mentioned as the most important reason by most of the employees and CEO.

To understand the organizational aspects of the quality steps, the managers were asked to indicate three main stages of delivery performance in the season 2013 among a choice of options. The results are showed in Figure 3 and Appendix 2. Some responses needed to be overviewed closer.

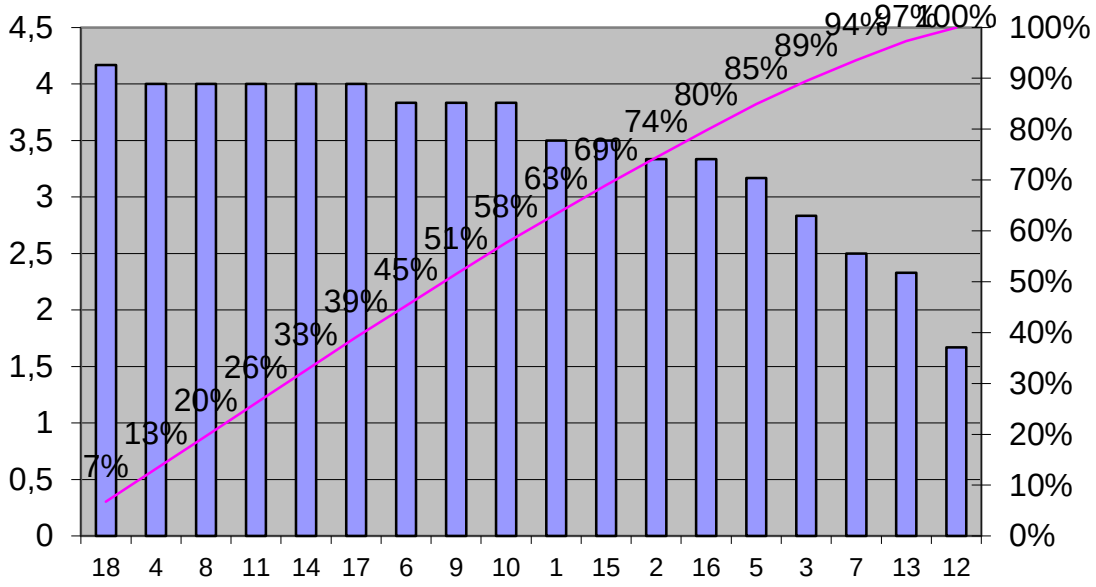


Figure 3. Answers on three stages of delivery.

In Figure 3, the identified stages included, in order of priority: 18. Invoice was send always in time, 4. Arrival of trailer in time to loading place, 17. Successful door-door delivery, 5. Documents are usually not ready at the loading moment, 3. Information on goods in planning stage is different from client/consignee compared on primary data from shipper, 7. Differences in dimensions and weights on goods at planning stage, 13. Queue or other issues on border, 12. Late delivery of goods, because of incorrect information.

The most top ranking was "invoice was send always in time" (number 18) with the response mean of 4,17 and "arrival of trailer in time to loading place" (number 4) with the response mean of 4.

"Successful door-door delivery" was ranked as mean of 4 (number 17). The highest rank was not achieved and the reasons are discussed below. In the discussions about the results, the managers agreed that all the below factors have ranking below 4 are needed to be improved.

For example, the evaluation for "Documents are usually not ready at the loading moment" (number 5) was 3,17, and it means that the drivers are needed to wait. Incorrect documents can be given to the drivers, or later these documents may change several times by the shipper. Or the final versions on export documents can be send to the case company by email several times, or the correct documents may be forgotten to be given to the driver in the end, because of huge number of sent documents. The reason behind this difficulty may be that more than one copy of export documents has been sent to the case company. When two or more copies are sent, it is difficult to identify the correct version and provide correct documents to the driver for border and the customs. One copy and in only one place might be a workable solution for this challenge. Ideally, a cloud space or drop box in some internet space may help the case company to succeed in challenge with documents. This was confirmed in the discussions with the colleagues. Then, the first copy of documents can be saved and if any new versions of export documents appear later, they can be overwritten into that one shared space, with the previously existed documents replaced. In that option there is no fear in sending any incorrect documents with the driver to CIS country.

The evaluation for "Information on goods in planning stage is different from client/consignee compared on primary data from shipper" (number 3) was ranked as 2,83. This means that some gaps occur between the shipper and client, as it was identified in the discussions with the colleagues. It is possible that details are incorrect because of different measurement standards, lack of training in the workforce, lack of time or other human factors without re-checking them. The case company can go on shipper's state to recheck all details on goods, measure and weigh them. After collecting all details on goods in shipper's premises, the case company can achieve full pack-

age of information on goods for transportation. In principle, the case company relies on information from shipper or client without rechecking goods by representative of the case company. Nurminen Transportation usually goes to shippers premises, if shipment is challenging. Therefore, asking details is an important moment in planning stage. The shipper must send all information on goods and the case company must compare details received from client.

As a result from the previous issue, "differences in dimensions and weights on goods at planning stage" (number 7) can also occur at the loading moment. Details on goods are different than they were informed earlier. The average for gaps in details on goods have 2,5 or almost half of deliveries on loading moment. Mostly half of the deliveries are challenging because contact person is not usually working in warehouse from where shipments are loaded into trucks. The details on goods in export documents can be different than in reality. The case company tries to request shipper to recheck separately all dimensions on goods, but still something remains to be incorrect.

The delivery was badly late because of "queue or other issues on border" (number 13). This challenge was ranked with mean of 2,33. On holidays or on weekend's quantity of trucks is higher than on normal working days. Internal working moments of border are challenging also. If something unexpectable happens on border, traffic will be stopped until issues will be solved. Sometimes documents from shipper are not fulfilled with requirements of the customs and truck will be stopped until correct documents will be received by the customs. Or sometimes weights of goods are less or more than it is informed in export documents. From one point of view scales can be broken, but from another goods can be really with different weights and error happened in shipper's yard. This spot is challenging, because the case company can only prevent all requirements, but cannot effect on the customs and internal rules of the customs. Corrective and prevent action can be occurred in rechecking export documents on loading date or earlier by manager. The documents should be consisting of needed information for the customs purposes with all relevant information on weights, quantities, the customs codes, shipper and consignee details. During March 2014 one case took place, when description of goods did not match with the customs code and border asked for detailed translation on curtain goods. Required information was asked from client and provided by client. The result was in delay on border, because the case company did

not recognize mismatch of description and the customs code. The shipper did not recognize contradiction between goods and the customs code neither.

The last point was ranked with 1,67. "Late delivery of goods, because of incorrect information" (number 12) occurred in the planning or on loading stages did not effect critically on delay of shipment. The client or the consignee was informed in time about contrariety on goods and delay was not a surprise for them. Both were aware about incorrect information, which did not effect on quality of delivery on behalf of the case company. At this point, information sharing with client was achieved, because of importance of the case.

Summing up, it seems vital from the point of view of the results of the current state analysis that preparation time, monitoring of the delivery and sending information to client should be better implemented than they were in season 2013. The identified problems need to be located in the current process and improved, so that this performance would not affect negatively on quality of the service.

3.3 Current Gaps of Transportation Process

If the current transportation process is assessed as for the quality of service at different stages and bearing in mind the gaps identified above in these stages, the picture for the current process is as follow. The key gaps are affecting the service quality at different levels. These gaps may exist between a 3PL service provider and shipper, shipper and consignee, and the consignee and 3PL provider.

The current transportation process was mapped and the gaps marked in the process, as shown in Figure 4 below.

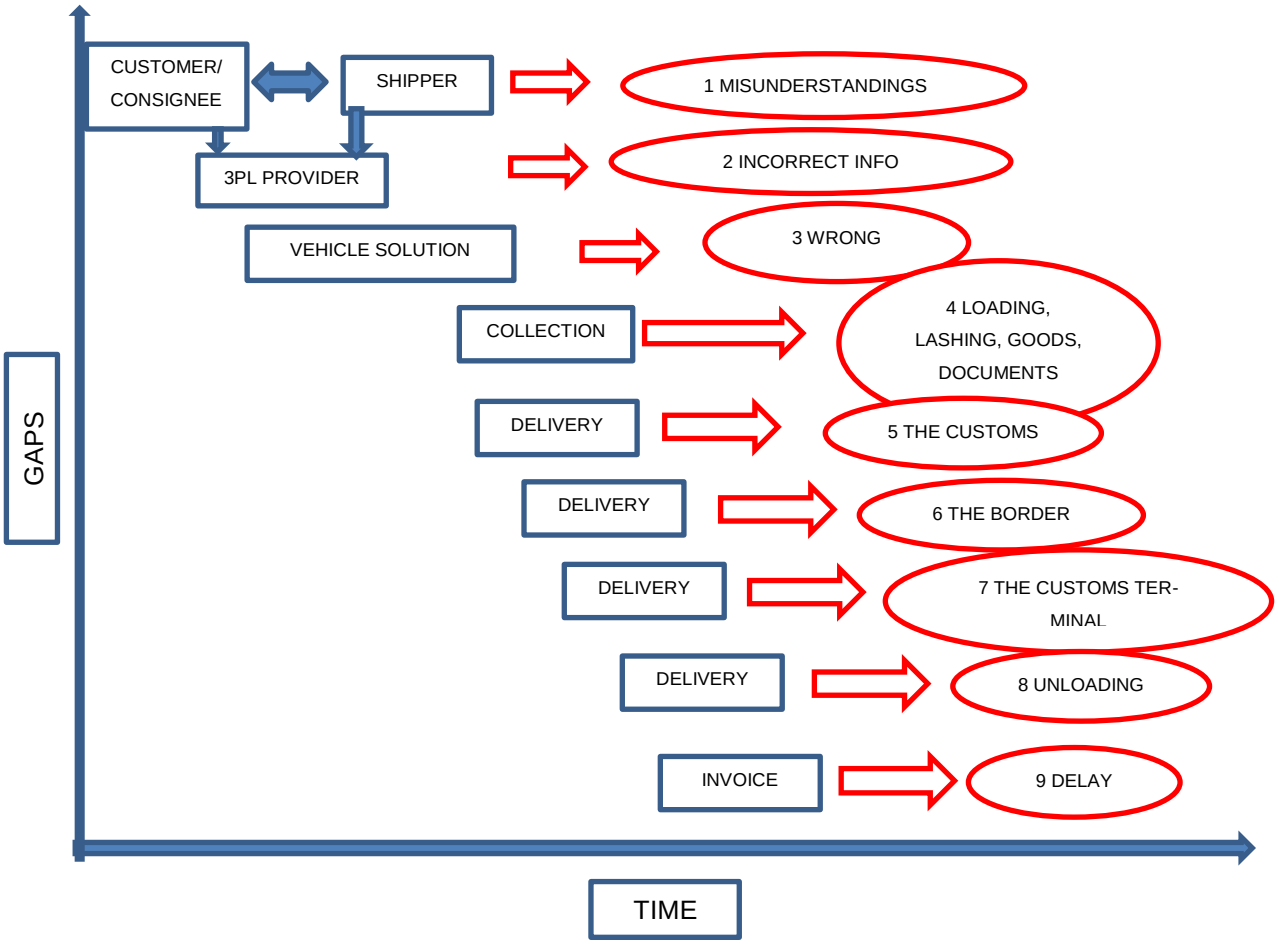


Figure 4. General gaps during transportation process.

Figure 4 shows a simple graphical representation of the current transportation process of any new delivery in the case company. It shows the stages in the transportation process located against the time on the horizontal axis and the current gaps marked red on the vertical axis. At the moment, the delivery process has nine identified gaps to be improved. The *Pre-ordering* stage is placed in the beginning (Customer/consignee). At this moment, the maximum number of gaps occurs in this level, in the beginning of the transportation details, and number of gaps goes to a minimum before the transportation process ends. Therefore, in the end, when client is invoiced, the only last gap that can occur is the delay of final documents to the client with the invoice.

To illustrate these gaps even further, Figure 5 shows these challenges in the transportation process on the example of the projects done during the spring 2014. To measure the performance in spring 2014, the first versions of check sheets were introduced into

the current transportation process. These check sheets were developed based on Section 3.1, identifying gaps in the current process, and introduced immediately, before the check lists were developed. The check sheets have the same nine gaps identified in Section 3.1. The results are shown in Figure 5 below.

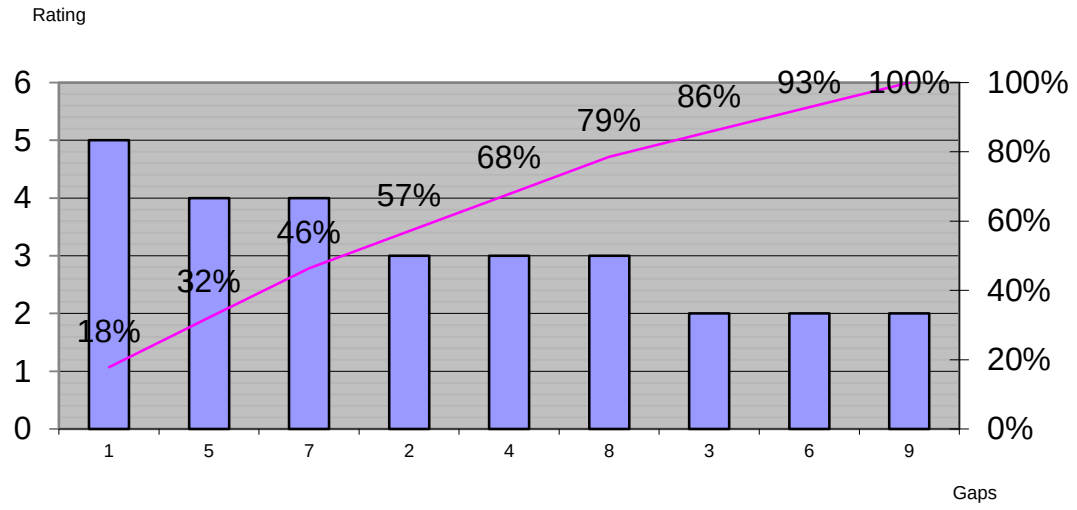


Figure 5. Gap analysis model from spring 2014.

Figure 5 shows the identified challenges in the projects in spring 2014. They included: 1. Misunderstandings, 2. Incorrect information, 3. Wrong vehicle solution, 4. Challenges with loading/lashing/documents, 5. The customs in the loading country, 6. The border, 7. The customs terminal in a CSI country, 8. Delay with unloading. 9 Delay of the invoice.

Figure 5 exemplifies the problems that occurred in the case company during spring 2014. This figure is based on the introduced check sheets and shows the results observations in the case company during March-April 2014. Figure 5 shows curtain gap on the horizontal axis and the gaps on the vertical axis.

The first and the main important gap, where order starts is *the misunderstanding between shipper in EU country and consignee in CIS country*, especially when it is the first transportation between the involved parties. Lack of understanding about the process, production times, lead times, costs and other details is vital for buyer and seller about planning the delivery further. If something is unclear to the customer, an actual shipper of goods can help others to understand details of the delivery through the case

company. In that situation, the 3PL case company may prevent and resolve misunderstandings between shipper and consignee. Additionally, the 3PL company itself may also have misunderstandings which are needed to be solved with client. Thus, false details occur with inefficient and incorrect information flow. The information flow is a key element in the order process, which has a great impact on total cost, operation efficiency and the quality level of customer service. In this beginning stage, it may lead to the loss of whole business between shipper and customer. During March 2014, five projects have started with misunderstandings on the shipment details and quantity. It could take about one week to resolve this issue to obtain agreements from all parties.

The second gap is the lead times, dimensions, weights, loading times on goods which are usually clear in the Planning stage and these details can be resolved before the actual loading. Later on, the same issues on the dimensions and weights may cause much more problems. The transportation company tries to confirm and recheck with the maximum obtained details related to the transportation process with all parties. Double-loop method is used in both directions, but something still can be changed later without informing the transportation company in advance on purpose or by coincidence. Incorrect information send to the 3PL company can be fatal and occur plenty of errors, which can cancel the total delivery. The planning process should then start from the beginning, with new details on shipment and loss of the first transportation attempt, and causing additional costs. This second gap means incorrect details on shipment send to all parties of delivery. The difference in the second gap compared to the first is when goods have been seen physically by the drivers. In the first gap, negotiations and confirmation occur when details are unclear, when goods may still be in production and physically goods are not ready, since the customer can order transportation in any stage of production of goods. During March 2014 three of such gaps were identified and measured in the case company.

The third and fourth gaps usually take place on the loading date. Both gaps can be described as the lashing and loading possibilities forgotten to be checked. Some specific tiny detail on goods such as value, weight, length, width or height may make a big difference if it was wrongly informed earlier. If specific part of shipment is, for example, bigger or more expensive than earlier, there are two main problems. The first is related to transportation permissions, which are applied in advance. The second is in lashing works, because sometimes there is no space to put securing belts or chains. As a result, a total change of truck is possible also, because goods simply cannot be placed

on floor. In spring 2014, there were two projects, when incorrect truck arrived to the shipper and nobody informed about the change. The transportation company itself has not checked that issue either. Another three projects showed that documents have been changed on the loading day. It resulted in value on shipment becoming high, and additional charges were needed to cross the border.

The fifth gap happens at the customs of the shipper's country. It may bring some difficulties to the transportation company, such as the truck's condition or absence of working side lights, incorrect export documents or false lashing of goods. It is also possible that the found malfunction is actually working correctly at this moment, but the customs thinks differently. So, misunderstandings with the customs can be mentioned as the fifth gap, which happed four times in March 2014.

The sixth gap is usually on borders with CIS country, where waiting times can be different or the customs of one or another country may find inadequacy on goods, export documents or condition of vehicles. This kinds of border challenges happened twice in March 2014.

The seventh gap is the waiting time on the customs terminal in a CIS country. If the arrival of truck is not informed in advance or a consignee was not ready or paid for the customs clearance of incoming goods, vehicles can stay in a terminal longer than one or two normal days. It happened four times in March 2014.

The eights gap is the unloading possibilities on the final consignee's site. Sometimes a consignee must order a crane for unloading the goods or some additional equipment. When a consignee is not informed about the arrival of goods on a specific time - the driver may wait or need to drive to another unloading place. All additional moves require additional costs and waiting time. At the unloading stage, documents on goods are passed from the driver to consignee. Sometimes the driver is not allowed to pass all documents, because the final consignee is not client of the case company, but a client of the case company's client. These kinds of difficulties in unloading happened three times in March 2014.

The last gap is usually the charging customer in time. The same leader of the project can be switched on a totally another project or may be focused on operational work. Therefore, invoicing from the previous project to customer can be totally forgotten. Sol-

vency of the company is on a low level without incomes. The request for the invoice from the client happened two times during March 2014.

Summing up, inaccurate transportation usually starts in the beginning, when the shipper and customer, and also the transportation company may not understand each other. An experienced 3PL case company may add additional value by improving the transportation process through checking carefully the nine gaps identified as the most frequent and typical in the transportation process.

The next section summarizes the current nine gaps into one current process flow and describes them from the point of view of the information flow in the transportation process.

3.4 Current Information Flow

The previous section has focused on the nine gaps in the current transportation process. This subsection maps the present information flow between the involved parties in the transportation process. They are described in Figure 6 (next page).

The challenges in information flow may be described as the tenth meta-gap in the transportation process, which summarizes the nine the previous gaps into one picture. As there are many participants in the delivery chain, from Placing the order up to Receiving the goods, there are also many documents required by different parties and authorities. The problem in the case company is that nobody is aware of all of these demands, so nobody is able to oversee the deliveries and take good care of the information flow. This section aims to clarify the requirements and preferences for the information flow in the process to better evaluate the risks and suggest improvements.

Figure 6 below shows the present information flow between the involved parties in the transportation process. Three colours are used in this figure. The green colour means a satisfactory performance, the orange colour means some challenges in that stage, the red colour mark the parts which are performed wrong. The blue colour describes the involved parties in the transportation process.

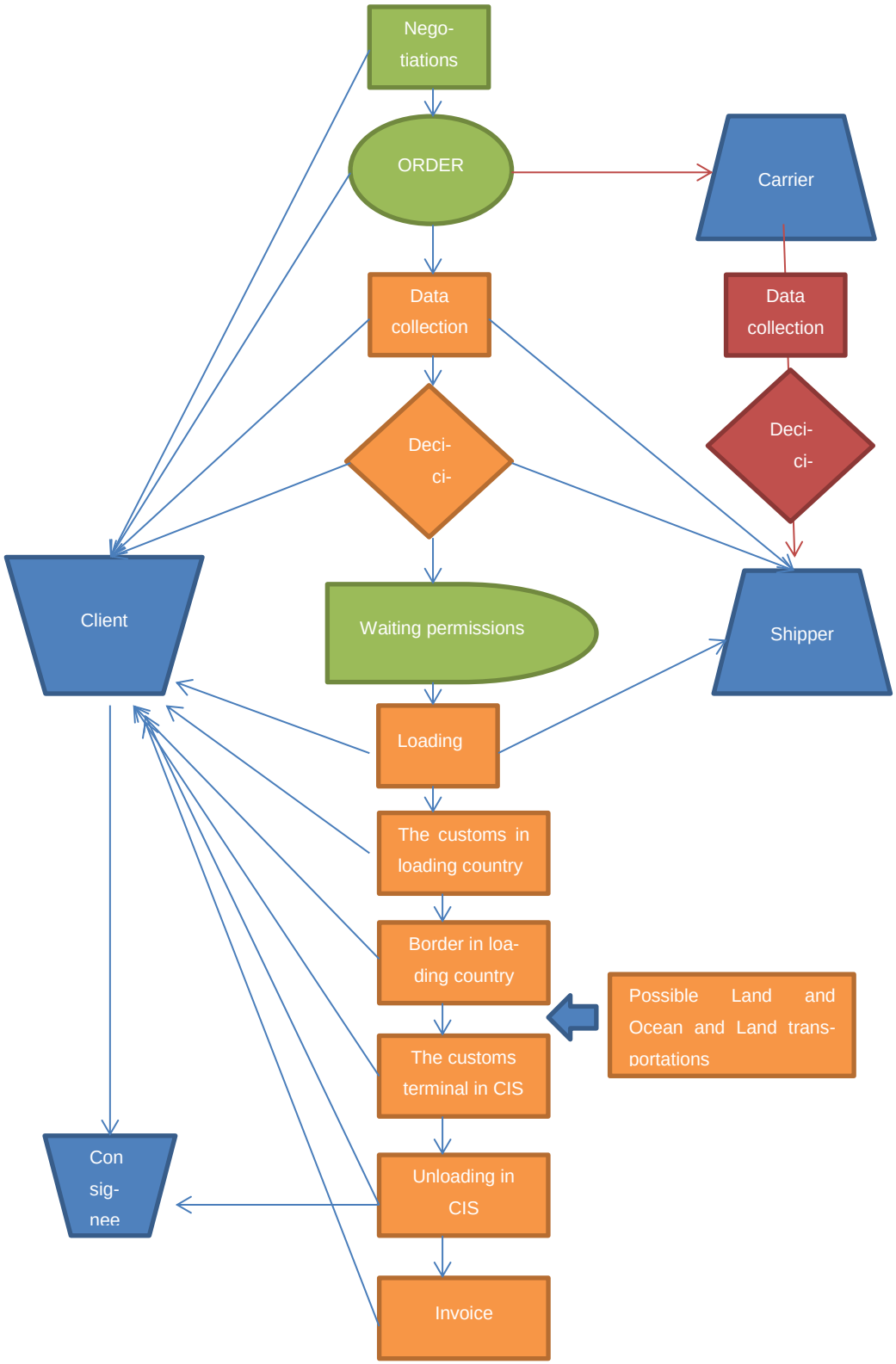


Figure 6. Current information flow.

Looking at Figure 6, the stages marked as those well-performed typically occur if only one manager monitors the delivery status through a close contact with the driver, shipper and consignee. The same manager usually informs client in time about the status on shipment. When more managers are involved into the process, gaps may occur and possibilities are high for the information flow to go wrong. Quality, costs and needed time are under the biggest risks to be completed incorrectly. It may happen because, firstly, the project can be received by any new, second manager on any stage of transportation, for example, if the first manager is absent or sick. The new manager may not know what has been already done by the first manager, and what was informed to client and what was not. Secondly, transportation can be divided into several stages, for example: land delivery, ocean freight, European land transportation and land transportation into a CIS country. And the current four stages can be controlled by four different managers, so the risk is high, with no special control tool, to move the project to any other person. Managers can talk to each other about the delivery project in the meetings, but sometimes not all information is shared. Something may be forgotten by one manager or another. All written instructions from the client or shipper are often stored only in the computer of one manager, who is handling transportation. This information is rarely shared with others. Thus, information sharing makes a considerable challenge in the current transportation process.

Moreover, monitoring the delivery status happens always with mobile phones and emails. Emails are used in communication with any freight agents. Moreover, the case company receives updated status from all the involved party in delivery, so that there are many updates needed and sent simultaneously. However, it is sometimes possible that the driver's mobile phone is switched off or network is not available, or the received information cannot be re-checked. In that moment, receiving information creates challenges and client cannot receive a status update in time. The status update is required always in a written text and on time. As a result, client receives the same incorrect information. During March 2014 clients received four incorrect status updates, which effected quality of the whole delivery and showed to the client that the case company has no idea where shipment was at that moment. The deliveries went smoothly otherwise, but the incorrect information flow gave a negative picture of the case company.

Finally, when the transportation manager share the preparation stage with the carrier and the carrier is in contact to the shipper, they often try to resolve all questions related to transportation by themselves. In this stage, the risks are too high that none of vital information goes to the case company, because the carrier discuss about delivery schedule with the shipper, and do not share all the loading details with the case company. The case company is not aware anymore of these transportation details, if such kind of model is implemented on the planning stage.

All these factors described in this sub-section add challenges to the information flow of the transportation process.

3.5 Summary of the Gaps

Table 3 summarizes ten current gaps and introduces them. In addition, the time of occurrence, meaning the stage in the process, and type of outcome or results are shown to demonstrate what will happen, if a responsible manager would not take the current gaps into consideration in the Planning stage.

Table 3. Summary of gaps.

Gap	Time of occurrence (stage)	Results
Misunderstandings	• During the transportation process • In emails, phone conversations, order, confirmations	• Wrong results or solutions for transportation process • Loss of time and money
Incorrect information from shipper, client, the driver	• During the transportation process	• Loss of quality, because information is not analyzed before forwarding
Wrong vehicle solution	• Loading time	• Loss of freight • Penalties fees xx% of freight
Wrong loading (stackable, too close to other goods)	• Unloading time	• Loss of total value of goods
Wrong documents	• Loading time • The customs • Border	• Demurrages • Loss of time • Additional charges
The customs in loading country	• On loading date on the next day	• Inadequacy of truck • Wrong lashing
Border with CIS country	• Delivery time	• Demurrages • Loss of goods

		• Additional penalty fees
The customs terminal in CIS country	• Delivery time	• Revers logistics • Additional charges
Unloading	• Final stage	• Lack of lifting equipment • Delays • Additional charges • Demolishing of goods • Unloading place may be different as it was informed earlier
Invoice	• After delivery	• Lack of liquidity • Frustration of client in delivery went smoothly • Client has no money

Table 3 summarizes the ten problems which is the most common gap in the transportation process. The same information on goods or delivery times or unloading places may be changed several times before the actual action on goods will be implemented during the delivery time. Documenting the changes may be totally forgotten and have not been informed about further for checking with client or shipper or another party. All these challenges are typically described by one word “misunderstandings”. In this analysis, they were divided into separate gaps and mapped on the current process.

Further on, the study mainly focuses on improving the information flow in the transportation process in the case company operations.

4 QUALITY MANAGEMENT IN TRANSPORTATION

This section concentrates on the concepts of 3PL and TQM, with special attention to the leaders in the quality movement such as Joseph Juran and Kaoru Ishikawa. This section explores how the quality in the internal processes can be improved.

4.1 The Conceptual Model for 3PL

Logistics plays a significant role in supply chain. It is a process of operations with purchasing, storing, transporting, consolidation and distributing of physical goods. Interaction between supply chain and 3PL is important, as 3PL companies collaborate with external companies to implement logistics processes, which have been performed between client and shipper earlier. The role of 3PL company is to define all needed information related to delivery, analyze it and to implement a reliable delivery process later. Client can freely focus on its own core competence while the 3PL provider implements transportation, with the goal of providing low cost and better customer service. To achieve all this Seth (2006) argues that it is mandatory to have required features to measure, monitor and control the quality of service. (Seth 2006: 549)

Based on Gunasekaran's (2003: 825) findings, transportation logistics includes everything from all of the information and material flows, from the movement of a shipment or from a service to be carried out, through the management to its delivery to the final consignee. Environment is highly competitive and many companies are aiming to obtain the global market share with high production and sourcing efficiencies. Logistics function must ensure the smooth flow of goods through a partner's supply chains, especially if logistics is on outsourcing. Logistics is defined and recognized as a critical factor in competitive advantage and outsourcing helps to achieve that status without additional operating costs and capital investments by manufacturer.

The general challenges, which arise in logistics, include inefficient operations, incomplete services, delays and incorrect flow of information internally and externally. This report explores the approach in utilization of seven "rights" (the ability to deliver the right amount of the right product at the right time at the right place in the right condition with the right information at the right price) in the case company by adopting possible information technology and processes. Information technology can be implemented

with customer's expectation and with minimum delays of the delivery of needed information and goods by themselves. (Lai 2004:149)

As Figure 7 illustrates, 3PL model can be defined though strategic planning, inventory management, transportation, capacity planning and information flow.

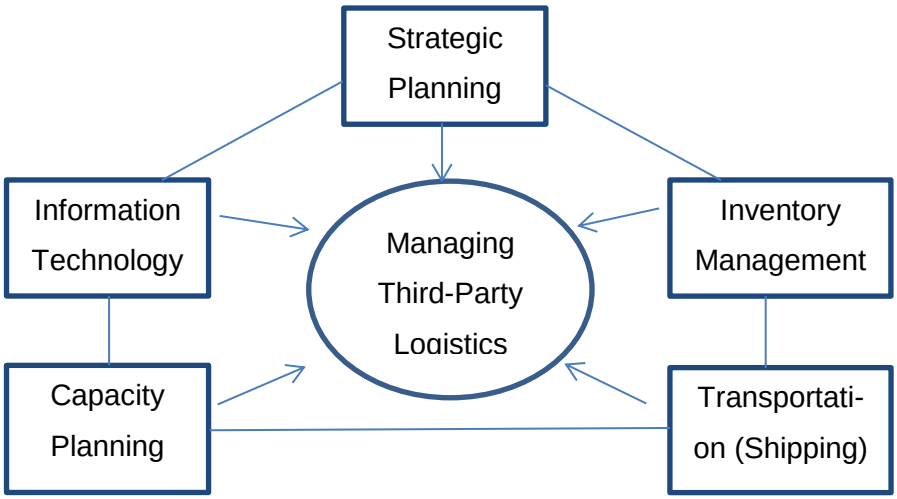


Figure 7. A conceptual model for 3PL (Gunasekaran's 2003: 832).

As shown in Figure 7, strategic planning involves long-term decisions from 3PL operations such as nature of the logistics business, working areas and budget. Inventory management describes coordinating, planning and controlling of material flows. Transportation or shipping explores scheduling of transportation and utilization of available space. Capacity planning defines the number of required vehicles and equipment for short-term and long-term demand for the workforce, for example, drivers. Finally, Information technology or systems contribute to all the above factors in implementation of logistics activities. Internet, extranet, EDI, WWW, ERP and TROMB can be involved as IT tools. These tools support information processing and communication technology. Tools allow the buyers and sellers to communicate directly through information channels with reducing coordination costs and fostering collaboration based on mutually agreed goals. (Gunasekaran's 2003; 831-832)

There are several approaches to understanding transportation logistics, and these approaches are discussed as involving the use of external companies to implement logistics functions, which have originally implemented within an organization. (Lieb 1992:

29) At the same time, the organization can outsource a part of logistics activities required to a professional transportation company to concentrate on the core competitive competences of the organization. In that situation, a 3PL provider will carry out logistics activities on behalf of a shipper or consignee.

Thus, a challenge for a 3PL company is considered as a set of specific tools, which every employee should take in advance while working in that business area. The general challenges that arise in 3PL are delays and inaccurate information, inefficient operations and incomplete services with possibilities of product damage, because the most part of vehicles are not equity of a 3PL company. It is not one specific area such as warehousing or only transportation or just packing the goods that is involved in the transportation process. Clients are also different and everyone has specific needs to fulfil in their competitive business areas. To survive in these conditions, a 3PL is suggested to take care of the five mentioned areas. Each area can be improved separately and TQM can help to implement them.

4.2 Total Quality Management

Total Quality Management (TQM) has been identified as the most important strategy for service companies. TQM practices help to reduce the process variance through introduction of transportation performance measures. TQM applications ensure that processes are followed and customers are satisfied. The successful implementation and adoption of TQM requires planning, time and effort. (Talib et al. 2011: 269)

Kordupleski (1993: 93) defines TQM as an interaction between the customer's needs expressed by customers themselves and internal processes of the company, with linking customer satisfaction and customer-perceived quality and measuring the impact of quality improvement. Total quality management is described by Foster (2010: 47) as a movement toward total involvement of employees, which generate total quality management. Foster (2010) describes three spheres of quality which are quality control, quality assurance and quality management, which are summarized in Figure 8 below.

Figure 8 Three spheres of quality (Foster 2010: 47).

One of the three spheres of quality is the quality control. *Quality control* is a set of operational techniques and activities to implement requirements for quality. It includes the phases of analysis, relation and generalization of detailed transportation process and performance of it (Foster 2010). The Analysis phase is divided into its fundamental pieces, which the process consists of. The Relation phase summarizes relationships between parts and pieces. And generalization includes interaction for quality understanding. The three phases can be discussed as a monitoring process, measuring process, reducing costs process, optimizing process, then performing, developing and maintaining control. Quality control is used to collect data on performance and understand missing or not working parts in performance process. (Foster 2010: 48)

Quality assurance is a set of tools to guaranteeing activities of the quality of service. It is related to design the service of quality challenges after challenges occur in process and found. Quality assurance can be designed with process improvement, design of new team and management approach and reliability in service testing. When roots of quality loss are defined, quality assurance may be implemented as corrective or preventive actions to avoid the same malfunctions in future. (Foster 2010: 48)

Quality management supports quality on all levels of process by whole management, not just quality managers. Foster (2010) argues that, first, all management is involved into quality activities because of further planning quality improvement. Secondly, it creates a quality organizational culture with leadership and support. Thirdly, training is organized to refresh process activities to identify core competences of employees. In summary these steps create a well organizational communication and information flow on internal and external levels. (Foster 2010: 48)

The notion of quality can be better explained if exemplified with the examples form the business area in the focus of this study. For example, the famous transportation company Fedex is known for its management policies and actions “People-Service-Profit”. Fedex is using their management evaluation system SFA (survey/feedback/action), which involves continuous surveys from employees and analysis from managers. The purpose of SFA is to develop a written action plan for managers to become more effective through continuous improvement. Secondly, the “Recurrence training” method is used in Fedex also to train frontline personnel. Thirdly, Fedex is known for replacing theirs percentage of on-time deliveries measurement on quality performance by 12-component index consisting of service quality indicators (SQI), which shows feedback on performance by customers. The company has based teams for each component of service quality indicator to ensure performance of company. Therefore, the principal of Fedex business is “Do it right the first time”, and it teaches employees the 1-10-100 rule. This rule explains the problem occurring in different stages. If a problem was identified and fixed right away, it costs some time and money. If malfunction was caught later, it may cost 10 times more to repair. The mistake will cost 100 times to fix, if it was identified by customer. (Foster 2010: 49, 53)

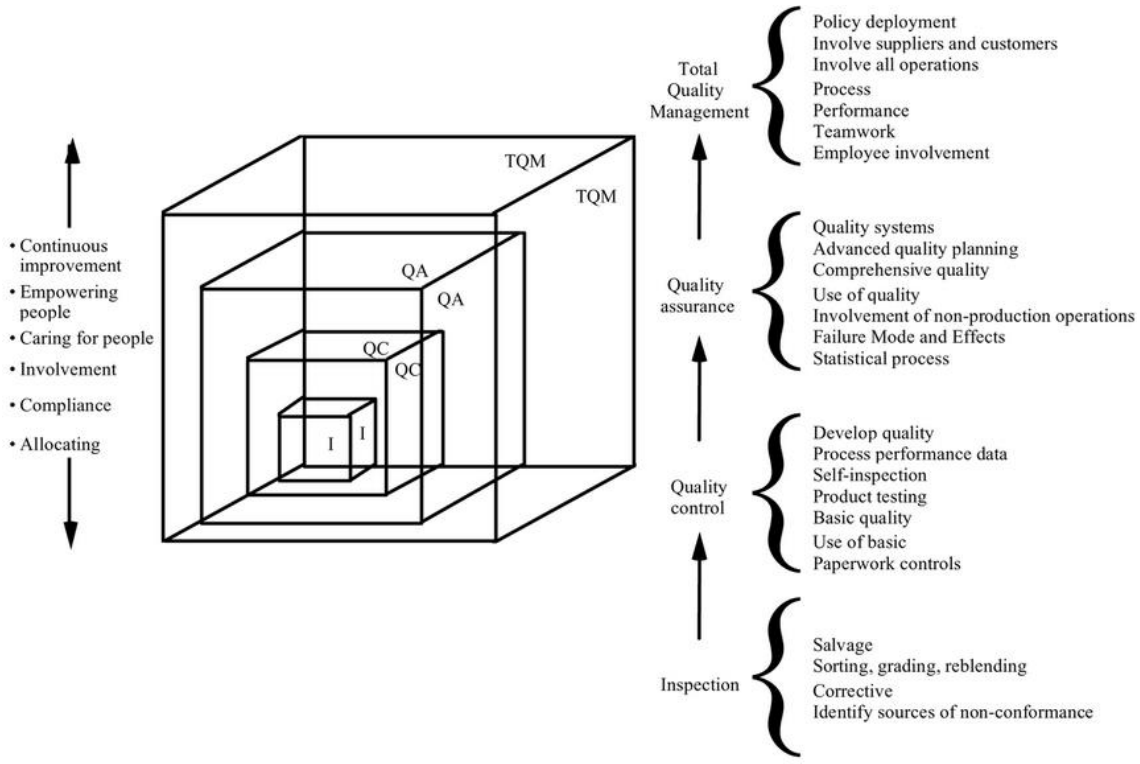


Figure 9. The four levels in the evolution of TQM (Dale 1999: 5).

Figure 9 describes another approach to quality management through four levels. In recent years, the inspection level has been replaced by quality control. The third level Quality assurance has been developed. All these three levels gathered together inside of one box used to base TQM. (Dale 1999: 4)

The *inspection*-based system is usually internal. Customers are not involved. In the service system, self-inspection is carried out by dedicated employee, who is named to that responsibility for the whole process. Goods, trucks, documents and other specific moments related to transportation process may be reworked or modified in the beginning planning stage before the actual delivery starts. (Dale 1999: 5)

Quality control includes testing and reporting activities of transportation process from collected data or feedback of process information. It tries to detect findings and fixing mistakes. Quality control is developed from inspection through methods and systems, use of information and the tools and the techniques and self-inspection by approved operators. (Dale 1999: 6)

Quality assurance is defined as preventing problems occurring at source. It is not enough to find and solve the problem. Problem must be guaranteed. Quality must be born at the design and planning stage, but not on later control stage. To switch detection to prevention requires a development of a totally new operating philosophy and approach, not just a set of tools and updated techniques. A new way of thinking required from each manager and employee to discover roots of problems instead of just pursuing the elimination. (Dale 1999: 8-9)

TQM is the highest level of quality management, which involves all parties of the organization with customers and shippers and their integration to the key processes on every level. TQM can be exceed to logistics as the mutual collaboration of everyone in an organisation and related business processes to produce services, which meet and excel the expectations and needs of customers. (Dale 1999: 9)

Summing up, two main approaches by Foster (2010) and Dale (1999) can be considered by the case company to start with improving quality in the transportation processes. Different cultures use various approaches in theirs specific ways to improve quality. The next section shows briefly the American way, the Japanese way and the European

way of quality approach. The European way especially is highly appreciated in the case company.

4.3 International Quality Standards

This part will shortly discuss about opportunities and challenges, which have been created by globalization. Although business areas are different and manner of doing business and quality approach varies from one area to another, three different regional types of quality approach can be distinguished in transportation logistics. Each country tries to protect its own culture, while at the same moment collaborating with other countries. All three regional types have a massive bank of knowledge on quality. This study focuses only on main principles to better understand quality in action, some of which are merged later in analysis.

4.3.1 The American Way

Several quality management leaders have been born in America such as Juran, Deming and others. Many military quality technics are also adopted in America firstly. In the beginning quality improvement in American way was based on statistics. Nowadays, the approach became to the behavioural level, because teams and other methods have been applied. Systemic issues are used better to focus on improving rather than tactical day-to-day problems. Approach of the U.S. has been more “command-and-control” oriented. It can be presumed as a result from a history of politics and military. Results are the most important. (Foster 2010: 95, 122)

4.3.2 The Japanese Way

Worldwide quality has been brought to a new competitive level by the Japanese. Their principal was to compete with the West market in huge numbers in electronics and vehicles. One of the approaches is to focus on detail to improve the process further. Process by itself became more understandable, when it is crushed into pieces. The Japanese land is much smaller than American. There is no space to produce waste, especially from raw material point of view. (Foster 2010: 107)

Lean improving method concentrates on reduction of useless waste, which does not add any value for customer. Such kinds of unnecessary steps should be eliminated.

Lean continual improvement approach is implemented in Toyota Motor Company and expanded to the rest of the world. Toyota was focused on continual reduction of trash. (Foster 2010: 108)

The Japanese approach includes an important aspect such as visibility. When problems occur in process, the first reflex of manager in charge is to hide the problems as they do not exist. In Japanese approach problems must be made visible and hiding problems must be eliminated. Another method is called “andon”. The delivery process must be stopped, when defect occurs in process. Defect must be identified and eliminated. Once problem is discovered and fixed, process continuous as normal. (Foster 2010: 108)

Another way to contribute in quality is to monitor in-process inspection or validation check list. Implementing in-process inspection help worker on each stage of process and the workers inspect their own work at the same time based on Fosters analysis (2010; 108.) Dale discusses (1999: 289) about highlights of a process, equipment, system and service, which can be ensured through procedures in operation, inspection and maintenance. Check-lists were discussed for Ahola Transportation showing a set of basic requirements for high-quality transportation process. Check-lists can be used to ensure quality in process in the case company.

4.3.3 The European Way

Europe is in different level of quality compared to the two above ways, and it is difficult to define. ISO 9000 family with standards is highly related to European way. There is a perception in quality world about Europe is behind the Japanese and Americans in quality improvement. For example, a European customer service can be considered on a low level if compared to the Japanese and American standards. (Foster 2010: 110)

Following the European philosophy, the case company organisation shows willingness to apply for ISO 9001 certificate. Therefore, this section describes a set of general requirements of ISO9001 with detailed focus on the sections related to improving transportation process. However, since this research is not creating manuals for ISO 9001 certificate, the overview of ISO 9001 certificate is only done to discuss the quality improvement and quality assurance.

ISO 9001 Certification as a way to improve quality

International Organization for Standardization is a worldwide federation of national standards. It prepares international standards through ISO technical organizations. ISO 9001 is described as “Quality management and quality assurance”. Effectiveness of organisation defined in determining and managing numerous linked activities. This activity requires transformation of inputs into outputs, which are arising in transportation process. Usually the output from one process leads to the input in the next process. Identification with interaction of these processes leads a company into desired result. To achieve desired outcome company must create a continuous control of processes. From TQM system ISO 9001 approach emphasizes such important understandings as: to understand and meet requirements, value addition in the needs of improving processes, process performance and effectiveness must obtain results and the last is continual improvement of processes, which is discussed later. (ISO 2008: 7-9)

ISO 9001 includes eight head sections to achieve TQM in company and lately certification for company. For each section the case company should provide detailed manual with action plan and descriptions of transportation process. These eight sections are:

1. Scope
2. Normative references
3. Terms and definitions
4. Quality management system
5. Management responsibility
6. Resource management
7. Service realization
8. Measurement, analysis and improvement

In the beginning “Scope” puts company to identify their needs to demonstrate its ability to provide transportation services, which meet customer. Scope is an area, where organisation can perform, when requirements are identified. At the same time organisation aims to enhance satisfaction of customer with strong and effective workable system, where are processes of continual improvement. (ISO 2008: 13)

Normative dated references shall be documented and provided for certificate. (ISO 2008: 15)

Terms and definitions shall be included into manuals. This is required for new employees in the company, which are not totally involved into internal business process of company (ISO 2008: 15)

Quality management system shall be established, documented, implemented and maintained in organization. The sequence and interaction of the processes shall be also determined with needed methods to ensure effective operation and control. All these are possible with available resources and information to support operations and monitoring of the deliveries. If company outsource some of processes it also obligated to ensure operations there. Checklist on the paper or as a software can be implemented in that phase. A map with critical gaps can be created for proper understanding of sequence in transportation. (ISO 2008: 15-17)

Management responsibility shall be provided through evidence of its commitment to the development and implementation of the quality management system and continual improvement. Management shall meet customers; establish the quality policy with ensuring that quality objectives are established and they are measurable. (ISO 2008: 19)

Resource management can be defined in two ways. Human resources are on the one side and technical availability of resources is on the other. Technical resources shall be provided to employees to support implementation and maintenance of quality. Basically human resources are defined through education, training, their skills and experience. Resource management is overviewed also with infrastructure of company with work environment. (ISO 2008: 23)

Service realization is planned and developed by company. It shall consist of requirements and objectives of quality management system, which are specified by customer. Basically, this section is an action, where physical transportation happens. This section considers all aspects of service and process design in addition to purchasing, control plans, setups, preventive maintenance, traceability and other details to producing transportation (ISO 2008: 25)

In the last stage measurement, analysis and improvement are needed to ensure and continually improve the effectiveness of the quality management system through tools as satisfaction surveys, customer feedback on delivered service quality and claims.

These methods of monitoring and measurement demonstrate the ability of the processes to achieve expected result. (ISO 2008: 35)

Summing up, there are various ways to approach quality. These ways also include the culturally determined way, for example, the Japanese, American and European ways to maintain and improving quality. Transportation process can be overviewed as a set of all these three different ways of quality approaches. The European and the Japanese ways create a workable, statistical and guaranteed quality management system without useless actions. The American way puts emphasis on the results of outcome from these two ways. The European way also includes quality standardization, for example, through ISO 9001 standards. Since this topic is important for the case company and the company aims to approach quality by complying with ISO 9001 standards, the next section merges TQM with ISO 9001 standards.

4.4 Developing Quality Management System

This section discusses possible approaches to quality development which can be utilized by the case company for the improvement of quality in the transportation process.

4.4.1 Continuous Process Improvement

Continuous process improvement can be described as a journey, where the final destination is never reached. One of the most popular approaches to quality improvement is a cycle “Plan-Do-Check-Act” (PDCA). If applied to the context of the transportation process, *Plan* means establishing the objectives for the transportation process according to customer requirements and the organizations polices. *Do* means implementing the transportation process. *Check* means monitoring and measuring the transportation process against requirements and reporting results to responsible parties. *Act* means doing and continually improving process performance. After the first result of expectation improvement is achieved it can continue further to obtain additional innovations in process. In its general logic, this model coincides with an international standard model, which is related to ISO 9001 certification . (ISO 2008: 11) This model is presented in Figure 10 below.

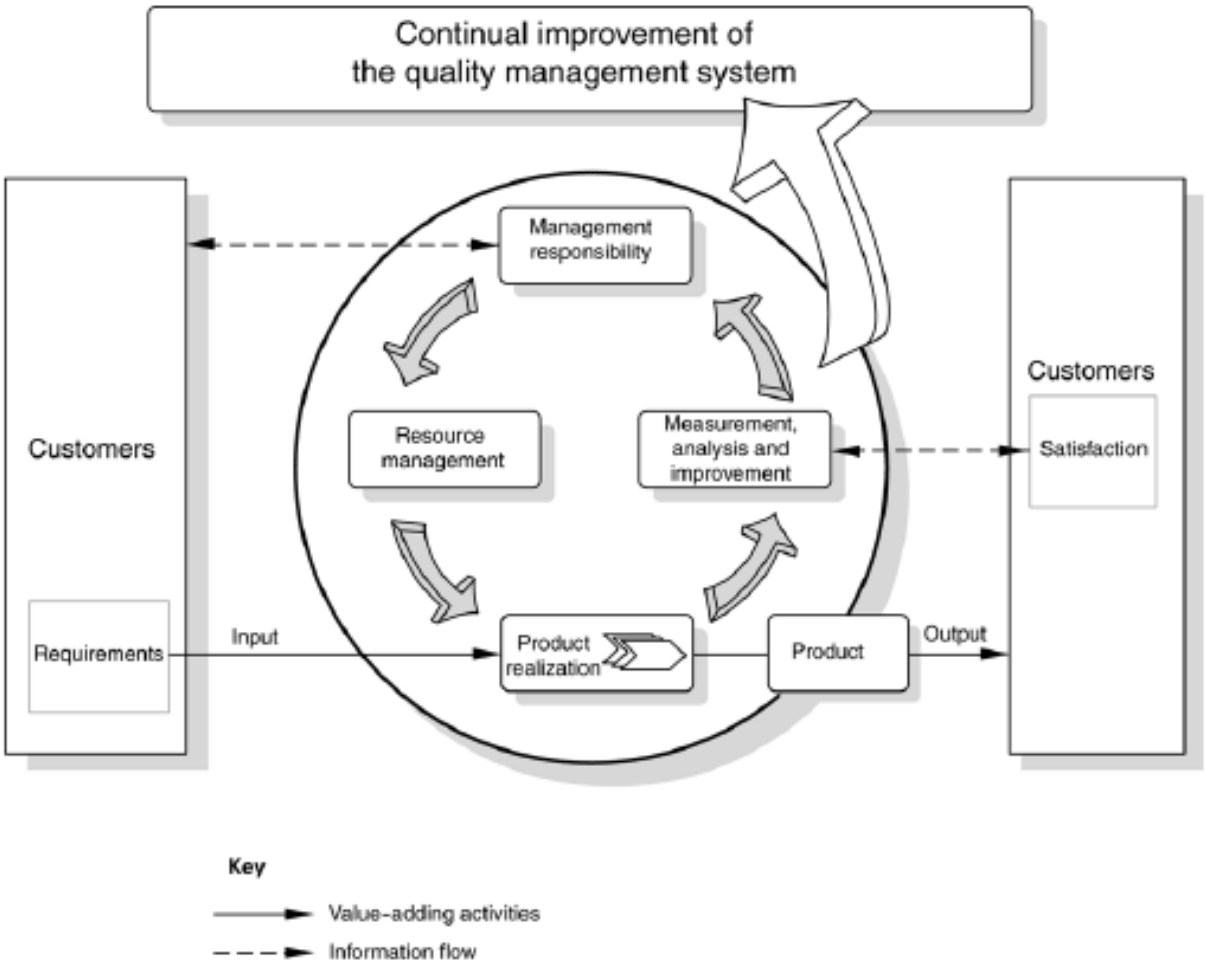


Figure 10. Model of a process-based quality management system (ISO 2008: 11).

The model shown in Figure 10 proves a significant role of customers in creating and defining requirements as inputs. In other words a process-based quality management system in Figure 10 starts with understanding of customer requirements on product or service in the top left corner from customer to management responsibility as an information flow. Quality Management recognizes key processes and document needed points. Management defines resources, quality objectives and manpower to realize requested product or service with already informed requirements on wanted output. The case company service is under process with all needed analysis, documents and measurements to define the better service for now. The output is showed in the right below corner, if value is achieved or not. Information flow is also sent to customer to receive a feedback on created product or service. If something is missed and quality level is not high or can be developed to achieve better monetary value. Management rethinks what can be done better to achieve new wanted level and continual improve-

ment of the quality management system can be started again to ensure effective operations on product or services.

Utilization of this general model can be overviewed as continuous quality management approaches. It is further explored in the next two subsections though discussing the quality leaders in the business world. Casadesus and Castro (2005: 345) overviewed the beginning of implementation of quality from one of these approaches, especially Juran and quality assurance, which can be implemented together with the standard of ISO 9000 family.

4.4.2 The Juran Trilogy

In Juran approach, three basic processes are essential for managing to improve quality. They are planning, control and improvement. It all usually starts from planning a new service, which is needed to meet customer's standards or new sales contacts or new tools to monitor delivery process. When the planning phase is complete, then it is just operational controlling of the new project. In control stage the quality gaps and new challenges may occur. Control versus breakthrough can be mentioned here. Control is to ensure stability of process with positive outcome. On the other hand, breakthrough improvement suggests a ready result with development for identified gap. However, control and breakthrough should occur simultaneously. When new gaps are defined improving process will start to prevent things from getting worse. Sometimes identified gap can prevent company from implementing large improvements, because future changes may be huge. "Project-by-project" improvement approach of Juran states to prioritize which projects must be improved first. This approach can be explained from two perspectives. The first perspective is of workers, which are implementing the language of things and actions. From another side management is thinking in the language of money. Usually improvements are under taken and prioritized in the way of financial return. (Foster 2010: 67-69)

Juran places quality leadership responsibility more on middle management and quality professionals. His emphasis is on reducing costs of quality, because language of management is money. (Dale 1999: 18)

4.4.3 Ishikawa's 11 Points

Kaoru Ishikawa's philosophy on quality improvement is summarized into Table 4. Most companies follow Ishikawa's tools in chasing continuous quality improvement.

Table 4. Ishikawa's 11 points. (Foster 2010: 72).

1. Quality begins with education and ends with education,	7. Put quality first and set your sights on long-term objectives.
2. The first step in quality is to know the requirements of the customer	8. Marketing is the entrance and exit of quality.
3. The ideal state of quality control is when inspection is no longer necessary.	9. Top management must not show anger when facts are presented to subordinates.
4. Remove the root causes, not the symptoms.	10. Ninety-five percent of the problems in a company can be solved by the seven tools of quality control.
5. Quality control is the responsibility of all workers and all divisions.	11. Data without dispersion information are false data.
6. Do not confuse the means with the objectives.	

Table 4 summarizes 11 points in quality improvements according to Ishikawa. For this study, the key message from this approach is that the workforce can improve quality and performance through commitment and implementing statistics. (Foster 2010: 71) The statistical quality control is everyone's responsibility to analyse and interpret information. To achieve utilization of these tools is possible through training.

4.4.4 Summary of Steps

Summing up, the ways of approaching quality management are suggested by Juran and Ishikawa, are discussed earlier. Each approach has its strengths in strong management, if management is committed and weaknesses in absence of well-trained the workforce in statistical tools. Juran's approach can be defined as project management. On the other hand, Ishigawa's approach can be defined as a statistical process control with continuous training.

One of the focuses of this Thesis is related to quality certification. ISO 9001 can be merged with two quality approaches of continuous quality management in Table 5 . However, cited point of view of Fine (1985) in Dale's book (1999) decided four points in common. Firstly, management is responsible in supporting of the workforce and participation in discussions, meetings and feedbacks from client. Secondly, training and education is needed for the workforce. Thirdly, careful planning and involvement of company-wide philosophy is required by quality management. Fourthly, permanent and constant activities of quality improvement programs are represented in organisation.

Table 5. Quality improvement content variables.

	Juran	Ishigawa
Scope	x	x
Normative references		
Terms and definitions		
Quality management system	x	x
Management responsibility	x	x
Resource management	x	x
Service realization	x	x
Measurement, analysis and improvement	x	x

Many differences occur in among approaches to the quality management. However, goal of the case company is to implement one of approaches or a little from each approach and create a totally new approach for itself. Anyway, table 5 shows two approaches are straight connected to the second focus of this report also in ISO 9001 certification. Juran's and Ishigava's quality management approaches can be considered to be carried out in the case company.

However, there were efforts to implement Japanese quality principles by Western companies in the 70's and 80's. The quality approach did not bring any success, because management was not often involved into activities. Therefore, quality practices stayed on hobby level. Even quality practices are still performed in Japan and results are visible, Western approach varies from Japanese, when commitment of management is absent. (Lecklin 2002: 62)

The next section describes Japanese tools, which are commonly used in quality control, quality assurance and continuous improving of quality.

4.4.5 Basic Tools and Techniques in Quality

The quality system is not a set of variables and relationships. It is an interconnected network of technology, procedures, markets, customers, requirements and people. The most aspect is the people, which is the engine of creativity and innovation. The technology is very good in performing transportations tasks, but technology of itself cannot innovate. The organization's potential can be unlocked in the way of managing people. The system includes people. This section presents the tools used in unlocking potential for change and improvement. The basic tools of quality are used in continuous improvement efforts. These tools are useful in all levels of organization. Kaoru Ishikawa has demonstrated in continuous quality improvement quality tools, which worked well also with Juran's framework. (Foster 2010: 317)

A process of continuous improvement is supported by a selection of tools and techniques. They have different roles to play in continuous improvement. In case of the case company continuous improvement of quality can be achieved with some of their roles. Firstly, tools and techniques can summarize and collect data on control level. Secondly, problems can be discovered and understood and then implemented into resolving action also in control level. Thirdly, roots can be identified and causes of problems can be removed in quality assurance level. Fourthly, process control can be maintained and monitored with these tools. Therefore, this section suggests to the case company to be aware of particular tools and techniques of quality also for improving information flow. (Dale 1999: 281)

The typical order of tools may be used in logical order. The flowcharts give to company a big picture of process to be improved. The checklist can ensure operation moments are followed and information is shared. The check sheet can be used to collect process data. Collected data can be analysed. The problems with process can be identified with cause-and-effect diagram. The Pareto analysis helps to prioritize causes. (Foster 2010: 317)

The process map can explain a transportation process with only one picture. The first step in improving a process is to build a map of process as it exists. In the case company this can be a gap analysis process map suggested in the CSA. The meaning of it is a concept what we must know before we can improve. (Foster 2010: 318)

The *checklist* or inspection is used to help the workforce. The checklist highlights the key points of transportation process, system or service in critical needs to ensure performance, operation or inspection have been followed. The checklist can be compared to ISO 9001 certification and may be used in audits of transportation process. This aid of checklists may have valuable support for Quality Assurance as a tool of monitoring process. (Dale 1999: 291)

The *check sheet* is used to collect data, which can be used later in creating analysis. The meaning of the check sheet is to identify common defects occurring in the process. The problems can be putted to the left side of the table and on the right side of the table user can check the moment the defect occurs. Time period can be decided freely. (Dale 1999: 293)

The Ishikawa ”cause-and-effect or fishbone” diagram is a tool to move on lower levels of process and solve the problems from there. Usually workers spent time on improvements efforts than on reasons. Fishbone describes a problem in the head of skeleton and major causes are on ribs of the fish with sub causes on the bones off the ribs. The brainstorming involves participant to identify major causes of the problem. On each circumstances leader should ask five “Why?” to identify reasons. When reasons are found management sets goals to eliminate the core causes. Fishbone can be used in logistics at quality control stage. (Foster 2010: 329-330)

Pareto Analysis is mostly used in quality improvement opportunities. It does not identify the defect, but identifies, which defect can occur in process most often. Quality problems can be found in economic concept, which Juran identified and named after Vilfredo Pareto. This economic concept is named Pareto’s law or 80/20 rule. The essential part of this model is related to transportation and founds about 80% of perfect transportations was implemented by about 20 % of workers. On the other hand 80 % of problems can be created by 20 % of causes or 20 % of customers can provide 80 % of revenue. It is a useful tool to consider a large volume of information into a manageable form. It helps to determine which problem to solve in which order at the same time making a prioritization on problems. (Foster 2010: 70, 333)

To be successful the case company can take advantage of these tools to achieve better quality and to satisfy its internal processes and finally customer through these tools. These tools can be adapted to the specific needs of the case company. Not all of these

tools are required in a single project. This sector has briefly introduced the basic tools of quality. The next section will discuss about typical gaps in transportation process, which are usually can be overviewed in content of quality tools as the most common ones. The same gaps occurring in the case company, but they were shown from different perspective.

4.4.6 Gaps Approach

The gap refers to the differences between wanted level of result and actual level of result. In transportation services it can be explained as the difference between expected and actual level of service provided. Once a gap is identified action and process can be improved. Services are intangible and gaps in communication and understanding between employees and customers have a serious negative effect on the understanding of service quality. Gap analysis is formal means for identifying and correcting gaps. (Foster 2010: 259)

Foster, Dale and Scherbakov overview five different gaps showed in Figure 11 (next page). All of them demonstrate differences in perceptions, which influence the quality perceptions in services. Several instruments and questioners can be implemented to identify the differences in perceptions between customers, between managers, between employees and, in the end, all these perceptions can be compared between each other. Figure 11 below shows each of five gaps discussed in the next paragraphs.

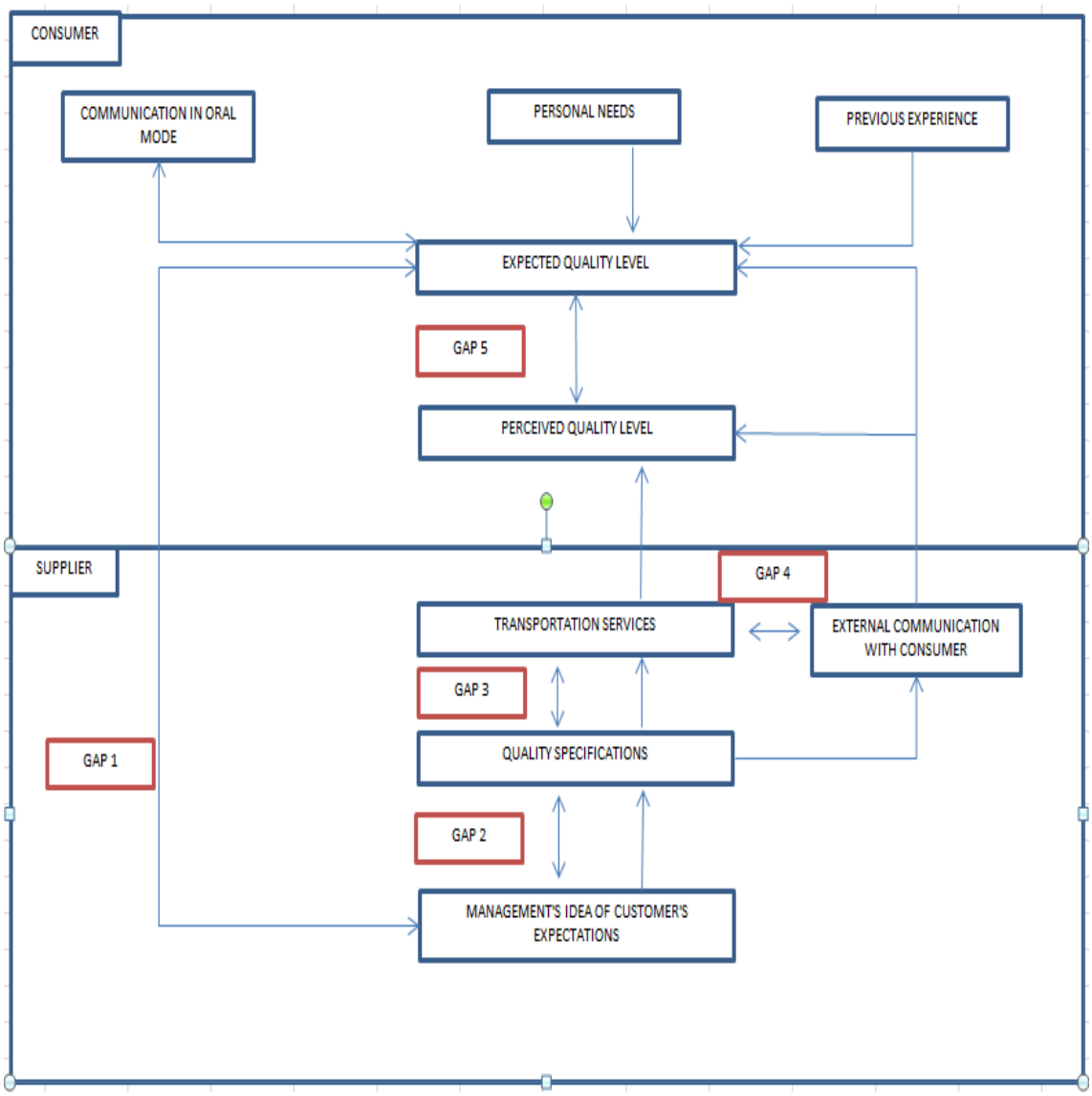


Figure 11. Model of service quality (Scherbakov 2009: 312).

As shown in Figure 11, Gap 1 shows the difference between the customer expectations and the management's idea of the customer's expectations, where misunderstandings of the transportation process, if applied to this study's context, can start. The customer's service should be improved through process improvement. To do so, the management should understand what customer wants. (Foster 2010: 259) Unsatisfied customers' needs exist because the management have not decided on a clear idea of the quality service. The reasons for this gap are non-effective benchmarking of delivery services, non-adequate quality evaluating or information channels or variety of hierarchy levels in the 3PL company.

Gap 2 explores the manager's expectation of service quality which may not match the customer's service quality specifications. Since even if the customer needs are identified, they may not be translated into workable service specifications. (Dale 1999: 184) The possible reasons are in: 1. Non-adequate evaluation of higher management of 3PL Company to quality specification, 2. Not enough action discipline to customer's order, 3. Absence of the target levels or clear instructions about the quality.

When a service specification is established, the delivery of the service quality is still not assured in third gap. The contact person of customer in the company may not be well trained or prepared to interact with customer. This performance can lower the quality. (Foster 2010: 261) The reasons for that may be in internal conflicts of the 3PL company is not fully implemented the workforce discipline or wrong carrier selection.

The companies influence the customers through the word-of-mouth and through media and advertising. Gap 4 shows the difference between what customers hear about company is going to deliver and what the company actually delivered. This gap means the difference between the external communications and the service delivery. (Foster 2010: 261) The reasons for that may be in absence of required technologies for internal and external communication or overestimation of service quality by the 3PL company.

Gap 5 explores the difference between perceived and expected services. This final gap can be described as merged Gaps from 1 to 4. The organization needs to identify all these five gaps, determine the reasons responsible for the gaps and develop solutions. (Foster 2010: 261)

The critical moment in each gap is the re-checking of the received information from the parties in the transportation process. Once information is received in any mode, it can be re-checked with others or with the sender for confirmation that everyone has the same understanding of the task. It is obvious that some information can be assumed in one manner or another. Hence, quality will suffer, if the result is not the same as it was requested or expected from the service.

4.5 Improving Quality Management through Information Flow and Monitoring

To achieve better customer service at reduced costs, organizations are adopting process improvement, improved control systems and IT breakthroughs in track-and-trace.

To obtain benefits from continuous improvement, measurement of logistics performance should be improved which can be done through improving information flow. .

It is hard to adopt only one quality philosophy. Successful companies in quality do not adopt only one concept of Juran's approach, for example. Each company is different and copy of only one concept of quality management can be a total fatal for performance. Contingency perspective means implementing of the various approaches of quality. It requires understanding of strong and weak sides of the company. This section shows possibilities in improving information flow and monitoring processes, which are needed to be solved in the case company in the beginning and then to move somewhere further.

4.5.1 Improving Quality Management Information Flow

The purpose of planning and control processes in transportation is to fulfil absent information using minimum of resources. Obtained information from input must be exchanged between involved parties. This exchange can be described as technical and organisational integration. If this integration is not filled well, Gustavsson (2007: 933) suggests about lack of quality through information gaps. Gustavsson argues that external integration with internal integration is a high quality of information. Lee and others (2002: 137) discussed about possibilities in assessing information quality through timeliness, reliability and accessibility.

Inadequate, inaccurate and insufficient information may lead to the waste of 6-10% of costs on transporting goods. (Thai 2007: 337) The information about shipment must be captured in a real time to make adjustments also in real time. Investments in IT and EDI are expectable to increase performance. With proper software many benefits might happen between to improve quality of performance. With early submission on cargo information any company have a better control in their own planning and management. The main purpose of control and management is to drive out the variability of collection, transit and delivery time, at the same time increasing the reliability of service.

Gustavsson (2007: 933) shows external and internal information flow must be in open access and discussed on person-to-person level with additional input of information to database. Otherwise problems and misunderstanding are visible, if only the second method is implemented. Regular meetings for planning information exchange could be provided on low and high levels of organisation. This need in meetings arises because

of complexity of obtained information. In the end of each meeting it is necessary to re-check with each manager that obtained and discussed information earlier is understood correctly. So, collaboration between all involved parties is vital.

Mutual understanding on internal level of each goal of project is compulsory to achieve quality. All departments must be taught to use information tools to succeed. Problems often occur between processes in different scopes. Final result of quality is different, when interpretation of transmitted information is different between manager and subordinate. (Kahn and Mentzer 1996: 6-14)

The communication technology by fax, mail, phone, e-mail, web portal or EDI has different influences on just-in-time delivery. Mail, fax and e-mail always may perform with some delay in information exchange. On the other hand, online communication results stays without actual longer delays. Lack of communication tools leads to information quality deficiencies. Well organized communication between staff mainly affects into collaboration between all departments.

The commitment of the top levels of management can be shown in investing into new information technologies. The efficiency and effectiveness of transportation operations can be improved on the outcome of information technologies. The commitment is the more important issue than trust in boosting information exchange. The strong commitment to the transportation process can be achieved through development of successful partnerships or collaborative efforts in IT area. (Moberg 2002: 758)

A communication group has been founded in Dutch K.I. Transport Company. The result of this group work was a better understanding of the problems that company have faced, if there was a lack of needed information. The target of that group is to improve communication, to ensure a faster data exchange about curtain transport tasks, and also to understand the importance of the data needed by transportation companies. The obtained information flow was analyzed from the beginning of an order to the final delivery of the goods to the final customer. The whole transportation process was analyzed and the identified areas for improvement were found. The output of that group was suggested to use the shortest driving distance with storage of goods in the warehouses of partners to save additional costs and time. The trucks are fully loaded and no space left as it was earlier. These results are possible through Internet based freight

tool. Transportation tasks have improved and loading, planning and executing costs have decreased. (IRU 2002: 32)

The Spanish TLS transportation company has started to work out the improving of working conditions through reducing the number of misunderstandings, accidents and promoting a high quality of life to its employees and business. The safety manuals with checklist were developed, which define and records the information on transportation operations and procedures. These inventions could continuously be updated, if action and other occurred gaps required that. All required procedures are implemented safety with support of manual and checklist. The responsible of employees is showed and the sequence of tasks shows, when those tasks should be executed in the checklist. This checklist with included procedures are explained to the workforce, when they join the company, when they change to different positions or duties, when new or modified equipment is about to take into use or when new technologies are adopted in the company. The results showed that this manual with checklist have improved quality of service with low rate of absenteeism and improved internal and external image of the company. (IRU 2002: 52)

The TLS company made an investment into “The New Information and Communication Technologies” (NICT) project, which is aimed to improve communication between centers, customers and the drivers. This project included improvements in the mobile communications with vehicles, in the local and extended network infrastructure, intranet and internet architecture and also communications with customers. This created the SMART computer application for transport business management made a possible communication between the vehicles and management and also between customers and management. The computer programmers were hired to adopt the necessary technology and solutions know-how to the workforce. Benefits for the company are easier control of the company’s objectives with better communication between clients, the customers and drivers. This new administrative process involves substantial reduction in communication costs. (IRU 2002: 54)

Swedish VSV timber haulage focuses in continuous development in offering harvesting and transport systems. The EDI computerized system were developed for communication and guidance in transportation processes. This system was called “TROMB”. This TROMB supports mobile communications and consists of a Geographical Information System (GIS), GPS, e-mail and emergency alarms. Every vehicle unit includes a varie-

ty of communication tools with monitor, GPS receiver, computer, keyboard, mouse, alarm etc. The transport planning with the distribution of transport orders go through TROMB with direct mailing. (IRU 2002: 56)

As a result of improvement of the information flow between all parties in the transportation process, the above mentioned companies have started to create IT solutions based on the computerized technologies for reducing transportation, communication and management costs during transportation process.

4.5.2 Improving Quality Management Monitoring

Monitoring of the transportation process requires a well-defined set of metrics to establish goals in organization. A metric is a standard measure to assess companies' ability to meet customer's needs or company's objectives. The monitoring of transportation process is a critical to measure quality of service. The statistical process control is a well-organized collection of problem solving tools. These tools can achieve stability of process and improve process through the reduction of the waste. Taylor suggests using seven tools of Ishigawa to monitor process. (Taylor 2007: 4-1)

The same seven tools can be implemented into reality through computerized technology. However, the United Biscuits took in use the satellite tracking in with addition technology investments. The tracking of vehicle and identifying tracking with provided data can be used to optimise efficiency and deliver operational benefits. The tracking system was installed on different vehicle units. This tracking system was also linked to the management system enabling real time and historic reporting of vehicle. In addition, to the real-time benefit of seeing the location of all vehicles, a number of daily and weekly reports were developed to enable further efficiencies to be gained. The use of satellite tracking brought savings of £200,000 to United Biscuits. The following benefits were achieved. Firstly, it was possible to change schedules and driving routes in real-time. Secondly, the visible improvement is to track and trace the vehicle. Thirdly, high utilisation of vehicles and reduced maintenance cost were achieved. (Clecat 2010: 27)

4.5.3 Conceptual Model for Quality Analysis

This section summarizes the approached and tools discussed above into the conceptual framework for improving the quality in the transportation process of the case company. The approach to building a solution for the case company is mostly based on the findings from Total Quality Management, with additional elements merged into this vision from some other areas of quality. Figure 12 shows the conceptual framework built based on the reviewed literature above.

Figure 12. Conceptual Model of a Quality Management System.

Since this study focuses on the basic tools of quality, the quality tools are placed in the Quality Control circle in the middle of the conceptual model shown in Figure 12. These tools are suggested to facilitate the case company's performance to design, build and develop the Quality Control on transportation processes. The CSA section showed that

quality tools can help the case company to discuss and communicate with related parties of transportation process, because the sequence of each identified part must be implemented according to the quality tool. Since the case company is a transportation company, the case company cannot forget the consignee, client or shipper. To improve the information flow, they must reconfirm required and needed information for delivery process. This can be done by following the process flow and checklist. Some detail on transportation can be gathered only from a curtain party. For example, the consignee cannot know the loading possibilities from the shipper premises. Therefore, the case company must communicate with all the parties related to the transportation process. It can be challenging and risky to give out all responsibilities to agree on the curtain route of delivery straight to the shipper or client. This can be grounded with two statements. Firstly, the actual carrier can misinterpret transportation details, which can add more costs to transportation process, or curtain agreements can be decided without the case company and new gaps will occur again. Secondly, the case company is not needed anymore, if the shipper and the client have straight contacts to the actual carrier. That's why the case company must be in contact with all the parties and information flow must be shared effectively with the involved parties in the transportation process. Such successful information collection and sharing can be done by the case company to another parties in the process through developing and following the process flow and checklist.

In Figure 12, another three mentioned tools in the Quality Control are the check sheets, Pareto Analysis and fishbone. The check sheets can be used to collect data from the curtain period of time. This data can be analysed and charts can be built based on the collected data from check sheets. Later, a fishbone model can be built to overview the most frequent gaps in the transportation process to be improved later.

The next external circle is the Quality Assurance with the six key factors from ISO 9001 certificate meaning the Scope, Quality Management System, Management Responsibility, Resource Management, Service Realization and Improvement. These six factors create a strong wall to keep information in the transportation process under control, if it is well documented and well used by the workforce. These six key factors help to keep internal circle of communication quality tools between the case company and shippers, clients and final consignees. The most important aspect in Quality Assurance level is understanding the required output result from the transportation process. Thus, information can be kept under control and European ISO 9001 certificate with six sections can improve performance of the case company. In addition, to prevent leak of infor-

mation Juran trilogy with planning, control and improvement processes reminds management about language of money, if incorrect action will occur in the third external level of TQM.

Finally, the conceptual framework also incorporates the results of the current state analysis from the case company. The color code is used for this purpose. The green color in the conceptual framework means well performed actions at this moment. The orange color means actions which can be improved and performed with some rarely mistakes. The red color means actions which must be totally improved. Therefore, usual questions are: Who is going to control the project and how process control can be done? Sometimes it is unclear, who will be the responsible manager for special transportation project without special instructions given to proceed. In the end no specific improvement is done, because there are no special marks from happened transportation and information is already forgotten after several weeks. Occurred information with mistakes is kept in emails of any involved manager and no action is done to prevent mistake from occurring again. Hence, occurred malfunctions and gaps during transportation process must be documented with quality tools to be improved later.

The target of developing the Quality Control is located in the middle. As a result of applying this framework, the number of gaps during the transportation process should be minimized to zero and the expected quality level should be achieved through communication, meetings and discussions in the beginning of each transportation process. Additionally, all information should be kept somewhere at one place for further modifying, adjusting or using information in the action of the transportation process, if responsible manager on shipment details will be changed during transportation process.

The next section utilizes this conceptual framework for the building of the improved transportation process through establishing control over the quality of performance.

5 Building the Proposal for Improved Quality Performance

This section discusses how to improve results and develop a quality system for the case company. This quality system tries to prevent the current gaps from occurring again in the transportation process. First, this study takes a look into the CSA results, specially focusing on the roots of the identified problems. Then, the study presents them in the fishbone model and suggests the process chart to improve the current mode of actions. Third, the checklist is developed to improve the quality in the current transportation process from the quality control perspective.

5.1 Fishbone

The current state analysis and surveys defined the gaps to be improved in the current transportation process of the case company. More important is to also take into account the causes and effects analysis of transportation problems in the case company. To help this, the Ishikawa cause-and-effect diagram can be used to illustrate the relationship between the results and causes in the transportation process. The causes and problems occur during the transportation process are summarized using the fishbone by Ishikawa showed in Figure 13 below.

According to Ishikawa, removing root causes instead of symptoms on the responsibility of each employee, not just management level. Therefore the sequence of continuous quality improvement is plan, mark and identify root and then improve and eliminate roots of problem. Additionally, it is also useful in promoting process improvement to use the aspects of environment, customers, including manpower, machines, methods and measurements suggested in the fishbone.

The gaps and roots shown in Figure 13 were defined in the CSA sections and collected in the one fishbone diagram. Brainstorming of the case company involved the employees to identify major causes of the problem. On each circumstances leader is asked five "Why?" to identify reasons. When the reasons were found, the management set goals to eliminate the core causes.

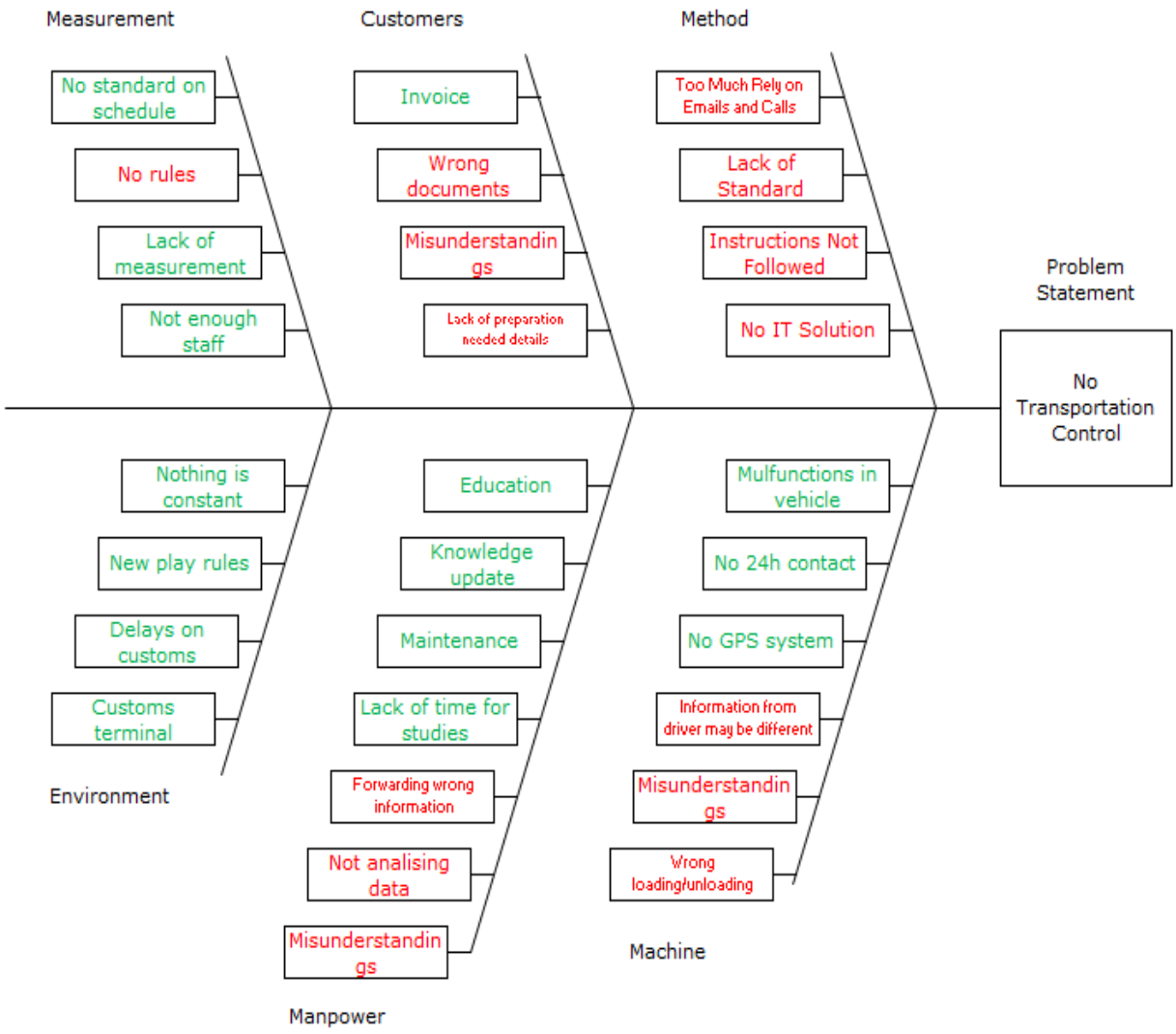


Figure 13. The cause-and-effect diagram of transportation process (Fishbone).

Figure 13 represents the causes and effects analysis of the transportation problems in the case company which can be improved. These gaps are collected from CSA of the case company and from surveys with employees of the case company, and illustrated in the form of a fishbone. This study is focused on the problems marked with red color, which can be improved with basic tools of quality.

According to Ishikawa,"cause-and-effect or fishbone" diagram is a tool to move on lower levels of process and solve problems from there and fishbone can be used on a planning level. Usually workers spent time on improvements efforts than on reasons

behind them. The fishbone describes a problem in the head of skeleton and major causes are on ribs of the fish with sub causes on the bones off the ribs.

Fishbone can be used in logistics at quality control stage for the already occurred gaps, as well as in the future. This tool can be used in the case company to identify all roots and later improve quality of performance, which can be updated monthly. Fishbone diagram is important in implementing quality control and improvement. Data collected with check sheets and showed in the CSA can be shown in Fishbone analysis model. Check sheets and checklists can later be used to collect statistical data.

Currently, based on above findings from Fishbone the pain points of red are unclear and pain points of green are clear. According to Figure 13, the main causes marked with red can be improved with the main five tools showed with red in Figure 14, which are not in use in the case company at this moment. On the external level in Figure 14, Control and Improvement boxes are also red. This means that Juran's two last points are not in use in the case company.

Figure 14. Building outcome from gaps in fishbone.

In Figure 14, there are five quality tools suggested from the theory for quality improvement through data collection, which are: *process flow, checklist, check sheets, Pareto analysis* and *fishbone.* The *process flow* comes first. This is a figure of internal transportation process flow of the case company can improve the understanding of the workforce, what steps are needed to be done next. The process flow is the first quality tool suggested by theory. The process flow can be a process map of gap analysis. Basically, usual gaps can be seen in one picture of the process flow. All critical gaps occurred in the CSA can also be shown in this picture of the process flow. Misunderstandings of required next steps of the transportation process can become visible for the workforce and successfully implemented with identifying required information with related party of transportation.

The main red paint points from fishbone can be also improved with the second quality tool - *checklist*. The most unclear issues and occurred problems of the transportation process can be written on the paper in written mode and followed to be solved in advance before occurring in reality. In that way causes can be prevented from occurring and guaranteed in advance. The workforce will not rely only on emails and calls. In that case the workforce has specific work instructions introduced with checklist, where specific problems and gaps are listed. At the same time the same standard of work method and work instructions can be followed. Lately, the same checklist can be rebuilt from paper to web based software solution. The rib of Method in fishbone model can be improved with checklist.

Actually, the checklist can be built in the manner to improve all six ribs with red paint points of the fishbone to eliminate upcoming gaps and problems. On the other hand, will the workforce successfully implement the checklist in each transportation process? Specific managerial roles for each party of transportation process can be added to the checklist with necessary interpretation of required action. In desired level only one manager can implement transportation process with support from management. Details on goods and details on the vehicle can be added to the checklist for preventive action. Forwarding received information can be also added to the checklist with related party from whom specific data is needed to be obtained.

Check sheets are used to collect data, which can be used later in creating *Pareto charts* and *fishbone* models for continuous improvement, which are already showed in this study earlier.

Summing up, the model of quality improvement shown in Figure 11 has five elements related to the most frequent gaps which need to be fixed for the successful transportation process. Thus, quality control and quality improvement can be improved in the case company by following the basics five tools of quality. Eliminating all five gaps is a hard work, but the advised five quality tools above can start this work, if required data is correctly collected, understood and rechecked in the *process flow* or *checklist*. These two tools will mark a good start on the long way of service quality improvement for the case company. These two make the most needed tools to cover the gaps in the current transportation process.

5.2 Development Ideas for Proposal from Interviews

The interviews were arranged with the partners of the case company. Interviews were held face to face and by phone conversations and through email with partners of the case company. The main questions concerned information sharing on the internal level with the partner's company, and a possible sharing of IT solutions and information storage from the beginning of the project to the end.

It is challenging to coordinate clients and employees together on one paper such as checklist, which can be lost someday. Thus, how the case company can merge all information together in one place and use it in further developing and as a leading tool in the transportation project? To build a mutual information system requires merging of all information from the workforce, practices and external inputs. Quality leadership base their success on sharing of information internally and externally. In the case company, there is an abundance of possibilities and the case company has potential to develop based on best practices.

Two main conclusions were drawn from phone interviews with clients which confirmed the findings from the theory section. The first is that quality perceptions are derived in the transportation process into the service and the service outcome. The second perception of the customer with the quality of transport services result from comparing them to the service expectations with before the actual service experience. For exam-

ple, one company outsourced transportation services for several years. During several years the most transportation details were well-known to the transportation company and no additional questions arose. But changing the transportation company for a totally new one, the transportation details must be negotiated from the beginning. Identifying critical issues in the customer transportation needs will take some time to be aware of all of them. The same two challenges were identified in theory section.

As benchmarks collected from the interviews with partners, the container lines use *SAP information system internally for their daily operations with curtain sequence of required information*. This IT solution is based on *real-time update of information*. All colleagues from all sides of the world are able to see new and updated shipment information at the same time, while another of their colleagues is inputting updated new situation on container from country of departure. SAP is a general type of software used by several logistics providers for all procedures, from order booking to invoicing.

In some software systems, management is planned so well that client can even check fuel consumptions. Software of Ramevrotrans and *Protect systems is integrated with the drivers pocket computer*. Orders and updated information is available anytime with *real-time availability*. The driver is only checking the quantity of goods before collection from the pocket computer and confirms pick up after goods were received by the driver. One internal computer system tells also to account manager of customer that goods were received and no call to the driver needed. The biggest part of big logistics providers such as DHL and TNT have adapted new IT solutions for stable information sharing.

The European trucking company Ewals could not find any workable IT solution from already existed IT software and has decided to create their own software only for project management, information sharing and monitoring needs of trucking. Software is based on *internet browser*. Employees or clients have access from everywhere via internet connection to check status of the shipment. Monitoring is focused on GPS technology signal, which is located inside of trailer.

TNT have implemented an IT solution for pick up orders. The customer *inputs all required data in software* through internet browser and e-mail notification goes immediately to shipper about pick up of the shipment. The shipper confirms readiness of goods by clicking on the link in confirmation e-mail. TNT's database adds ready ship-

ment on collection list and the nearest truck collect shipment soonest. In this method of collection all responsibility goes to customer or shipper. TNT is not responsible on incorrect information provided by other parties and uses little time to solve misunderstandings, if shipment details are not inputted correctly into booking database.

The case company has tried several IT software solutions to control its transportation process, but none software matched the needs yet because the needs of the company were different. The hope is that, with identifying the gaps and better formulating the requirement for IT software development, the output will be like in Ewals Company. The case company can start creating of their own software with IT experts for a support. Development of software by outsourcing internal IT services may be a workable option. The problem is in the specific sequence required for the transportation process, so that the results of the study can help to solve this problem.

5.3 Suggestions from Interviews

Based on the results of the interviews and discussions with the colleague and customers, the following suggestions how to improve the quality of the current transportation process were suggested.

Firstly, the transportation process flow can be improved and updated. The improved process flow can also be used as guidelines for further creation and adaptation of IT software for the case company. Documents can be stored in this software in one place and can be overviewed in any time from any place. The biggest part of misunderstandings between the internal offices on the case company can vanish with the support of such kind of IT software. Information and instructions will be updated automatically, and the specific planning sequence of transportation flow is checked on each check point. Therefore, each stage of transportation process can be implemented and nothing is forgotten, even if there is a need to confirm some specific part and add additional information of goods, loading details, etc. The interviews showed positive attitudes towards introducing IT technologies to control performance in the company's transportation practices.

Secondly, to fulfill the temporary absence of IT software with the specific check points, a checklist or action plan can be created for successful implementation of transportation process at this moment. It will equip the workforce with clear instructions and

standards for of implementation transportation process. Each stage of process can be marked or checked, if this stage is implemented accurately. If misunderstanding happened, a mark of deviation can be settled. With this action plan the case company can achieve quality control and obtain further bottlenecks and roots for further corrective and preventive actions on quality assurance level, when gaps and problems are documented.

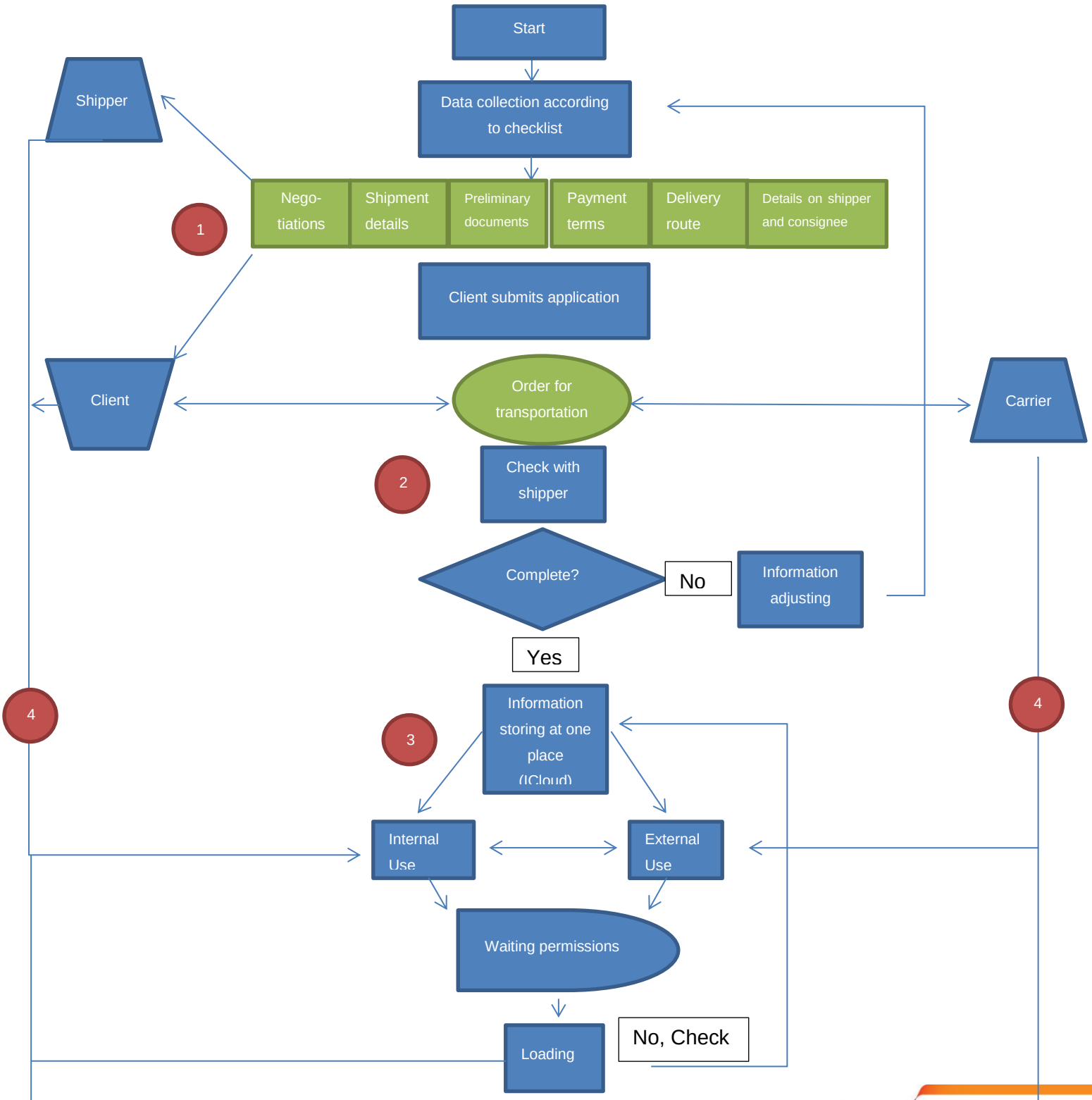
5.3.1 Process Flow

In CSA section, the current process flow was introduced to underline its most critical moments. To improve the current process flow even further, this section goes back to the results of the current state analysis and focuses on improving performance through mapping the gaps in the information process flow for creating the improved transportation process.

A primary suggestion for the case company was to start the transportation process through receiving and sharing data on transportation request and transforming it further in order to proceed with transportation process preparing. After all the data is obtained on the quantities, numbers and descriptions specifications on goods, the received and analysed data should be transformed into workable information and shared with shippers, consignees, the drivers, colleagues and the rest involved parties in the transportation process.

Next, information process is a process where analysed information is overviewed as an object, which can be changed later. Primary observations and survey results proved that information on goods can be changed and nothing is constant. This fact must be recognized and adjusted to in the transportation process. A special concern in the transportation process is the big amount of such information. Therefore, four different levels of handling information are recognized in CSA and updated in Figure 15. Firstly, *information on deliverable goods* can be collected from the original place of it creation. Usually it is shipper or manufacturer. Secondly, received information can be analysed and confirmed. Thirdly, accumulated information can be storage preferably in one place, from where information is easy to update and recheck. Fourthly, final information can be transported and shared with easy access. In the language of TQM, this is the sphere of Total Quality Management, when everyone has a constant access to the required information, where the correct information is the information with seven

"rights". In other words, the case company needs to have the ability to deliver the right amount of the right product at the right time at the right place in the right condition with the right information at the right price. The suggestion of the improved conceptual model of the process flow is showed in Figure 15 below.



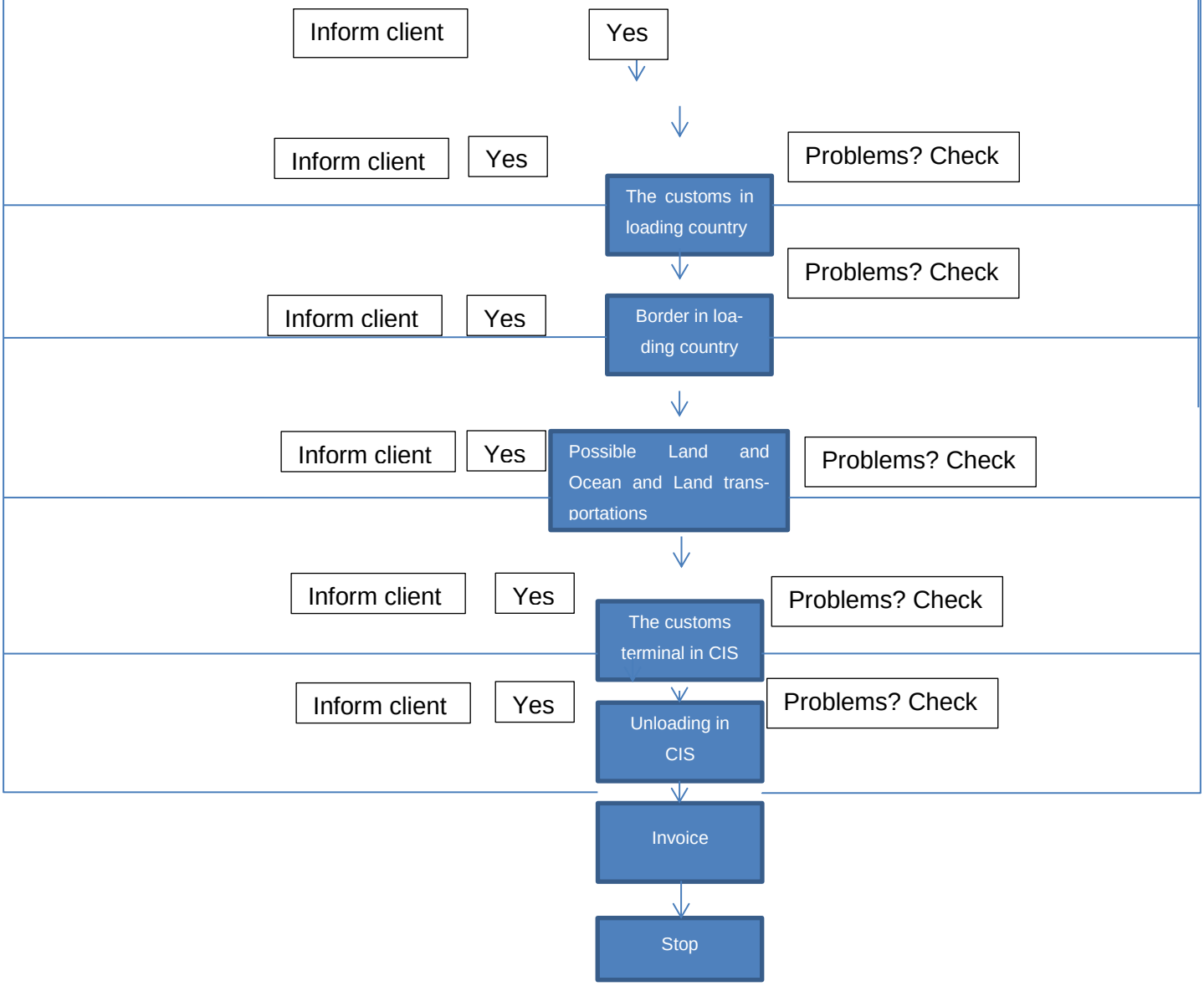


Figure 15. Information flow in the transportation process.

In Figure 15, the transportation process starts with obtaining of the required shipment details. These shipment details must be received from shipper or manufacturer and rechecked with client that the same goods are needed to be delivered. So, constant contact must be with shipper and client in the planning stage. When details are received, final order with required details must be send to the case company and actual carrier. Later carrier can recheck with shipper the same shipment information, when the case company have done it, not before, because the several gaps may occur there, if carrier is requesting on goods by himself. If there is a small chance of hidden information the data gathering can be started from the beginning. But if all required data is

correct and well collected, it can be saved in drop box or iCloud or IT software with constant access and reliability.

From this storage bank information can be overviewed by shipper, client on internal level of information, where all gathered data is collected. On the other hand, carrier can overview the same details with limited access to the same storage bank. From quality perspective the case company is sharing all elements with involved parties all the time during transportation process and none of parties can say anymore that something was not told to us. Basically, an expected level of service can be understood as a perceived level of service without any further misunderstanding. So, all the time customer, carrier and shipper are aware of any action related to goods. It could be better to add for example email of contact persons to this IT software, if something new information is added notification of new information automatically goes to all parties. But sometimes not all information can be shared between all parties, because of confidential issues.

When everything is clear to all, preparing of road permits or booking of transport can be started. Two-four weeks are required for preparing and loading can take place. After each stage of transportation, software can help to check curtain points, which must be marked by responsible manager. Information can automatically send to client from software. For example, loading is happened, the customs formalities in loading country are finished, border is passed over and goods are arriving to the customs terminal. After each of check point message goes to client and software is updated with new status with particular time of checking, which can be overviewed later, if misunderstanding occur. If some problem happens during delivery time, it can be also added to software. Documents can be taken from software, if something is forgotten or left in the office by the driver or another manager. This solution can be workable on border for example during night time, when responsible person cannot answer on phone to resend documents to the driver. In these occasions storage of documents and vital information in one virtual place is helpful.

Summing up, the improved process flow represents an updated possible solution for minimizing any new gap from occurring during transportation process. If account manager understands transportation order requirements correctly already in the beginning, these requirements can be shared with other for smoothly preparing of the transportation. If the transportation specifications are clear, the transportation can proceed with ordering and loading, and delivering can proceed successfully. In the end, expected

level of customer can be achieved. Ideally, this success can be achieved by intruding an effect IT system. However, since creating and adopting this kind of IT software in the case company might be challenging and costly for a middle size 3PL, this study offers another solution instead of software. This solution is called a checklist or an action plan.

5.3.2 Checklist

The checklist as a solution for the transportation process derives from all the approached discussed in the theory section. The Juran Trilogy suggests approaching any process with planning The checklist can also viewed as the Juran Trilogy of planning, control and improvement phases. The same is suggested by Ishikawa. The first step in quality is to know the requirements of customer. The same start is discussed in manual of ISO 9001 certification – know what customer wants and prepare for long-terms relationships. Planning of transportation process include variety of details to be checked. Similarly, like in the Japanese way of quality, process must first be crushed into pieces to decide what is working and what is not working.

As a result, this study suggests a constantly updated checklist or action plan. Checklist is established as the quality inspection protocol of the case company in Appendix 3, which shows the set of basic requirements for the high-quality transport process. Checklist is in Excel format created table, which consists of six key areas, which are required in transportation process of the case company. The checklist is based on the gap analysis and incorporates the nine gaps, identified in the current state analysis as a quality tool. Checklist is a one-page document with nine gaps descending to six important stages of the transportation process. These six stages of transportation process are also highly relevant to ISO 9001 certificate stages, which consist of eight stages altogether, but six of them are strongly related to the same purpose as in checklist.

In the checklist, quality improvement in the transportation processes is focused mainly through overcoming the critical check points in the transportation process with monitoring and gathering correct information and sharing with responsible key persons in the process. The key stages in the checklist are overviewed below.

In the first stage of the transportation process all vital data must be gathered. It can be done in different ways. For example, TNT has put a client to fill all data in order and the

case company can perform at the same level to avoid misunderstandings and identified the first two gaps. The shipper must inform dimensions, weights and quantity of goods by himself. Sometimes details on goods are not even checked by the shipper, because the shipper relies on information from the Russian consignee that everything is correct. Sometimes the employee of the case company must go on site of the shipper to re-check and confirm validity of goods. That can be performed when goods are challenging the transportation, because, for example, the shipper does not always know if goods are stackable or which critical point of the shipment is the most challenging for transportation. Loading times must also be acknowledged in advance with the shipper with informing on the vehicle type to eliminate the third gap. Road permits must be re-checked before the transportation starts, because sometimes there are also mistakes. Finally, the contacts of the driver must be received to have a straight contact for any matter.

The second stage usually takes place on the loading date. The driver must be aware of loading goods to automatically check that correct goods are under loading to the trailer. The shipper and the driver must have the mutual understanding what is going on at the loading date. Received details on goods by the driver must be rechecked after loading with all the documents. If well performed, these actions can eliminate the fourth gap.

The third stage usually takes place on the customs terminal. Export documents for the customs must be rechecked with client for confirmation. At the same time, the condition of the trailer and lashing works can be rechecked to avoid additional questions from the customs. When confirmation is received, the trailer can continue to the customs in the country of loading and then to the border. The fifth and sixth gaps can be eliminated with simply checking the documents and conditions of the trailer.

The fourth stage takes place on the customs terminal in a CIS country. The trailer with goods should arrive at the terminal with notification. The customs broker and the client must be informed in advance and they must prepare the customs costs and import documents for clearing goods in use. Informing the client well and in advance can save a huge amount of euros on demurrages charges. Thus, the seventh gap can be eliminated by informing the client.

The fifth stage takes place on the unloading time. This issue can be resolved on planning the stage by identifying the unloading possibilities and places. The eight gap can be resolved by inquiry with the involved parties.

The sixth stage is the final one, where the transportation process is finalized. All the required final invoices and stamped export documents must be send to the involved parties. The transportation invoice is charged from the client and must be send in time after the transportation is finished. It depends on a contract, but usually the invoices are send after the delivery. Changing the terms of payment with the customer towards pre-payment term can be a positive solution to the case company.

At the end of the process, a manager or management can re-check the whole transportation process by the marks in the checklist. A responsible manager can take notes or mark on a deviation if something did not work as it was planned. Data must be collected and summarized in the end of each delivery and marked on the checklist for further improvements. By doing this way, the roots for the current gaps must be eliminated and continuous improvement is initiated in the case company.

Summing up, implementing total quality management in 3PL requires eliminating of all the discussed gaps. The greatest part of these factors can be improved by training the workforce in using the checklist. Some specific details can be developed and further added when working more with the checklist. So far, the check was put to the initial trials and validated with the company. The results are discussed in the next subsection.

5.4 Validation and Final Proposal

The outcomes of this study can be overviewed from two different perspectives. The first perspective is in point of view of the beginner or a new employee in the case company. The second perspective is the point of view of the experienced employee. This logic was used for the actual validation of the proposal for which these two types of the employees, on the suggestion from the management, were selected.

According to the initial discussion on the primary experience of the checklist and check sheets, collected from the interviews and discussions in the case company, an overall suggestion to keep both tools was accepted and approved of. Then, it was decided to evaluate the tools in more details, and the tools were discussed in details from the two

points of views: the beginner's and the experienced workforce. The beginner said that he can learn the company's transportation process through the checklist and define the new gaps to prevent them from occurring. The beginner automatically can fill in the checklist out to keep the transportation process in order. There are no claims from the management and clients indicated yet. The beginner copied the most vital questions from the checklist and created a template in the Outlook for his own use in communicating with the shippers. Thus, his feedback was fully positive and the checklist was immediately taken to use.

Two experienced employees suggested to develop the Proposal even further and build two additional checklists. The first checklist can be used for the normal and easy transportations, which can include half of the already included information, since the other half of information is not relevant for the simple transportations. The second checklist can be utilized as it is presented in Appendix 3 for the complex transportation projects, because these difficult or oversize transportations require a lot of check points to ensure quality. Thus, they also approved of the proposal but recommended to adjust it to various types of deliveries.

According to one of these experienced managers, the checklist is correct but does not add much help to him, because he already remembers all these gaps and intends to stay as the only project manager in his projects, thus sacrificing his working time for maintaining the checklist is not considered important, from his point of view. Thus, it has a message that continuous quality improvement through implementing checklists and modern IT tools may take some time in the case company.

A few other employees, however, who participated in the general discussion, supported the idea and suggested updating the checklist from the current general level even further, to a more detailed and specific level, and take it into use. They plan to adjust it since various projects have various checkpoints and the employees already remember some gaps in their mind. The second suggestion was to improve the checklist to become better visualized, because a lot of information is placed in the checklist and it is challenging to find a particular row to check, and the check point can slip to another row. Text was recommended to be moved more to the right side for the check points.

The informants, however, said that this checklist can work with positive results and each logistics manager can use it starting from the Planning stage with important ques-

tions to be resolved. The participant also appreciated that the checklist makes a tool to document the current transportation process for later analysis and improvements in quality. It was decided that the checklist can be taken into use in its current form already now, and in the future it should be developed further to a more visualized and workable solution for the transportation process, and as a preparation for IT software changes. The changes were advised by a few experienced managers because of either simplicity or the complexity of certain deliveries, compared to this generalized solution. Their recommendations were collected and will be used for the development of an IT solution, with various transportation templates. When a workable solution is found for all employees, the checklist can be integrated to the software system.

6 Discussion and Conclusions

This section discusses and summarizes the results of this study and presents evaluation of the study in terms of its objectives, as well as validity and reliability.

6.1 Summary

The objective of the study was to improve the quality of the current transportation process in order to avoid malfunctions in deliveries by implementing quality control tools. The need for this study is caused by the lack of specific checkpoints for the delivery in the current transportation process. If misunderstandings and malfunctions occur during the delivery, they are fixed and discussed, but not documented for further improvements since no specific support tools exist for the workforce. Currently, the case company uses guidelines and working instruction but they are in several pages and rather complex. Therefore the need arose for improving the current transportation process through suggesting the quality tools.

This study started from identifying the research problem, method and material for implementation of this research. Triangulation of observation, interviews, questionnaire and a survey was used to collect data for analysis and identifying the current gaps in the process. Based on the results of the current state analysis, nine different gaps were identified during the current transportation process, which must be controlled to guarantee successful quality performance.

When the current gaps were identified, this study is focused on finding best practices for 3PL and TQM approaches. Theory section helped to formulate how quality in the case company can be controlled and discussed the American, Japanese and European ways of ensuring quality. The European way leads to ISO 9001 certification, which is the target of the case company. This study also overviewed the concept of continuous process improvement in a Japanese way, following the Juran's trilogy and Ishikawa's 11 step of approaching process improvement to show the core possibilities of quality management. The conclusions was that the process improvement happens by collecting, analyzing, interpreting, presenting and improving collected data from the process. Utilization of this approach to the transportation process showed that there are five most common five gaps, which usually occur in transportation. At the end of theory

section, the best practices were identified to tackle these common challenges and also another transportation companies were benchmarked for better comparison.

Theory section overviewed different aspects of quality. Three different spheres were discussed and three different cultures were compared for better understanding of main differences in the quality approaches. This study approached the quality in the Japanese way by dividing the transportation process into pieces, and identifying and reducing all waste. Then the case company tries to apply for ISO 9001 certificate as Europeans usually do. In the end, the case company approaches quality on the behavioral level, where final results are the most important, according to the American way of quality understanding. This study also explored the approach in utilization of seven "rights" (the ability to deliver the right amount of the right product at the right time at the right place in the right condition with the right information at the right price). It is possible, if these seven rights are informed to responsible parties in correct and adequate mode, which are documented later as an actual order or information can be inputted to the software. It was found that to improve quality in the case company is possible by developing quality control. It is feasible, when the whole transportation process is understandable and the most critical check points identified to prevent future errors. The conclusion was that it could be done through controlling these most critical check points in a checklist.

Using the process chart and a checklist can help monitor the transportation process and predict quality gaps. These gaps can be shown to the workforce in a process control chart to achieve even higher levels of quality. The quality control includes every aspect from the Planning stage up to the customer receiving the delivered goods. Currently, the case company uses the everyday of checklists, which are filled in the case company to monitor deliveries. In the future, the occurred gaps, which lead to the unfulfilled deliveries, must be checked through special tools for quality control.

The purpose of quality control is to assure that the transportation process is performing on an acceptable level. This is accomplished by monitoring the process output using special tools and techniques. In the Quality Control stage, the operating managers can ensure service quality by employing personnel called the quality control inspectors or managers. These inspectors can use statistical techniques to establish quality standards, educate managers and monitor quality performance in the transportation process. The statistical techniques are methods concerned with the collection, organization,

interpretation and presentation of data, which are related to the basic quality tools. The data provided by measuring the processes are raw data, which do not directly provide the information necessary for quality control or problem solving. Hence, these data must be organized and analyzed for the purpose of quality control or problem solving. Statistics provide an efficient and effective way of obtaining meaningful information from the collected data, allowing managers and workers to control and improve the transportation processes. In the Quality assurance level, the transportation process can be ensured by establishing confidence among all the concerned parties that the quality related activities can be implemented effectively.

Quality is not the responsibility of one person in the case company. Everyone is involved directly or indirectly in the transportation process is responsible to ensure the quality in the offered service. The main role and purpose of quality assurance is to provide a workable system, which ensures and support all procedures in transportation process, which have been designed, planned and followed well. Quality Assurance is the system of procedures, guidelines and action plans that establishes and maintains specific standards of the transportation process quality. A basic quality Assurance system includes well designed and documented procedures for the process control, inspection and testing. ISO 9001 standards provide a basic framework for action sequence in such a system of assurance.

The conceptual model of this research described six key elements of a quality assurance system on the quality assurance level. It begins with the formulation of the quality management objectives, which reflect the client, shipper and consignee priorities and the case company's own organizational capabilities of information sharing. ISO 9001 standards provide a basic model around that information sharing center with a sequence of Juran's three elements of plan, control and improve. These two models, one of ISO 9001 standards and the other of Juran's elements helped to support a successful information sharing model in the case company showed in the improved process flow.

The results convinced the case company that a quality system in the transportation process must be documented in the form of a quality manual or an action plan. Since the company aims at ISO 9001 standardization, these documents can be developed according to these standards. However, the goal of this research is not to provide an extended manual for certification, but a better understanding of what can be done to

improve critical gaps identified in CSA section. The location of critical gaps was identified and an inspection manager or a responsible manager in the transportation process can overview the quality of the delivery at each stage of transportation process. Firstly, a manager can inspect the quality after the operations that can produce faulty results. Secondly, the inspection can be done before the costly operations such as truck ordering and invoice payment. Thirdly, the inspection can be done in the end of the delivery.

The outcome of this report is an improved process flow and checklist, which explain how quality can be improved in the case company. An improved process flow suggests taking into use an additional shared virtual storage space with easy access to information for every involved party of the transportation process, where documents and vital information can be shared. Later, the same process flow can be implemented with the IT software support for the case company. Meanwhile, until the software is under production, an action plan or a checklist can be utilized with improved manuals. The process specifications reflected in the checklist can constitute standards against which the transportation service is measured. Basically it can be measured by statistical methods with check sheets and showed with a Pareto analysis to the workforce with the most important gaps, problems or misunderstanding from some specific timeline. These standards for transportation service are used to control the quality of incoming deliveries.

The next steps for further improvement can start with requesting IT companies to create such kind of a web-based software based on the model of the process flow to support performance of the transportation process developed in this study. The second step is a plan for writing real quality manuals to proceed with quality certification for ISO 9001. This certification can be applied for after the instructions and the quality manual are developed for proper quality audit.

6.2 Discussion

The most common quality characteristics in transportation services are the waiting time, service time, lead time and delivery time. In addition, transportation costs also add to this list of factors. These kinds of characteristics can be measured. Time and costs are the most common factor, which effect the quality and can decrease it if the customer needs are not met. Other observable quality characteristics are the types of errors, such as wrong dimensions of goods, wrong transportation mode, wrong loading

or unloading. This study has found that in the case company misunderstandings, malfunctions, errors and delays occur mainly because of the incorrect information flow between the parties involved in delivery.

Better information practices can increase business performance of the case company. Good IT practices are necessary, but not sufficient to improve business performance. Careful attention to the ways in which information is collected, organized, processed, analysed and then maintained is also essential to improving quality in the transportation processes.

The research question of the study was: *How to develop quality control and quality assurance to guarantee timely transportation?* The first approach to this question was to minimise performance gaps and establish the process flow. Secondly, internal measurements of service quality can be performed with check sheets or checklists. Time is measured by taking the starting time and finishing time. Check sheets can be designed to record the types of errors that occur. Later on, collected data can be analysed and improved. The whole transportation process must be visible to the workforce, especially if the workforce is new or management is absent, because of being aware of the next steps which must be implemented.

To manage process successfully, three elements have to be implemented. Firstly, identify critical gap in process on planning level. Secondly, document the gaps in the process to control them. Thirdly, apply the quality tool that leads the process improvement by eliminating the real roots of gaps. Additionally, understanding and knowing of customer needs marks the successful beginning of the transportation process. Gaps should be minimized in the beginning and planning level of transportation process. Then, chances are greatly improved that the rest of the process will go on smoothly.

One of the main consequences from this study is the understating the quality cannot be improved by itself. Plenty of work is required from each employee to improve performance of the case company. TQM is started with “Total” by meaning that everyone is involved into improving process. Without a long term goal in mind performance of the case company will quickly become a one-case relationship. Thus, customer satisfaction should be the driving force behind each action the case company does. Customer service and the operational team must work to achieve customer’s expectation perceived through communication. Ideally, if perceived service is not fully achieved managers

must strive to eliminate all failures and accept only one goal – 100% conformance and the maximum quality. The case company may well have a quality policy regarding customer satisfaction and continuous improvement.

The purpose of quality control is to assure that transportation process is performing in an acceptable level, in order to ensure service quality and to provide confidence to the customer. This study suggests that it should be accomplished by monitoring the process output using tools and techniques. Effective quality assurance and control systems include a well-designed and documented transportation process and quality control, including inspection and testing, control of measuring and test equipment, corrective and preventive action and the use of appropriate techniques and tools.

Based on the results of this study, the most important determinant of a transportation process is communication. The well implemented communication means keeping the customer informed in the language and by means he can understand and appreciate. In addition, communication only with customer is not enough. Well organized communication with all involved parties in the transportation process is required for the successful delivery, because every single person provides necessary information which can become a critical obstacle.

In addition to communication, access, responsibilities and competence of the workforce are also important issues for successful delivery. The access involves approachability and easy of contact in any time of 24 hours, because of important questions occurred during the delivery time. Responsibilities must be divided and each employee must know his role or provide support for manager in charge. The competence means possession of the required skills and knowledge to perform the transportation service.

It is assumed that adopting new software for the case company is a positive step for improving quality in transportation processes and optimization of working tools. The biggest advantage is in possibility of storage of information in one place and in use of that information in online connection from everywhere. Additionally, required specifications and reports can be issued from that software immediately to client. Anyway, there might be bottlenecks. Firstly, storage of variety of information requires constant access to database with simultaneous over load at each directions of information. Secondly, technical issues can occur with certain authority access. Thirdly, database can be big enough and some day there is no capacity to store additional information. Fourthly,

software can be constantly updated with new incoming stages of process flow. Sixthly, costs of software's design and adaptation to the case company can be high and time of adaptation can take from months to years. Building new IT software is a half of battle. The other half consists of getting the workforce in the case company actually to use it on daily basis. The real challenge could be in commitment of the workforce to IT software which they have demonstrated already for the checklist and check sheets.

6.3 Practical Implications

Based on the findings of this study, several recommendations can be made to put the proposed improved process and the checklist into operations in the case company.

Table 6. Practical implications.

Action plan	Responsibility	Time
• Print the process flow map to visible place for the workforce	• Management	• All the time
• Use the check sheets to collect data for further improvement	• Project manager	• During the project
• Use the checklists to evaluate check points of the each project	• Project manager	• During the project
• Build the Pareto Analysis charts after each month to show action of the case company	• Management	• In the end of each month
• Build a Fishbone with all internal roots of problems to minimize them later	• Management	• All the time

In addition, management of the case company is suggested to control that the checklists are really used by the workforce and accurately followed to achieve quality in the transportation process. A powerful quality control will not let critical gaps emerge, when different tools are in front of the eyes for each manager all the time.

6.4 Objective vs the Results

Overall, the study seemed to achieve its initial objective. The improved transportation process was approved in the case company for putting into practice, and the proposed checklist is already in use in the case company with positive results.

Internal data collection can also be viewed as partly completed task. Difficulties occurred due to the limited time of the study and the working time for analysis. If more time had been invested into defining the steps for improvement, the study could have provided a more detailed action plan how to put the recommended improvements into action. In addition, implemented discussions with the workforce gave valuable information, they were not tape-recorded and documented very briefly.

The external data collection methods could be evaluated as the most challenging part of the study. The benchmarked respondents were not very willing to share information on their internal processes. None of two questions indicated in Section 2 were answered in a straightforward and full way. Answers were collected on a general level, without the needed level of details. This makes a significant limitation for the study. If this research was repeated again, it should be thought how to collect this information in a more reliable and complete way. The publications do not provide the detailed level of the process either. But even from the indirect and incomplete manner of the responses it was obvious that the benchmarked companies experience similar challenges in their transportation process, and the gaps discovered in the case company are quite general also for other companies in the same logistics sector. Other companies are facing the same challenges and issues to be improved. Thus, the business problem of this study touched and interested also the partners of the case company.

Positive and reliable results were achieved from the interviews with clients and partners which confirmed the gaps and the needs for improvements in the discovered problematic areas.

6.5 Validity and Reliability

This final section discusses validity and reliability of this study. The evaluation is based on material by Yin (2003) and Quinton and Smallbone (2006) discussed in Section 2.

Firstly, the data for this study was collected through interviews with the workforce of the case company and external partners. The daily observations were used to collect particular challenges, their roots and suggestions. The questionnaire and the survey were implemented to collect data for CSA and guidelines for the future. All material was showed to the workforce of the case company and the critical gaps were discussed. In addition, further discussions with the workforce and managements confirmed the initial suggestions for improvements.

Secondly, a variety of data sources and collection tools were used to analyse the business problem from different aspects. The conducted structured and unstructured interviews were documented to the researcher's notebook and displayed in the discussions. The interviews were not recorded on the tape, because they were held mostly as phone conversation or the partied did not give their approval.

Thirdly, rigorous attention was used during collection of data for the business problem. The focus was on the roots of current gaps and possible improvement possibilities. The development has provided solutions, which can be implemented in the case company.

Finally, due to limited research period, not all improvements and solutions were found to erase all the problem roots. It leave place for another researcher to continue so that the results would be complete. The researcher's own biases have affected the study, because not all the answers were found from interviews and survey, because in some cases partners of the case company were not willing to share all information on theirs internal processes.

This study provided an interesting topic for research, as it includes many types of process parts and moments to be improved. For future development, the case company should start to use quality tools proposed in this study and further work to identify more roots of problems. The checklist is already in use as a powerful reminder in critical moments of the delivery process. The next steps can be suggested to management of the case company in focussing to take in use IT software tool and applying for ISO 9001 certification for a better quality assurance level.

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