Fourth-party logistics: A case study on performance measurement
Master Thesis within Business Administration

**Title:** Fourth-party logistics: A case study on performance measurement

**Names of authors:** Petrus Petersson, pepe1010@student.hj.se
Tim Zantvoort, zati1087@student.hj.se

**Master program:** International Logistics and Supply Chain Management

**University:** Jönköping International Business School, Jönköping, Sweden

**Date:** May 14, 2012

**Keywords:** Performance measurement, KPI, Framework, 4PL, 3PL, Reverse logistics, Construction logistics.
ABSTRACT

The number of Fourth-Party Logistics providers (4PLs) is growing. Researchers have expressed the importance of measuring the performance of a business, but still there are only a few customised performance measurement frameworks developed for logistic service providers. This Master Thesis addresses this issue by performing a multiple case study at two 4PLs that are operating in separate industries, one in reverse logistics and the other in the construction industry.

Previous research agrees that performance measurement frameworks have to be comprehensive and at the same time provide the right information in an understandable way. The Balanced Scorecard and the EFQM Business Excellence Model address this issue with different approaches and have been used in further developments of new frameworks.

The empirical study found that none of the studied businesses had a well-developed framework for their performance measurement and therefore the alignment between their measurements and their business strategy was affected. Performance measurement frameworks, which have a wide application, do not have a flaw that make them unsuitable to use for a 4PL. Managers in the researched businesses therefore see a need for frameworks that are easily implemented and are customised to their specific situation.

Moreover, the study found that no alignment had been developed yet between the customer and the 4PL. The businesses strive to align their KPIs among the partners they are cooperating with, down the supply chain, but are not interested in communicating them to their customers. Offering their customers full transparency might affect the businesses’ processes.

Research connected to performance measurement specified to 4PLs and Logistic Service Providers (LSPs) in general is needed since the currently available research leaves space for uncertainties and further discussion.
Acknowledgements

We would like to take this opportunity to thank those who helped us in establishing this thesis.

First of all, to our supervisor, Leif-Magnus Jensen, who guided and helped us from the formulation of the topic to the finalised thesis.

Secondly, to the representatives of the businesses where the case studies were conducted. For all the time you gave us and the curiosity you showed.

Third, to our companions who have gone through the phase of thesis writing with us. For all the support you offered and all the input you have given us.

We thank you all!

Petrus Petersson & Tim Zantvoort
May 2012
# Table of Contents

1. **Introduction** ........................................................................................................................................ 1  
   1.1. **Background** ................................................................................................................................. 1  
   1.2. **Problem Discussion** ..................................................................................................................... 2  
   1.3. **Purpose** ......................................................................................................................................... 3  
   1.4. **Delimitation** ................................................................................................................................ 3  
   1.5. **Definitions** .................................................................................................................................... 4  

2. **Literature Review** .................................................................................................................................. 5  
   2.1. **Logistic Service Providers** ............................................................................................................ 5  
   2.2. **Third-Party Logistics** ................................................................................................................... 6  
   2.3. **Fourth-Party Logistics Providers** .................................................................................................. 7  
   2.4. **Measuring Performance** ............................................................................................................... 8  
      2.4.1. **Key Performance Indicators** .................................................................................................. 9  
   2.5. **Industry Wide Frameworks** ......................................................................................................... 10  
      2.5.1. **Balanced Scorecard** ............................................................................................................ 10  
      2.5.2. **The EFQM Excellence Model** ............................................................................................ 12  
   2.6. **Industry Specific Frameworks** ..................................................................................................... 13  
      2.6.1. **Framework for Performance Measurement in the Supply Chain** ....................................... 14  
      2.6.2. **Framework for Performance Measurement in the Construction Industry** ....................... 14  
      2.6.3. **Performance Measurement in Reverse Logistics** .................................................................. 16  
   2.7. **Research Questions** ...................................................................................................................... 17  
   2.8. **Summary Literature Chapter** ....................................................................................................... 18  

3. **Research Method** .................................................................................................................................... 19  
   3.1. **Scientific View** .............................................................................................................................. 19  
   3.2. **Research Approach** ...................................................................................................................... 19  
   3.3. **Research Strategy** ......................................................................................................................... 20  
      3.3.1. **Researched Businesses** ......................................................................................................... 20
3.4. DATA COLLECTION ..................................................................................................................... 20
  3.4.1. LITERATURE STUDY ........................................................................................................... 21
  3.4.2. SEMI-STRUCTURED INTERVIEWS ......................................................................................... 21
  3.4.3. STRUCTURED INTERVIEWS .............................................................................................. 22
  3.4.4. OBSERVATION .................................................................................................................... 24
3.5. ANALYSING METHOD .............................................................................................................. 24
  3.5.1. PRIMARY DATA .................................................................................................................. 24
  3.5.2. QUALITATIVE DATA .......................................................................................................... 25
3.6. QUALITY ASSESSMENT OF THE THESIS ................................................................................... 25

4. EMPIRICAL RESEARCH ................................................................................................................ 28
  4.1. THE REVERSE LOGISTIC BUSINESS .................................................................................... 28
    4.1.1. PERFORMANCE MEASUREMENT ...................................................................................... 28
    4.1.2. INTERNAL PERFORMANCE MEASUREMENTS ............................................................. 29
    4.1.3. EXTERNAL PERFORMANCE MEASUREMENTS ........................................................... 29
    4.1.4. THEORY PROPOSED FRAMEWORKS ............................................................................. 30
  4.2. THE CONSTRUCTION LOGISTIC BUSINESS .......................................................................... 32
    4.2.1. PERFORMANCE MEASUREMENTS .................................................................................. 33
    4.2.2. THEORY PROPOSED FRAMEWORKS ............................................................................. 33
  4.3. CUSTOMER PERSPECTIVE ..................................................................................................... 35
    4.3.1. SUPPLY CHAIN MEASUREMENT .................................................................................... 35
    4.3.2. SUPPLY CHAIN ALIGNMENT ......................................................................................... 36

5. ANALYSIS ...................................................................................................................................... 38
  5.1. PERFORMANCE MEASUREMENT ........................................................................................... 38
    5.1.1. INDIVIDUAL BUSINESS PERFORMANCE ..................................................................... 38
    5.1.2. CUSTOMISED KPIs .......................................................................................................... 40
  5.2. PERFORMANCE MEASUREMENT ALIGNMENT ..................................................................... 40
    5.2.1. INTERNAL ALIGNMENT ................................................................................................ 41
    5.2.2. CUSTOMER PERSPECTIVE ............................................................................................ 41
  5.3. EXISTING PERFORMANCE MEASUREMENT FRAMEWORKS ............................................... 42
    5.3.1. BALANCED SCORECARD ................................................................................................. 42
5.3.2. EFQM EXCELLENCE MODEL & BASSIONI’S CONSTRUCTION INDUSTRY FRAMEWORK ............................................. 43

5.4. FURTHER DEVELOPMENT OF PERFORMANCE MEASUREMENT FRAMEWORKS ............................................. 44
  5.4.1. BUSINESS FRAMEWORKS .......................................................................................................................... 44
  5.4.2. SUPPLY CHAIN FRAMEWORKS .................................................................................................................. 45

6. CONCLUSION ......................................................................................................................................................... 46

7. DISCUSSION ........................................................................................................................................................... 47

REFERENCES ........................................................................................................................................................... 49

APPENDICES ............................................................................................................................................................ 54

APPENDIX A: INTERVIEW GUIDELINES .................................................................................................................. 54
APPENDIX B: QUESTIONNAIRE ................................................................................................................................. 56
APPENDIX C: KPIs AT DIFFERENT MANAGEMENT LEVELS ....................................................................................... 58
1. INTRODUCTION

This chapter will state the background of the thesis topic. The problem discussion, the purpose, delimitation and definitions used in this research are mentioned in this chapter and will thereby function as a general introduction into the thesis and the work connected to it.

1.1. BACKGROUND

In production industries, all the steps, from raw materials until the product has reached a satisfied final customer, can be described as a Supply Chain (SC). By taking this holistic view, sub-optimising can be avoided, thereby creating mutual benefits for all the individual businesses instead of a short time benefit for only a part of the chain. Nowadays businesses require more agile SCs to meet the increasing customer demand and therefore need to manage their processes more efficiently to deliver their products in a shorter time, at a lower price and with a higher quality. To effectively run such a SC there is a need for transparency, which in turn asks for constant monitoring of the process and ensuring quality along the way. Businesses need to implement metrics and clearly state their goals, vision and mission, only then they can effective and efficiently measure their performance (Gunasekaran, Patel & McGaughey, 2004). Moreover, they need to know how to reach the overall goal, what to measure for reaching it and determining when it is considered successful. Therefore a strategy needs to be set up with clear metrics on how and what to measure and for what purpose, as performance measurement would be meaningless without defining those essential details (Melnyk, Stewart & Swink, 2004; Gunasekaran et al., 2004).

From this background it is clear that measuring performance is necessary, the real difficulty lies in what has to be measured. Depending on the selection of measurements the employees tend to adjust their work according to the measurements to reach set goals. This implies the importance of choosing the correct processes to measure and implement the correct metrics, but also measuring them in the correct way to produce the right information for the right purpose (Janse, Schuur and Brito, 2010). Key Performance Indicators (KPIs) are covered under performance measurement, but only measure those processes that have significant impact on the overall performance of an organisation (Gunasekaran et al., 2004). They are implemented to compare past performance of a business with the performance of today’s business and facilitate the possibility to compare KPIs towards best practice or towards
competing businesses. There are only a few measurements in place for return processes and customer satisfaction (Sheperd & Günter, 2006) and as LSPs are in the stage of offering a wider variety of services, the need for a structured performance measurement strategy increases. This especially applies to performance measurement frameworks for fourth-party logistics providers (4PLs), which is further increased by a general lack of performance measurement in the logistics sector (Krakovics, Leal, Mendes and Santos, 2008).

The construction field has been criticised for not being as effective as it should be due to a lack of overall systematic benchmarking (Costa, Formoso, Kagioglou, Alarcón & Caldas, 2006). Even though research has been conducted to fill this gap, research in the field of KPIs, especially developed for logistics in the construction industry, is still under-developed and the authors’ own experience contributes to the view that this field is often overlooked. The construction field has been sceptic towards best practices developed for conventional production industries with the argument that their field is too different; it cannot be treated as a regular production business. Objections raised are that every project is unique and it is thereby not helpful to compare KPIs between different projects, since they all have different designs, site conditions and management teams (Costa et al 2006).

Reverse logistics is the activity of returning goods upwards the supply chain, such as returns of damaged goods, and is a field that got more attention within logistics and supply chain management. As businesses did not spend enough attention to this field, resulting in unsatisfied customers and long lead times, they are nowadays implementing more closed-loop solutions. Especially fourth-party logistics providers are getting more involved in this type of business and are challenged to meet the overall customer demand, convincing their clients of the need of such a provider for their return flow of products. They have to translate the clients’ expectations into a performance measurement strategy and align it among the partners they are cooperating with. As the terms ‘reverse logistics’ and ‘4PL’ are new terms within logistics, there is a gap in the literature how these businesses can be managed effectively using frameworks or KPIs for their performance measurement strategy.

1.2. PROBLEM DISCUSSION
The most commonly used performance measurement frameworks are general in their application to serve a wide set of businesses. Krakovics et al. (2008) state that there is a need for performance measurement frameworks for 4PLs, but there is only limited research available if they can be applied to
4PLs’ operations. As 4PLs are cooperating with a large set of external businesses, the alignment of metrics along the supply chain also plays a significant role in defining a business’ performance measurement strategy. The problem statement for this thesis is therefore how general frameworks can be adapted and/or applied for 4PLs and how their performance measurement is aligned along the supply chain.

1.3. PURPOSE
The purpose of this thesis is to research the suitability of performance measurement frameworks in settings of fourth-party logistics providers not previously researched. The aim is to get an overview of what those providers are currently measuring and how performance measurement frameworks can be applied and adopted by 4PLs. It will furthermore address the supply chain alignment by analyzing it from a customer perspective. The research will focus on businesses in logistic fields that are outside the mainstream way of performing logistics. Two case studies will be conducted, one at a fourth-party logistics provider (4PL) specialized in reversed logistics, hereafter referred to as RC, and the other at a 4PL specialized in the construction industry, which will hereafter be referred to as CC.

1.4. DELIMITATION
This research will focus on performance measurement strategy for fourth-party logistics providers. A business within the reverse logistics industry and a logistics business within the construction industry were used to exemplify 4PL businesses operating in unusual settings. The outcome of the research will therefore focus on 4PL solutions and not on operations in any specific industry.

A large variety of frameworks have been developed for performance measurement and it would not be feasible to analyse them all. Therefore those that have been most referred to in the literature, the Balanced Score Card (BSC) and the EFQM model, have been selected, representing different areas of performance measurement. The well-known SCOR model was not selected because it is more multifaceted. Performance measurement is only one of the three pillars of the SCOR model and is more focussed on processes than the other selected frameworks. Including this framework in the comparison would thereby influence the representativeness of this research. To cover the area of performance measurements of the whole supply chain the model developed by Gunasekaran et al. (2004) was selected since it is based on the SCOR model but is more specific, which proves more useful for this research.
1.5. DEFINITIONS

Gunasekaran et al. (2004) highlight the importance of having KPIs throughout the three levels of management; Strategic, Tactical and Operational, which will be followed and referred to in this thesis. In Appendix C, a table is included that exemplifies what KPIs belong to each of those levels in the supply chain. Other definitions used throughout this thesis can be found below.

**4PL** – A Logistic service provider categorised as a customer developer or logistics integrator (Hertz & Alfredsson, 2003) and serving as a control tower. A 4PL does not own any assets, but has contracts with third-party logistics providers or other external partners, such as transport companies and warehouse providers.

**Businesses** – In this report this term should be interpreted widely as it refers to any form of business.

**Closed-loop solutions** – Solutions that are covering the return of goods. Closed-loop supply chains are similar to traditional supply chains added with additional reverse supply chain activities (Guide, Harrison & Van Wassenhove, 2003).

**Customer** – Customers are categorised as those who are the customer from a business being a legal entity.

**Final customer** – Final customer is defined as a private person without any commercial intentions.

**KPI** – Key performance indicators are those metrics that have significant impact on the overall performance of a business (Gunasekaran et al., 2004) and are those that a business regards as the most important metrics to control.
2. LITERATURE REVIEW

In this chapter previous research will be reviewed. 3PL and 4PL theories are presented followed by a review of industry wide frameworks versus industry specific frameworks used for performance measurement. The chapter will end with a formulation of the research questions.

2.1. LOGISTIC SERVICE PROVIDERS

Businesses increasingly start to focus on their core competences, outsourcing activities that do not belong to those competences and re-evaluating their logistics processes. The market for Logistic Service providers (LSPs) has therefore grown considerably as they offer a wide range of logistic services, such as transportation, warehousing and logistical activities such as collection, consolidation, storage and handling (Lai, 2004; Persson & Virum, 2001). Persson and Virum (2001) developed a model that distinguishes between the different LSPs:

- **Logistic operators**: Variety of services offered by using physical assets
- **Logistic agents**: Variety of services offered by using non-physical assets
- **Logistic integrators**: Services adapted to the customer offered by using non-physical assets
- **Third-party logistics operator**: Services adapted to customer offered by using physical assets

Lai (2004) takes another classification scheme that is based on the degree of service performance:

- **Traditional freight forwarders**
- **Transformers**
- **Full service providers**
- **Nichers**

The full service providers offer a wide range of services, such as value added logistics services (VAL), technology-enabled logistics services (TEL) and freight forward services (FFD) and can be compared to Persson and Virum (2001) their third-party logistics operator (Lai, 2004). Businesses that are focusing on their core competences increasingly require extensive logistical services. Together with the increasing global competition, deregulation of the transport sector and developments in information technology (IT), 3PL service providers can experience further growth in the upcoming years (Marasco, 2008).
2.2. THIRD-PARTY LOGISTICS

It is attractive for business to outsource logistical activities to third-party logistic service providers (3PLs) because of the increased service level and the lower financial risks they offer, thereby making it possible for businesses to focus on their core competencies (van Damme & van Amstel, 1996). 3PLs are able to offer worldwide sophisticated logistic solutions with specialised logistical knowledge for a lower price compared to when the same activity would be kept in-house (Selviaridis & Spring, 2007). There are many definitions on 3PLs, but it is shown that they are all specialised in serving the specific logistical needs of their customers for at least management and execution of transportation and warehousing (Berglund, Laarhoven, Sharman & Wandel, 1999; Marasco, 2008).

3PLs, or logistical service providers (LSPs) in general, are increasingly getting involved in mergers and acquisitions (M&A) to serve as cross-border providers, thereby entering new market segments, enabling high investments in physical infrastructure and ICT and creating strategic and operational synergies (Carbone & Stone, 2005). The activities of 3PLs therefore get widespread and the exact functioning of a 3PL gets blurred. Hertz and Alfredsson (2003) therefore distinguish between four different kinds of 3PLs:

- **Standard 3PL provider** offers the basic logistic functions, such as warehousing, distribution, pick and pack.
- **Service developer** offers advanced value added services, such as cross docking, track and trace and forming specific packaging.
- **Customer adaptor** overtaking a client’s existing business and improving the efficiency in for example warehouse or logistics activities.
- **Customer developer** often overtakes the client’s whole logistics operations, which can also be called a ‘logistics integrator’ or ‘complexity manager’, showing similarities with the definition of a 4PL.

As Hertz and Alfredsson (2003) state, the *customer developer* is the most advanced form in serving clients’ needs. The business therefore needs to acquire specialist capabilities, such as contract maintenance and repair and after sales services such as reverse logistics (Maede & Sarkis, 2002).
2.3. FOURTH-PARTY LOGISTICS PROVIDERS

The fourth-party logistic providers (4PLs) market grew considerably with the use of IT as a 4PL participates rather in supply chain coordination than in operational services (Hoek and Chong, 2001). It functions as a control tower over other parties, taking responsibility of all the users’ outsourced operations, thereby serving as a single interface between the client and multiple logistic service providers (Büyüközkan, Feyzioglu & Ersoy, 2009; Skjoett-Larsen, 2000). As a service provider they do not own assets themselves but instead function as an integrator making use of their design and planning capabilities in combination with advanced IT solutions. They provide administrative services where other operators perform the physical movement of goods (Selviaridis & Spring, 2007; Stefansson, 2005). Büyüközkan et al. (2009) studied the 4PL relationships and mention three models used for the evaluation of those relationships:

- **Synergy plus (SP) model**: Collaboration between 3PL and 4PL to offer supply chain solutions to several clients
- **Solution integrator (SI) model**: Managing a comprehensive supply chain solution for one single client
- **Industry innovator (II) model**: Developing and managing a supply chain solution for several clients

These models are developed to distinguish between the different levels of integration and customisation for classifying the 4PLs relationships towards other LSPs and their clients.

Transparency is a pre-requisite for serving as a 4PL, as it needs real-time information from its partners to effectively manage all the operations within the network. Systems such as track and trace that require multiple information inputs can both help the customer in tracking where the products are, but also provide the 4PL and their clients with valuable information. Systems that create transparency between all the partners in the supply chain contribute to the coordination of activities, enhance visibility in daily operations and in conjunction with Internet offer limitless boundaries (Lee and Wang, 2001).

Lee and Wang (2001) describe the Internet as enabler of supply chain integration and by adopting this technology, within the business strategy, e-business and businesses can significantly improve their operations. Lee and Wang (2001) further discuss the advantages of using the Internet as a strategic tool
as it can be used for real-time information exchange, thereby enhancing transparency. A 4PL is managed by one business, located at one or several locations and manages the flow across a wide network of partners. Internet is an important tool for such a provider in offering client satisfaction, both from the consumer as well as for the partners they are cooperating with. The increasing use of Internet by businesses also enables development of professional systems interacting with the Internet. New cloud software increases transparency, workforce improvements and process optimisation. Using e-business within the supply chain will give a business a distinctive competitive edge over its competitors (Lee & Wang, 2001).

Outsourcing activities to a 4PL has some key advantages, but businesses also have to be aware of the disadvantages that come with 4PL cooperations. Felea (2011) mentions that especially loss of control and too much dependability on a single partner are increased risks when a business outsources its logistic activities to a service provider. Moreover there is a risk that the LSP might not deliver the agreed service level or manage to meet the expected cost reductions (Felea, 2011). Therefore it is important that service providers align their performance measurement strategy with their clients to decrease the risk of outsourcing from a clients’ perspective and at the same time increase the quality of their service.

2.4. MEASURING PERFORMANCE

To be able to compare the performance of a business with their previous performance, as well as with performance of a competing business, the same definition of performance has to be used. Literature in the field of logistics has used a number of definitions of performance making this comparison difficult to execute (Chow, Heaver & Henriksson, 1994). The difficulties with defining performance arise from the fact that businesses have several and conflicting goals. The measurements that are used can be categorised as ‘Hard’ measurements or ‘Soft’ measurements. Hard measures, as financial information like income and turnover, are straightforward to collect but can be difficult to compare between businesses. Since financial data is sensitive information for a business, non-public companies are reluctant to let these figures be officially known and it is thereby difficult to compare between businesses. Also, standards of accounting can be different, even in an individual business over time, which further prevents an effective comparison. Soft measurements are in many situations intangible and thereby have an uncertainty in their collection. For example, a soft measure can be focused on customer satisfaction and in order to collect this data a person has to make a judgment, which will be based on his own insight of how well something is working. If Business A and Business B answer a
question about the correctness of their deliveries on a scale of 1 to 5, Business A can put in a three and Business B a five even though both businesses have 80% correct deliveries. The differences in subjective numbering would be due to different goals within the business, Business A thinks that they should only get a three since there goal is 95% correct deliveries while Business B has a target of 80% and since they have reached it they deserve a 5 (Chow et al., 1994). This makes it difficult for researchers to compare those kinds of soft measurements between businesses and over time. Maskell (1989) argues that financial, or hard measurements, are best used for strategic decisions while non-financial, soft measurements, better suit to daily operations such as control of manufacturing and distribution.

A problem with performance measurement is that it in most situations focuses on an individual business performance, instead of performance of the whole supply chain. Fawcett (1991) found that if businesses early in their co-operation acknowledge logistics as an important part of their competitiveness, they will by addressing this issue, outperform similar businesses that do not address it. To evaluate performance a broad perspective has to be taken into account for all the parts of a business. Sink, Tuttle, and DeVries (1984) state that there are seven basic performance criteria; all of them interrelated to the others. The first two, effectiveness and efficiency, are commonly known as important measures. However many measurements, according to the authors, are focused towards efficiency without regards to effectiveness of the process. The third of the interrelated criteria is quality followed by productivity. Productivity merges effectiveness, efficiency and quality into one by comparing the input and output. The next two criteria, quality of work life and innovation, are two subjective criteria that are difficult to measure but affect the other criteria in a significant way. The last of the criteria is profitability; which is often being used as the most important area to measure performance in. To measure these criteria for performance both hard and soft measurements have to be used.

2.4.1. **Key performance indicators**

KPIs are often not aligned with a business’ strategy, as they are considered unimportant. Metrics are often not perfectly adjusted to the right processes (Janse et al., 2010) and therefore, to control the organisation, businesses in most areas should use KPIs that are in line with their strategy and vision (Ax, Johansson, & Kullvén, 2009). KPIs exist in many different forms and the reason why businesses use certain KPIs vary, but when deciding to use a KPI it is important to make sure that they are simple, clear, concrete and effectible (Catasus, Gröjer, Högberg & Johren, 2008).
Ax et al. (2009) chose to put the foundation of the KPIs as being KPIs that follow these points:
- KPIs which are motivating, inspiring and achievable.
- KPIs which employees understand how the KPI is relevant for their connected tasks.
- KPIs which employees can affect and has the knowledge how to affect them.
- KPIs which are monitored and reported consciously.

2.5. INDUSTRY WIDE FRAMEWORKS
Frameworks designed to help managers to evaluate the performance of their business have been developed in many different forms. The Balanced Scorecard (BSC), developed by Kaplan and Norton in 1992, and the EFQM Excellence model, are two of the most recognised frameworks and commonly referred to. These two frameworks are general in their application since they were designed to work in any business setting, thereby facilitating industry wide comparison and helping managers to see what ‘best practice’ is.

2.5.1. BALANCED SCORECARD
In 1992 Kaplan and Norton presented the Balanced Scorecard (BSC). Since then it has been further developed by the authors and nowadays performance measurements cannot be fully discussed without reviewing their work. Over the last 20 years the model has been questioned and recognised and other authors used parts of the BSC as foundation for their own frameworks (Malina and Selto, 2001; Schneiderman, 1999; Bassioni, Price and Hassan, 2005). This way of measuring a business’s performance combines hard and soft measurements to give managers a broad view of the business’ performance. The BSC is divided into four parts that managers have to evaluate by using measurements suitable for their own organisation. Kaplan and Norton did in this way recognise the different needs of measurements in different organisations and in different industries. When using the BSC, the first step is to translate the vision of the business into goals for each area, followed by deciding on key measurements with targets that will enable the organisation to move forward. This strategic way of using the BSC was not intended by the authors in 1992, but in later studies they found that managers in businesses using the BSC saw the strategic use of it as a logical step. This led to the use of the BSC as something more than a tool for performance measurement, making it a strategic tool that moves businesses forward. This can be achieved thanks to the BSC’s need of support from senior managers to be fully implemented across the business, instead of only focusing on financial measurements set up by the connected department (Kaplan and Norton, 1996).
The first area covered in the BSC model is the **customer perspective**. Useful measurements, depending on business strategy, can be the time from order to final delivery, order accuracy, service level and the percentage of sold goods that are newly introduced to the market to measure the inventiveness of the business. Both in-house information and information collected from outside will be valuable for the business. Next area is the **internal business perspective** that focuses on what the business has to excel at to continue/start to prosper. Measurements focused on the business’s core competence should be used to make sure that the customers’ needs are fulfilled. **Innovation and learning** is the third area and answers the question: Can we continue to improve and create value? Measurements that can be used include the introduction time of new products, research and development (R&D) time and how much time it takes to learn how to produce new products. The last perspective is the **financial perspective**, which is still important, as excelling in the other areas does not have to mean financial profit (Kaplan & Norton, 1996). By using all four of them, and only the KPIs that are most critical in each category, managers can get a holistic view of the performance as well as avoiding sub-optimising, since if the improvement in one measurement is done at the expense of the rest, it will be noticed immediately.

However, there is a problem with the BSC when managers think it will be an all-solving framework, states Schneiderman (1999). If managers improve all the aspects on the scorecard while the financial performance does not improve to satisfy the shareholders, than the manager cannot be blamed and the underlying reason must be external. The BSC has led to this kind of arguments and Schneiderman’s (1999) view is that the BSC is often not designed as comprehensive as it has to be. The BSC encourages improvements of KPIs that fail to address the complexity of today’s business operations, but it thereby only improves the KPIs itself, not the underlying process.

Even though the importance of KPIs is mentioned in most research, it is seldom specified what KPIs to use. In a study of customer perception of 3PLs, over 90 % of the businesses said that they are considering further development of their KPIs to evaluate their 3PL business (Wilding & Juriado, 2004). This indicates dissatisfaction with the KPI that have currently been used. This is a view that other researchers confirm; Selviaridis and Spring (2007) state that there is a need for future research to develop a framework for KPIs that can measure the performance of value added service as those can be provided by 3PL businesses. Wilding and Juriado (2004) state that the most common measure used by businesses using a 3PL is delivery timeliness, others being accuracy, order fill rates, overall service, and inventory turns.
These kinds of measurements can be used by a 3PL as part of the BSC to collect the customers view. Van Hoek (2001) argues that to measure performance in the supply chain, with different owners, horizontal measurement instead of vertical are useful. Those measurements are useful at an operational level instead of only being useful at a strategic level. According to van Hoek (2001), the BSC is a good framework to find measurements that can be used in at those levels. Fawcett and Cooper (1998) found that higher performing businesses had a broader set of measurements at their disposal covering aspects of productivity, cost, service and customer and employee satisfaction.

2.5.2. THE EFQM EXCELLENCE MODEL

In Europe the European Commission founded the European Quality Award to encourage businesses to become more competitive. To be able to announce a winner, a measuring criterion needed to be developed, resulting in the European Quality Award, which became the European Foundation for Quality Management Excellence Model (The EFQM Excellence Model). Similar to the BSC model, the EFQM Excellence model is one of the major frameworks consistently being used. When Wongrassamee, Simmons & Gardiner (2003) compared two frameworks for performance measurement, to help managers understand the strengths and weaknesses with regards to different areas, they chose the BSC and EFQM Business Excellence model. Therefore this model is presented alongside the BSC to give the reader a different view on how performance can be measured.

The model is non-prescriptive and built on self-evaluation to help businesses understand how to perform better. The EFQM has two parts that can be measured by KPIs, chosen by the individual businesses depending on their unique needs. These two parts are ‘Enabling’ criteria and ‘Resulting’ criteria. The idea is that by excelling in the categories provided by the EFQM, businesses’ performance will increase with the help of complete and coherent performance measurements that can be compared towards best practices (Wongrassamee et al., 2003).

The enabling criteria, as described by Wongrassmee et al. (2003) are as follow:

- **Leadership:** The behaviour of executives and managers, as well as how the mission statement has been clarified, with a focus on quality and continuous improvement for the people of the organisation.

- **People management:** The treatment of employees and how the businesses develop the employees’ skills.
- **Policy and strategy**: How the business implements its vision, mission and value.
- **Resources**: How the business uses internal and external resources effectively.
- **Processes**: How well the business designs, manages and develops its processes to satisfy stakeholders.

And the result criteria are:

- **People satisfaction**: What is the business achieving in relation to its employees.
- **Customer satisfaction**: How well does the business fulfil the expectations of targeted customers.
- **Impact on society**: Does the business satisfy the expectations of local, national and international society.
- **Business result**: Achievement in relation to planned business performance and satisfying shareholders.

The EFQM model has been criticised for not functioning as it was designed for. By examining the results for the EFQM Excellence Award, Gómez, Costa & Martínez Lorente (2011) found that the enabling and resulting criteria are not connected for all the subcategories suggested in the model. This perspective is important for managers to bear in mind when using the EFQM model. It enables them to compensate for the proposed drawbacks by choosing KPIs that are interrelated and dependent on each other, thereby avoiding the suggested risk with this model.

### 2.6. Industry Specific Frameworks

Even though there are strong arguments for using industry-wide measurements, researchers have noticed that the frameworks could be improved if they were focused on the special needs of each industry. Further development of the BSC and the EFQM Excellence model has therefore been done along with the development of new frameworks. Measurements of the performance of the whole supply chain are difficult since most frameworks only measure individual business’ performance. The construction industry has problems with implementation of these frameworks as well and therefore researchers feel a need for industry specific performance measurement frameworks (Gunasekaran et al., 2004; Bassioni et al., 2005; Eagan, 1998).
2.6.1. Framework for performance measurement in the supply chain

Gunasekaran et al. (2004) propose a framework for performance measures and metrics in Supply Chain Management (SCM). They structured their research by defining metrics and measurements gathered from previous research, conducted by a variety of authors, and interviews with representatives from several businesses. That resulted in the development of a customised framework where the metrics are divided into Strategic, Tactical, and Operational levels among the four major activities within the supply chain; Plan, Source, Make/Assemble, Deliver. They suggest that managers, for the development of a performance measurement program, can use their approach of designing a framework for SCM. Identifying measurements, by a combination of a literature review and conducting interviews, rating their importance according to the amount of times they appeared in the interviews and construct a matrix to identify the supply chain activity to be measured. They note that individual businesses will have performance measurement needs that reflect their operations, thereby not able to identify themselves with the measures and metrics that the model of Gunasekaran et al. (2004) propose. Therefore, those businesses should research and develop other, for their industry specific, measures and apply them to their framework. This proves the flexibility and thereby the wide possibilities for implementation of this approach for supply chain performance.

2.6.2. Framework for performance measurement in the construction industry

Bassioni et al. (2005) developed a framework for performance measurements of businesses in the construction industry, which is based on the BSC and the EFQM Excellence Model. The framework is divided, similar to the Business Excellence Model, into driving and resulting factors. However, these factors are based on the authors’ perception on what is considered appropriate by the industry as well as conducted interviews with managers within the construction industry. This framework is process-focused what managers found to be more suitable for their project-managed industry. Since it is process-driven with clear linear parts to focus on, managers found that it was comprehensible even though it is more detailed than the BSC and the EFQM Excellence Model.

The framework has seven Performance Driving Factors:

- Leadership
- Stakeholder focus
- Strategic management
- Function and program management
There are four Performance Results Factors that also have to be measured to get a holistic view of the health of the organisation:

- People
- Project results
- Customer and society results
- Organisational business results

Bassioni et al. (2005) admit that the framework more adapts to measuring organisational health instead of strategic performance, in which research is lacking.

After criticism of the UK construction industry, such as in the Rethinking Construction report (Egan, 1998), many programs to improve the industry were launched. One of them was the governmental founded Construction Best Practice Program (CBPP), which developed KPIs to be used by construction businesses to benchmark themselves against competing businesses and best practice in other industries. The CBPP has ten “headlines” that are measured and collected industry-wide to present yearly charts, with which businesses can compare themselves as well as communicating it to customers. The ten headlines are:

- Client satisfaction of product
- Client satisfaction of service
- Profitability
- Productivity
- Defects
- Safety
- Predictability of time
- Predictability of cost
- Construction time
- Construction cost

Operational KPIs were also developed for managers to be able to see areas were improvement was needed. The third layer is diagnostic KPIs that help managers to understand why changes have happened in the two layers above (Beatham, Anumba, Thorpe & Hedges, 2004).

Beatham et al. (2004) argue that the problem with the CBPP and many of the other schemes developed for performance measurement of the construction industry is that the KPIs are general in their application and that they are not connected to the business’s strategy. Another problem is that the KPIs used do not offer a possibility for managers to change their behaviour as most of the KPIs used measure
performance of actions that have already been completed. There is also a problem with the validation of the data presented by the business. The CBPP was intended to compare different industries where the variation of contractual arrangement was taking in to account. However, there were no positive results and the KPIs were used as a marketing tool instead of a way for businesses to see what they need to improve. In the model, KPIs for leadership as well as policy and strategy (taken from the EFQM), do not exist. Managers cannot get a holistic view of their organisation using the CBPP. Finally, the CBPP also lacks review of what has been learnt and how improvement can be done in the future. The CBPP has still been a success in the sense that it has been widely adopted in the British construction industry but it has to be improved if it is going to generate value in the future.

2.6.3. Performance Measurement in Reverse Logistics

As mentioned earlier the LSPs are not only adapting new technologies, but are also extending their operations. Reverse logistics is seen as the new differentiator in doing business and is defined by Fleischman (2000) as:

‘The process of planning, implementing, and controlling the efficient, effective inbound flow and storage of secondary goods and related information opposite to the traditional supply chain direction for the purpose of recovering value or proper disposal.’ (Fleischman, 2000, p.7)

Any upstream flow of goods or services, coming from any starting point in the supply chain, as well other than the point or origin, is included in the definition of reverse logistics (Fleischman, 2000). Traditionally the businesses denied this form of logistics because of a lack of knowledge (Krumwiede & Sheu, 2002). The increased transportation costs influence the implementation, as it is both economic and environmental contradicting (Fleischman, 2000). However, increased online purchases, stricter environmental regulations (Skrivastava & Skrivastava, 2006), higher quality standards, more lenient return policies (Min & Ko, 2007) and a more demanding customer have made the businesses more aware of this after sales service. To benefit from this logistics activity, businesses started adding value to their operations, either by recycling or recovering goods or by adding additional services to the businesses, such as checking, repairing and replacing, offering a wide set of closed loop solutions (Brito & Dekker, 2003).
Reverse logistics is part of a business’ after sales service and deals with the return flow of goods against the traditional flow of the supply chain (Fleischman, 2000). The customer is therefore the key in this process. As it is seen as an ‘extra’ activity that has to be performed by the customer in case of warranty, repair, recycling or overstock, it has to be done as efficiently as possible. Ravi and Shankar (2004) have researched the various barriers of reverse logistics, but the ones that catch the attention are the lack of appropriate performance metrics and the lack of information and technological systems. Track and trace systems, such as already used in many postal services, can enhance transparency in the location of the product and detailed customer data system can already provide the business with information of what has been returned to them. Next to information provision, businesses managing reverse logistics have to think about how to effective and efficiently manage the transport back to the manufacturer. Just as in forward logistics, it would be more efficient if transports are consolidated, making use of cross docking and delivering the goods in the shortest possible time. Here the same measures as for 3PLs can be used, as those also have to use similar metrics to measure their performance. As those service providers are also cooperating with external parties, such as transport businesses or external repair or recycle centers, they also have to evaluate the performance of their suppliers (Hervani, Helms & Sarkis, 2005). A small inventory can therefore be made for measuring reverse logistics:

- Lead time
- Supplier/partner performance
- Customer satisfaction

Those metrics apply to most businesses and are not specifically designed for reverse logistics. No clear performance measurement systems have been developed yet for this specific industry and only a few measures for the return processes have been published (Shepherd & Günter, 2006).

2.7. RESEARCH QUESTIONS

4PLs are nothing new but there is still a gap in research when it comes down to performance measurements in the 4PL industry. The idea with general performance measurement frameworks is that they should work in any setting, but is that true for all 4PL businesses? This leads to questions of how 4PL nowadays work with performance measurement resulting in two research questions that will be studied in this report.
- **Question I** - How do the suggested frameworks for general performance measurement fit with the reality when they are applied to 4PLs?

- **Question II** - How do 4PLs’ performance measurement strategies align with their customers’ expectation of the delivered service?

### 2.8. SUMMARY LITERATURE CHAPTER

There are several categorisations of the LSPs that operate in parts of the supply chain. Businesses strive to be more effective and that has led them to increase the number of outsourced activities. Since logistic operations are not a core competence for many businesses, the logistics activities have been outsourced to 3PLs, whom perform activities such as warehousing, repacking and transportation. A 4PL differs itself from 3PL by acting as a control tower and not owning the resources it controls.

To determine if a business is developing in the right direction and to be able to compare its performance in different parts of the business with best practice, performance measurement has to be carried out in a comprehensive way. Historically, business performance was measured only based on economic measures, but by also using non-economic measures, such as fill rates, order accuracy and other measurements of this sort, managers can get indications of what actions will increase the business competitiveness.

Many researchers have designed frameworks for performance measurements and two well-known frameworks developed are the BSC and the EFQM model. The Balanced Scorecard is divided into four perspectives and by assigning KPIs within all of those four perspectives managers get a comprehensive view of the business’ performance. The four perspectives are customer, internal business, innovation and learning and financial perspective. The EFQM Model is divided into enabling criteria and resulting criteria which are further dived into subcategories. Just as the BSC, the EFQM is a non-descriptive framework that enables managers to choose KPIs that are appropriate for their own business.

Gunasekaran et al. (2004) and Bassioni et al. (2005) developed frameworks that have been specialised to be able to address issues that its creators saw as problem within the industry. The framework of Gunasekaran et al. (2004) tackles the problem with measuring performance at a supply chain level instead of at the single firm. Bassioni et al. (2005) designed a framework that has its origin in the BSC and the EFQM Model, but has been further developed after the special needs of the construction industry.
3. RESEARCH METHOD

This chapter explains why the methodology used was chosen. It discusses the strength and weaknesses of the study as well as the general scientific quality. Each step of the study is explained, starting with collection of data, including literature, interviews and survey, and also discussing the method of analysing the collected data.

3.1. SCIENTIFIC VIEW

There are different views of what is important and what to do when it comes to do research and depending on the research questions different methods are appropriate to use. Researchers’ worldview will lead them to see different research areas as the right area to focus on. Hence the researchers’ worldview is an underlying foundation for the research done. The authors had an interpretive worldview when describing this study and analysing the cases. This is most clear in the authors’ view that they are part of what is being researched and cannot be separated from it. Small sample and in-depth research with qualitative focus are other signs of interpretivism. This philosophy focuses upon the details of a situation and believes that there is a reality behind the scenes and all this is part of what constitutes acceptable knowledge (Saunders, Lewis & Thornhill, 2009).

3.2. RESEARCH APPROACH

For researchers to be aware of their research, a well-developed approach is important, because the researchers will then be able to make an informed decision when designing their study. Also, when choosing between research strategies, the researcher will have a better understanding of which strategies will be appropriate in specific situations (Easterby-Smith, Thorpe & Jackson, 2008). The authors’ research follows an abductive approach. Even tough this approach is a separate approach, it has elements from both deductive and inductive approaches (Kovács & Spens, 2005). In this thesis this is shown by the first part of the research, the theory study, which is part of deduction. Other aspects, such as collection of qualitative data, strive to a close understanding of the research context and an understanding that researchers are part of the research process, are indications of an inductive approach. An abductive approach allows for creativity from the research since researcher can go back and forth between theory and empirical findings in their attempts to develop new knowledge.
3.3. RESEARCH STRATEGY
The research strategy is determined by the research questions asked as well as existing knowledge of the authors, the time frame in which the study is conducted and the availability of other resources (Saunders et al., 2009). In this research a case study approach was chosen because it gives the authors the possibility to study a specific situation in-depth and make generalisations on the results gained from these situations. Other benefits of the case study approach are that it shows what can be done and what should not be done in a similar situation. It furthermore also approaches the complexity of the studied problem (Merriam, 1988/1994). The drawbacks with this approach are that researches have to be restrictive with their generalisations, since the findings are only based on a specific case and since the researchers work significantly closer to the research object, in comparison with statically based research, personal values when interpreting the data can affect the findings (Ejvegård, 2009).

3.3.1. RESEARCHED BUSINESSES
To fulfil the purpose of this thesis, the authors contacted businesses that matched the criteria ‘unusual’ and two fourth-party logistic providers were thereby selected. The first business (CC) is operating in the construction logistics, mainly in Sweden and serving business customers, the other one being a 4PL specialised in reverse logistics (RC) throughout Europe, also serving business customers.

Logistics in the construction industry and reverse logistics meet the unusual settings criteria as RC and CC both operate in industries that are challenging as well as being two fields where, so far, no specialised performance measurement frameworks have been developed. Therefore these two business fields, within the 4PL industry, had an extra interest to the authors and proved to be useful when conducting the research.

3.4. DATA COLLECTION
The research that was conducted for this study followed a qualitative approach. As indicated in the research strategy clients along with businesses were interviewed to determine if their perception of performance measurement was aligned. From one side, the clients were interviewed by a structured questionnaire and on the other side semi-structured interviews were held with the business’ representatives, categorising it as qualitative research.
3.4.1. LITERATURE STUDY
An extensive literature study was conducted to be aware of what research has already been carried out and could therefore prove helpful for this research. Scientific articles and books were used to build extensive knowledge on the topics that have been touched upon, thereby creating a solid foundation for the research that was conducted. It furthermore extended the authors’ knowledge, which helped them in guiding the semi-structured interviews and professionally initiate the discussions conducted with the businesses’ representatives. The gathered information is all captured and processed in chapter 1, ‘Introduction’, and chapter 2, ‘Literature Review’.

3.4.2. SEMI-STRUCTURED INTERVIEWS
The interviews that were held with the business representatives in charge, or connected to performance measurement, were set up as semi-structured interviews with standard as well as open type questions (Walliman, 2011). The purpose of this research was to gather input from every angle, even from perspectives we did or could not have knowledge of. Another reason for using the semi-structured interviews was that it gave the possibility to create a discussion, which further contributed to the quality of the research.

A part of the business research consisted of researching what KPIs the businesses use in their performance strategy, while the customer research was to inventory what KPIs are used in their performance measurement strategy towards the service provider. The data gathered from both the customer and the businesses’ representatives therefore complement each other as it gives insight in the degree of alignment of the performance measurement strategy along the partners in the supply chain network.

A list with questions, which can be found in Appendix A, were set up to gather standard data, such as name, function and experience, but also to initiate discussions that functioned as a trigger for the representatives to think with the authors and connect to knowledge that would otherwise not be disclosed or referred to. The interviews were conducted face-to-face as a more personal atmosphere is created and where visual signs can be used to receive good responses (Walliman, 2011). When interviewing representatives of a business there is a risk that the interviewee will give bias answers, which results in the data collection not representing the factual situation.
For the 4PL specialised in Reverse Logistics, semi-structured interviews of approximately 45 minutes were held with several departments. For the 4PL specialised in Construction Logistics a longer interview, approximately three hours, was held with the Operation Manager. An overview of all the involved representatives can be found in Table 1. This added up to five interviews with the businesses’ representatives with a total of seven hours.

<table>
<thead>
<tr>
<th>Department</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finance</td>
<td>Finance Director (RC)</td>
</tr>
<tr>
<td>IT</td>
<td>BPM &amp; Quality Control Engineer (RC)</td>
</tr>
<tr>
<td>Operations</td>
<td>Operations Manager (RC)</td>
</tr>
<tr>
<td>Sales</td>
<td>Customer Service Manager (RC)</td>
</tr>
<tr>
<td>Sales &amp; Quality</td>
<td>Account Executive Manager (RC)</td>
</tr>
<tr>
<td>Operations</td>
<td>Operations Manager (CC)</td>
</tr>
</tbody>
</table>

**TABLE 1: POSITION OF THE INTERVIEWEE.**

### 3.4.3. STRUCTURED INTERVIEWS

Customers of RC and CC were interviewed by structured interviews, conducted either over the Internet or by telephone, to determine the perception of performance experienced by the customer. Uncertainties were further clarified by e-mail. In this way research could be done to evaluate if the businesses’ performance measurement strategy, measured by KPIs, was aligned with the customers perception of the businesses’ products.

For CC an online questionnaire was used. The questionnaire was created with online-based software, whereof the link was sent to customers of CC by e-mail. An outline of those questions can be found in Appendix B. An Internet based survey was used because of its speed of delivery and response and ease of data analyse (Sills & Song, 2002). To increase the response rate the number of questions was limited. Because of restriction from one of the researched business the answers for the questionnaire were gathered by telephone calls to a selected number of customers.

For CC the survey was sent to 20 customers. The total amount of responses was seven, which gives a response rate of 35 %. The response rate in itself does not guarantee the quality of the research and in this situation a low number of responses in absolute numbers make it impossible to draw industry wide conclusions based on the findings. Also, since the customers contacted were selected by the studied
business, there is a risk that the sample does not represent the view of all customers. Changes in e-mail address can also lead to non-sampling errors (Sills & Song, 2002). However the findings should be seen as an indication of what the truth might be and therefore be further researched. The reason for the low number of surveys conducted depends on practical hindrance. CC has relatively few customers resulting from their form of business; people do not purchase buildings on a daily basis. Furthermore, the Swedish construction market is dominated by four big businesses, which lowers the total amount of businesses in the market.

The purpose of the questionnaire was limited as it was only intended to answer what performance measurement customers of the businesses used when evaluating these 4PLs. The selections of KPIs used in the questionnaire were taken from Gunasekaran et al. (2004) where he suggests what KPIs to use in the supply chain. The metrics are spread over strategic measures, tactical measures and operational measures. KPIs suggested by Gunasekaran et al. (2004) that were not relevant for this study, were not presented as an alternative to the customers. To avoid misguiding and/or an insufficient overview of KPIs, the respondents also got the opportunity to suggest other KPIs that they think are worth mentioning.

For RC, the interviews were conducted by telephone, because of the limited amount of customers that were provided by the business. Although this number was limited to two, more topics could be discussed and reflected upon, as there was the possibility of discussion. Table 2 provides an overview of the function of the employees with whom the interview was conducted. As those interviews were conducted in a late stage of the process, the decision was made to let RC customers reflect upon the outcome of the questionnaire, which can be found in section 4.3, Table 3. Moreover, more details about the KPIs were researched to discover the customer’s perceptions towards RC.

<table>
<thead>
<tr>
<th>Customer 1</th>
<th>Project Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer 2</td>
<td>Digital Commerce Logistics Analyst</td>
</tr>
</tbody>
</table>

**TABLE 2: STRUCTURED INTERVIEWS WITH CUSTOMERS**

The five semi-structured interviews conducted with business representatives, the two structured interviews conducted over telephone and the seven structured interviews by e-mail and questionnaires brings up the total amount of conducted interviews to 15.
3.4.4. Observation
At RC an internship was performed by one of the authors, which enabled a better insight in the industry and the business’ activities. As the 4PL Reverse Logistics provider was, during the research, involved in the development of their performance measurement strategy and the author involved in a project involved with structuring the processes covered under Business Process Management, the actual presence proved beneficial for the conducted research. It allowed the researcher to verify ideas with the business on a daily basis and thereby making sure that the ideas presented in this report were reflecting the reality.

3.5. Analysing Method
Data was analysed from the literature review, interviews and questionnaires conducted. There was a difference in the way this data had to be analysed as primary data was gathered, but at the same time qualitative data was involved as well.

3.5.1. Primary Data
The semi-structured interviews held with the representatives of the two businesses that were involved in performance measurement, were analysed by observation and interrogation (Walliman, 2011). Personal conducted interviews, where not both the authors could be present, were recorded and/or captured in detailed notes, to keep the possibility of multi-interpreting open. Additional to this, the interviewer summarised the content of the interview on a regular base to keep structure and align the content of his notes with the interviewee. All the notes where communicated to the interviewee by e-mail with the question to confirm those notes and add additional ones where the authors might have forgotten details. This enabled digital documentation and an indirect way of authorising the notes, creating better conditions for analysing. The documented notes were communicated between the authors to avoid the loss of information when data gets exchanged by word of mouth. This contributed to the analysis of the gathered data as both the authors could make a well-funded interpretation based on the notes.

Further primary data was gathered by interrogation (Walliman, 2011). This data was gathered by digital questionnaires, where no possibilities were left to ask any question as a reaction to a given answer, and telephone, where more discussion was possible. Although the questionnaire was set up with clear questions, doubts can always be raised with the given answers. By applying the knowledge the authors gained and using common sense, the data was interpreted and used within the research.
3.5.2. Qualitative Data

Qualitative data was obtained by conducting interviews with representatives of the researched businesses, either by telephone or in person. As mentioned before, interview transcripts were made from those interviews and analysed by human interpretation (Walliman, 2011). Where needed, various sources were consulted to verify the information or to gain more insight into what had been said during the interview.

Further qualitative data was gathered by customer interviews, conducted over the Internet or by telephone. Analyses were based on the amount of times that a certain performance metric was shown as result from the questionnaire or mentioned over the telephone. The higher the amount, the more likely it would be used and advised to business to include in their performance measurement strategy.

The KPIs used in the questionnaire were categorised depending on if they where Strategic, Tactical or Operational. The number of responses of each level of importance, very important, important, unimportant and not applicable, was divided by the total number of responses for each level of management. It is thereby possible to present the number in percentages that can be compared between the different categorises. The same process was used to categorise the KPIs into the Supply Chain processes.

3.6. Quality Assessment of the Thesis

For research to have credibility and thereby scientific significance it has to have both reliability and validity. Reliability is based on the argument that another researcher should be able to do the same research again and get the same results. Daymon and Holloway (2011) argue that it is not possible to do a qualitative research as a case study, since the researcher is closely involved in the project, which is supported by an interpretivism world view (Saunders et al., 2009) and thereby is an integrated part of the measuring system. Taking away that researcher and adding another researcher will then change the measuring system that is supposed to be the same according to traditional reliability. To enhance reliability the interviews were done from a semi-structured perspective with an interview guideline as a framework, which made it possible for future researchers to follow the same track. As stated before, after an interview was finished transcripts were created while the interview was still fresh in the authors’ memory. Any doubts were further discussed with the interviewed, which also got the opportunity to correct the transcripts if the researcher had misinterpreted. Next to creating better conditions for
analysing the data it also decreased the researchers’ subjectivity bias on the data and thereby increasing reliability. However the research was only performed at two separate businesses in two industries, which make it probable that research performed at other businesses, with other persons, can provide different data.

Validity has to do with if the researcher is evaluating what he intended to evaluate, in other words, were the right things being measured (Ejvegård 2009). However, Daymon and Holloway (2011) argue that since validity, just as reliability, derive from quantitative research it is not strictly applicable in a qualitative research. Validity in qualitative research can be divided into external and internal validity. Internal validity is how the data presented reflects the social world of the case presented (Daymon and Holloway, 2011). To increase the internal validity the researchers visited the businesses to get to know how they operated, this enabled them to understand how different KPIs can affect the business. The external validity deals with how well the findings can be applied in other settings. The interpretive worldview focuses on a specific situation and can therefore not guarantee that the findings will be further applicable (Daymon and Holloway, 2011). The method chosen in this research is applicable in more situations than the one presented here, which creates external validity for this research making it possible to recreate it in other businesses and from there draw broader conclusions.

To increase reliability both prolonged engagement and persistent observation was adapted at the business where the internship was performed. The authors hereby compensated for the individual research limitations, which further contributed to the creditability of the conducted research (Onwuegbuzie and Leech, 2007; Shenton, 2004).

Halldórsson and Aastrup (2003) state that trustworthiness can be used to increase the credibility of research related to logistics problems. The trustworthiness replaces the traditional values of reliability and validity and replaces it with truth-value, transferability and contextualism and trackability and explicitity. As this research is based on a multiple case study, it is informed from a more naturalistic position. Truth-value is achieved by being aware of the nature of the problem, choosing the relevant criteria to address the characteristics of it (Halldórsson & Aastrup, 2003). Transferability and contextualism is achieved by comparing best practices, using the frameworks developed and analyse them to compare dis- and similarities. Trackability and explicitity can be further used for the credibility of

this research, as all the documents, results and communication will be stored and verified to serve as proof when requested upon.
4. EMPirical research

This chapter presents the businesses that took part in the case study followed by presenting how they work with performance measurement nowadays and their views of well-established performance measurement frameworks. The final part presents the results from a study of the customers’ preferences for performance measurement.

4.1. THE REVERSE LOGISTIC BUSINESS

The 4PL RC, where the interviews were performed, is a Pan-European provider of Reverse Logistics, currently in the stage of expanding their services throughout the world. As they provide reverse solutions with an extensive set of services, the business has contracts with a wide variety of distribution hubs, postal services and transport businesses, thereby providing a well-developed logistical network throughout Europe.

The business provides their clients’ customers with labels to return their goods and have therefore developed an easy and accessible solution for the return flow of products. The customer either prints, by providing details in a web-interface, or uses the pre-send label, attaches it to the package and depending on the service the client has chosen, it gets either picked-up or the customer can drop it off at any postal point. All the business’ processes are managed by the service providers’ IT-system and covering the entire supply chain, enabling transparency for both the client and the client’s customers.

4.1.1. PERFORMANCE MEASUREMENT

The business is growing fast as the awareness of having a closed-loop supply chain is increasing and in certain cases regulations force them to have it in place. RC strongly benefits from this situation and with their goal to offer their service across the globe their position within the market is strengthening. They are currently running two major projects within their business, one of them covered under Business Process Management (BPM), which takes care of mapping and optimising all the internal processes, the other one being the development of a monitoring system covered under the optimisation of their performance measurement strategy. The external request and internal need for a more developed and transparent measuring system made RC launch a project that embeds the development of a dashboard, which will function as a pro-active alerting tool where the performance of the network can continuously
be monitored. Those two projects are closely connected to each other as showed from the responses received from the different departments within the business.

4.1.2. INTERNAL PERFORMANCE MEASUREMENTS
For the inter-business performance measurement an interview was performed with the sales department, which is responsible for implementing and managing the internal KPIs. As the business is in the stage of developing their performance strategy towards their partners and suppliers, the sales department also recognised that they have to develop internal KPIs to ensure the quality for their customers. The need for such a system came after a customer’s request for supplying them with KPIs for the following-up of customer issues, which has been implemented but has, until now, only been maintained for this customer. Those metrics are reviewed on a monthly and quarterly base and logged in manual documents owned by the sales department. When the alignment was addressed, the interviewee noted that they want to be leading in defining the KPIs and therefore decided to start developing a set of internal KPIs, which could be offered to the entire customer base once implemented. While this was still in the development stage, the metrics were not yet aligned with other departments within the business.

The currently used KPIs are:
- Email response time
- Follow-up time of issues

Furthermore, when an offer for a new client is made, an internal business plan is made for the extra, non-standard services that a customer requires. Here the request is transformed into a business plan, where the hard, financial measures, are stated, which also serve as metrics that are used for measurement.

4.1.3. EXTERNAL PERFORMANCE MEASUREMENTS
The operations department is monitoring the external performance measurement, in this case the performance of the logistical network. As they are responsible for the postal network, distribution hubs and transportation businesses, they currently measure two KPIs, which are provided by RC’s IT system. When RC contracted its main supplier a set of metrics and service level agreements (SLA’s) were developed in the following categories:
Handling: off-loading times, scanning procedures, transition of documents. To be measured over periods of two months and reported on a monthly basis. Reviewed after 6 months.

- Line haulages: delivery times. Measured on a case-by-case basis.
- Reporting: information provided per category
- General: issue responding and reporting times

Since the currently used system does not yet support the monitoring of all these KPIs, the department is currently monitoring the following KPIs on a monthly basis and in certain priority cases, on an ad-hoc basis.

- Transit times: Analysing the time it takes to cover the total distance from customer to client.
- EDI coverage: The amount of parcels scanned compared to the amount of parcels processed.

Although the amount of KPIs is limited, the ones that are currently used function as a good parameter for the status of the network. In line with the development of the business’ performance measurement system, the operations department has developed a custom framework that describes the additional operational metrics that the department would like to have implemented, which will further increase the transparency of the network. The IT department is currently researching how their IT system can embed and measure those metrics.

4.1.4. Theory proposed frameworks
Performance measurement within this business is currently done with a set of hard metrics that do not belong to a certain framework, but were implemented by internal and external requests, which also resulted in a need to further develop and structure their performance measurement.

The sales department felt very familiar with the BSC model, not only due to previous experience with this model, but also with the remark that such a model could well function within RC. Although this model has not been introduced in RC, the business’ performance measurement shows similarities with the model for the customer perspective part. The sales and operations departments are requesting internal metrics, such as ‘transit time’, ‘e-mail response time’ and ‘follow up time’, which show similarities with the ‘customer perspective’ part in the BSC. As mentioned, using all the parts of the BSC would prove useful, as all the important aspects within the business would then be addressed.
The Operation Manager had previous experience with the EFQM model and stated that this model has not been implemented, as it is too general in its approach. Furthermore, fulfilling the requirements of this model, to be eligible for the quality award, is also a time consuming activity, which is not resulting in an equal increase of the effectiveness. The especially pragmatic approach of this department and the business in general is contrary to the general EFQM approach, which was also partly mentioned for the BSC model. They rather see a general, high-level framework, such as the BSC, aligned and extended with customised frameworks specified to the business’ operations.

The model developed by Gunasekaran et al. (2004), embedding the four activities of the supply chain and divided in a strategic, tactical and operational level, was perceived positive by the operations departments. Although the business’ activities do not comply with all the activities of the supply chain, the approach Gunasekaran et al. (2004) follow in their article, defining metrics by making an inventory of the business’ requirements that leads to the development of a customised framework, showed similarities with the business’ approach when they created their customised framework. Although they did not divide it according to the activities and levels Gunasekaran et al. (2004) use to create their framework, it shows the need of having a customised framework specified to the business’ operations. Gunasekaran et al. (2004) take a supply chain view, including all the businesses that are operating in this supply chain. When connecting this to the alignment among the supply chain, the business’ representatives were positively interested, but acknowledge that this has not been developed yet.

For the construction framework developed by Bassioni et al. (2005) the responses could be compared to the responses on the EFQM model, as the operation manager doubted what operational effectiveness it would bring compared to the theoretical implementation of this framework. A general framework, extended with customised, activity specific metrics embedded in one framework, would prove more effective and better reflect the business’ approach. Transparency between the business and their supplier is already provided by the IT system, which is connected to various external systems, and can prove helpful in the future when an alignment of the performance measurement strategy might come in place.

The need for performance measurement is definitely present within RC, as they are currently developing a performance measurement system connected to their IT system, which has until now only focused on the actual operations. The approach definitely serves as a good start for further development of their
performance measurement strategy, but a lack of time and a clear overview of their processes have mainly been mentioned as a limitation. Furthermore, defining the processes, currently covered under a Business Process Management project, is seen as a necessary step in optimising the performance measurement strategy and those two projects are therefore closely related to each other. Embedding this performance measurement strategy in a framework would be beneficial, with the remark that it has to largely consist of a customised part. This framework can then not only be used for internal optimisation, but can also serve as a good communication tool to the customers and suppliers.

4.2. THE CONSTRUCTION LOGISTIC BUSINESS

CC, a logistics business within the construction industry, where this case study was conducted, is a 4PL specialised in planning and delivering services for construction sites. The business started as a retailer of construction material and as an ad-on service they also delivered the material to the construction sites. Nowadays, the retailing part is sold and they focus on making it possible for builders to spend more time on value adding activities instead of waiting and other non-value adding activities. The business achieves this by carrying materials after regular working hours, material can then be moved faster due to less people on the site and less waiting time for the construction crane and construction elevator. As a result, the builders do not have to carry the material, as it is placed where they need it in the morning and do not have to invest time in organising where to place the material. Moreover, they also do not have to wait for resources that are needed at other places or by other people during the hectic day. The cost savings here can be reached by the idea that a specialist can perform the tasks faster and thereby cheaper.

The other part of the business is their logistics planning and information system. This system focuses on the planning of all flows within the construction site as well as planning for the arrival of goods to the site and the use of resources, such as construction cranes, within the site. The earlier they come in to the planning phase of the whole construction project the more possibilities they have to improve the processes. They plan where to store the material when it arrives to the site and where to keep it when the builder uses it, thereby reducing the production time. They have also developed an information system in which every delivery is booked along with the resources needed for offloading. This system deals with information about actual delivery times, damages on delivered goods and goods that arrive that have not been booked in advance. All this information can be accessed through their information
system and is used to encourage the contractors to step up their performance. However, this information is not centrally used to measure the performance of each project.

CC is the only business in Sweden offering this kind of service and the field has not yet been fully exploited, therefore new opportunities and new ways of carrying out their processes are continuously changed and developed.

4.2.1. PERFORMANCE MEASUREMENTS
In the current project their performance is measured by hard measures such as cost and revenues. For offering their service they measure the cost and revenues per article delivered to the site. All projects, as individual projects, are also measured by economic performance measurements as well as the economic performance of the whole business at the end of the year.

To compensate for the lack of measurement the business has a constant dialogue with its customers. During each project there is a continues contact between the business and its customers since they work together on the same site, thereby enabling immediate feedback when something is not working the way the customers expects it to work. In addition to the continues-dialogue, the business wants to have quarterly meetings together with its customer to discuss their performance, but those are not yet taking place. Furthermore, at the end of each project a final meeting is held where the customer gets the chance to elaborate on CC’s performance. The business lacks a set strategy on how to transfer the learned knowledge from each project back to headquarters, instead much of the gained knowledge is bound to the persons involved in each project and in turn use that in their upcoming projects.

4.2.2. THEORY PROPOSED FRAMEWORKS
Of the four categories in the Balanced Scorecard model, the ‘Financial perspective’ is the one used within the business. They also found ‘Innovation and Learning’ an interesting subject since they view themselves as successful in this area, especially during last years’ rapid growth, but they saw no real way of measuring it. ‘Internal Business Perspective’ is another area where they view themselves as successful since they more or less only work with their core competence and here they feel they perform well. This is the category that is most transparent and therefore easy to measure, for example damages on material. The ‘Customer Perspective’ part is carried out by having a constant dialogue with their customers instead of measuring it.
The major problem they see with the EFQM model is that it is non-descriptive, thereby making it difficult to know if you are using it in the right way. You can easily boost your own number by choosing how to measure, so they feel that setting it up correctly would be difficult. Another problem with this model is that most of the categories have to be evaluated by using employee surveys and since the business is small, there will be no real confidentiality.

The supply chain model divided up into Plan, Source, Make/Assemble and Deliver has a structural problem for this business since the services they provide are covered under deliveries and planning, which means that the Make/Assemble process cannot be applied. They therefore think that this framework is not applicable in their situation. Although, of the metrics suggested by Gunasekaran et al. (2004), the Operations Manager was interested in the operational part of the delivery process; these activities they thought would be useful to measure.

The construction framework, proposed by Bassioni et al. (2005), was perceived as too static, as it lacks flexibility to cope with the continues-development they are striving for. For example, the framework states that the strategy of the business is always affecting the different aspects, but since each project spans over a long time and the business develops new solutions, the strategy used is actually different for each project. This is due to the fact that the strategy used in the planning phase of a project can then after a while not be altered, meaning that the old strategy has to be kept. A positive thing with this framework, compared to the other ones that were presented, was the acknowledgement of the work culture affecting the performance of the businesses, which therefore should be measured.

To be able to determine their effects on a construction site the business has performed studies in collaboration with Swedish universities. In these studies the time of builders has been measured to quantify the time used for creating value against the non-value added activities such as planning, delivery times of material and waiting for the availability of resources. These results have shown a clear difference between sites using CC’s service and those that do not by a clear increase of the time used to value creating activities. This is a way the researched business measures their effect on construction sites and it is this information that they are most interested in with regards to measuring, both for the improvement of their performance as well as the possibility to present the information to potential customers. The problem with this measurement is that they find it time consuming and thereby expensive to carry out.
CC view performance measurements as something that would probably be good, but it demands more effort from their side. In today’s construction industry they therefore have no incitement to measure their performance. Their customers do not demand it from them, they do not have any real competitor and it is not a common practice within the industry. The only argument is that they could hereby increase their performance, but as long as they are generating good revenues, CC does not recognize the need.

4.3. CUSTOMER PERSPECTIVE
The response from customers of CC had an inclination towards viewing all the KPIs presented as important, however, there were certain KPIs regarded as more important for the customers. In general, the KPIs concerning the flow of cash, efficiency of it and the utilisation of capital scored a lower average than other KPIs. Other low scoring KPIs were effectiveness of delivery invoice methods and percentage of defects. Those KPIs that were considered more important were perceived value, cost per operational hour, delivery reliability, human resource productivity and net profit versus productivity ratio.

4.3.1. SUPPLY CHAIN MEASUREMENT
The KPIs from the questionnaire were categorised into the three levels of management where the number of responses was divided by the total number of responses for each level of management. Table 3 shows that the respondents viewed the Strategic KPIs as “very important” to a higher extent than KPIs on Tactical or Operational level. Table 4 shows the responses categorised into the different Supply Chain processes. The plan phase is clearly an aspect that customers perceive as essential when deciding to outsource logistic processes to a 4PL.

<table>
<thead>
<tr>
<th></th>
<th>Strategic</th>
<th>Tactical</th>
<th>Operational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very important</td>
<td>53%</td>
<td>32%</td>
<td>42%</td>
</tr>
<tr>
<td>Important</td>
<td>38%</td>
<td>48%</td>
<td>31%</td>
</tr>
<tr>
<td>Unimportant</td>
<td>0%</td>
<td>3%</td>
<td>13%</td>
</tr>
<tr>
<td>Not applicable</td>
<td>9%</td>
<td>17%</td>
<td>15%</td>
</tr>
</tbody>
</table>

**TABLE 3: THE LEVELS OF MANAGEMENT AND THE PERCEIVED IMPORTANCE BY CUSTOMERS OF CC**
Table 4: The supply chain process and the perceived importance by customers of CC

As the concept of reverse logistics in combination with 4PLs is fairly new in the service provider industry, this is reflected in the perception of the customer. The return flow of goods was in one case based on the forecasted turnover, which was allowed to be 12% and based on the average of the competitors serving the same or similar market. There were no metrics in place yet to evaluate the service provider, but RC’s customer indicated that there were agreements being developed to start with this measurement, by having Monthly and Quarterly Business Reviews (MBR & QBR) to review the agreed metrics between customer and service provider.

The customers were in the time of contracting not aware of how to effectively manage return flows themselves. Lowering the lead-times, increasing customer satisfaction and offering lower prices were promoted by RC and acknowledged by the customer, but no measurement for those metrics have been established yet. Customers do notice the decrease in price, but only at the end of the year, as it contains a part of their forecasted budget for returning products. Especially in the case of the 12% requirement, this is agreed upon at the beginning of the year and evaluated at the end. Since the customers’ forecasts are always rather optimistic, the returns always turn out to be lower than the 12%, satisfying the customer.

4.3.2. Supply chain alignment

From a customer perspective, when dealing with the alignment, no real alignment seemed in place for both the 4PLs. As no extensive performance measurement strategy had been developed and the businesses wanted to be in the lead concerning performance measurement, there was a low need for alignment upwards the chain. When addressing the purpose of striving for alignment, the businesses were positive about the effect, but acknowledged that with a wide customer base it is hard to strive for such alignment. They rather stay in the lead and offer standardised KPIs to their customers. Those KPIs
can then for example be offered by a different set of services, each specified to another type of service level.

One of the customers, in case of RC, acknowledged that the focus is still on the forward logistic flows. As they agreed on various KPIs for those providers taking care of the transports to the clients, those same agreements are not applied for the transport from the customers. The only metric the customer was stressing, was the lead-time for refund, as the final customer should get his money returned in the fastest way possible. Several developments have therefore taken place, taken care of by RC, such as grading the goods upon arrival in RC’s warehouse. As the client indicated that the final customer should be the central point of attention, more developments would be initiated, but as of now no attention was yet given to that.
5. ANALYSIS

This chapter presents the analysis of the findings, gathered after conducting the interviews. First a general view on performance measurement will be analysed, followed by the supply chains’ alignment. It will end with an evaluation of the general frameworks used in this study.

5.1. PERFORMANCE MEASUREMENT

Janse et al. (2010) state that there is a lack of appropriate performance measurement systems for reverse logistics, but standard metrics can always be implemented and monitored, such as:

- Lead-time
- Supplier/partner performance
- Customer satisfaction

As reverse logistics is not yet recognised as the tool that can put businesses ahead (Janse et al., 2010), those metrics can be implemented to increase their significance in business. They can furthermore extend this set of metrics with business specific metrics, which can be defined by analysing businesses’ activities (Gunasekaran et al., 2004). What was found during the conducted research was that those standard metrics were applied in the case of RC, but not in a consistent or effective way.

5.1.1. INDIVIDUAL BUSINESS PERFORMANCE

Sink et al. (1984) states that there are seven basic performance criteria; all of them interrelated to the other. As is stated in their article, the first two interrelated criteria are efficiency followed by effectiveness, where efficiency is often strived for without regards to the effectiveness of the process. Sink et al. (1984) their research shows similarities with the research conducted by Schneiderman (1999), as they state that it is difficult to get measures that make the process more effective. RC’s KPIs regarding email response time improve the perceived customer service but does not necessarily improve the process of customer service. A response that is confirmed and will be processed can be perceived by the customer as a confirmation that a solution of the problem will be given. However, a single e-mail is often not enough to solve the issue. By focusing on a quick response the solution can be incomplete and thereby not addressing the complexity of the logged issue. Those KPIs can then be combined with a KPI that focuses on how many replies are necessary to solve the problem or a KPI for the time that is needed...
for solving the problem. This will improve the overall transparency thereby enabling the business to improve the quality that is offered to their customers.

The same idea applies to the third interrelated criteria that Sink et al. (1984) addresses in his article, the criteria of *quality* followed by *productivity*. Productivity embeds effectiveness, efficiency and quality by comparing the input and output. When the KPIs complement each other, measuring the outcome over several combined metrics, those metrics can be combined in one KPI measuring the overall productivity. The productivity can then be improved as the combination of KPIs give a better overview of the performance and the workforce can adjust their activities accordingly. This will then contribute to the quality of the outcome as the productivity can be aligned guided by clear measurements. To develop for example the email response time KPI, as discussed in the previous section, with the aspect of time per problem to be solved alongside the number of e-mails send out, would be a measurement of productivity as Sink et al. (1984) also indicated.

The next two criteria, *quality of work life* and *innovation*, Sink et al. (1984) argue, are two subjective criteria that are difficult to measure, but affect the other criteria in a significant way. CC had an interest in these kinds of metrics and acknowledges their importance, but had no idea of how to measure them. For businesses where competition is lacking, innovation is essential. As long as a few businesses without fierce competition are successful in generating profit, other businesses will have a low-entry barrier to this market. To constantly stay ahead of the competition, the current businesses need to be able to innovate. If they lack an innovative culture it will be difficult to start when their survival depends on it. That is why they need to make sure that they are innovative already and constantly be aware of what is happening around them. This innovation has to be driven by the workforce, as they are part of the business they will be the key to innovation.

The last criteria stated by Sink et al. (1984) is *profitability*; which is often being used as the most important area to measure performance in and this has been confirmed by the researched businesses. Measuring economic performance has been the cornerstone for deciding the success of any business and it would therefore be highly unexpected to find any indication that 4PLs work in any different way with economic indicators. Nevertheless, economical KPIs should, as any other KPI, be easily understandable and workers that review those KPIs should be able to understand how their actions will affect them. The understanding of KPIs and their correlation to each other is essential to influence
peoples’ behaviour in the desired direction. This research was unable to find that businesses, when setting economical KPIs, had adopted this view to complement the economical results that are of interest to the stakeholders.

5.1.2. CUSTOMISED KPIs
During the conducted interviews the authors discovered that the researched businesses are lacking KPIs or performance measurement in general. One of the businesses tried to fill-up this gap by having a constant dialogue with their customers. Because their projects are client specific and new solutions are constantly being developed, KPIs can vary per project and thereby hard to implement. This does not hinder the business from developing KPIs that are evaluated for the durations of the projects thereby making sure the quality is upheld. Project specific KPIs can be developed in accordance with the customer, but also taken from a set of customised KPIs developed by the business itself. The business can furthermore develop complementing KPIs that are not project-specific, which, by aligning them with the business’s mission and vision, can be applied to every project the business is carrying out.

As representatives from RC mentioned, they want to be leading in defining the KPIs, therefore the business should take the initiative in implementing such KPIs in the project. The degree of alignment then depends on how much information the business wants to reveal to its customers. Implementing and aligning internal KPIs to measure the progress of a project will also benefit the business by increasing its transparency throughout the process. Monitoring for example budget, planning and utilisation will enclose discrepancies at an early stage and action can then be taken accordingly.

5.2. PERFORMANCE MEASUREMENT ALIGNMENT
The conducted study proved that there is a lack of alignment along the supply chain. While there are KPIs implemented after customers’ requests, there is no consistency in implementing them further among other customers. The businesses seem to more focus on an alignment down the supply chain, rather than upwards. This seems logical from a service providers’ perspective, as they are more interested in how their suppliers function, since that directly affects their operations. Aligning the KPIs upwards the chain would be an enabler for improving the service provided to the final customer, but has until now not been done due to a lack of performance measurement in general. Aligning them from the customer towards the final customer, including all the LSPs in the supply chain network will benefit the quality and contribute to the competiveness of the chain.
5.2.1. INTERNAL ALIGNMENT
The internal and external metrics for RC, which are currently developed and will be embedded in an alerting tool, will monitor the performance of the entire supply chain network. Alignment of the metrics will then be applied, but starting from the service provider, not the customer. This was rather remarkable, as the customer’s customers, the final customer, is only aware of the client of the LSP. The service provider as such is an unknown link in the supply chain from a final customers’ perspective. The mission and vision reflected by the customer, perceived by the final customer, was expected to align with the service that the 4PL is offering, but this was not the case.

The awareness of conducting performance measurement within businesses is growing, not only to improve internal processes, but also to be more competitive on the market. When performance measurement is in place, businesses are trying to align the KPIs with their strategy and vision (Ax et al., 2009), but as RC was developing their performance measurement strategy, there was no internal alignment in place. KPIs developed by one department were not aligned yet with other departments, therefore the KPIs that were agreed with the customer could only be established for use within the individual departments. Although, the KPIs that are maintained by the Sales department, and agreed upon by the customer, are:

- Email response time
- Follow-up time issues

The follow-up time could involve multiple departments, especially in the case of issues involving operational processes, where other departments carry the responsibility. Internal alignment is therefore a necessity and could be established by agreements made between the departments as an initial start. In a later stage the business can further improve its service by optimising its cross-departmental processes in line with the KPIs offered.

5.2.2. CUSTOMER PERSPECTIVE
What was proven from the research is that the businesses’ customers do not, or very limited, maintain KPIs to evaluate the performance of their service provider. As both the 4PLs are specific in the activities they perform, customers might not know what specific KPIs they have to use for the supplier evaluation. As no specific KPIs were indeed used, it was remarkable that even standard KPIs, such as for the economical performance, were used in a limited way. Alignment of the KPIs could therefore not be
applied, which was not only caused by a lack of performance measurement, but also due to a clear decision of the businesses to avoid being too transparent. The 4PLs did not want to disclose too much information to their customers, only the information that was deemed necessary to satisfy the customer.

In the case of RC, customers can choose from a different set of services, thereby able to adjust it to their values. When this customer maintains a high service level towards its final customer they would choose the services accordingly. Measuring those services would be an initiator for the alignment, although not specified to the customer’s exact mission and vision. In this case, the service provider would then carry the responsibility of maintaining the KPIs connected to those services. RC indicated that they want to be ‘leading’ in defining the KPIs, therefore connecting those KPIs to their products would then enable them to keep the initiative of proposing KPIs to their customers and be in the ‘lead’.

Offering a standard set of KPIs in the proposal phase would enable the businesses to create more trust from the customer’s side and when contracted, improve the transparency. When the businesses then evaluate their performance by having a dialogue with their customer, either continues, weekly or monthly, they can establish a good relationship and continuously improve their processes. The businesses should be aware that, when offering this set of standard KPIs, they have to make sure that they are able to maintain the service level promised to the customer. Well-developed KPIs should therefore be included in the standard set, as it will function as a controlling tool for their customer.

5.3. EXISTING PERFORMANCE MEASUREMENT FRAMEWORKS

No performance measurement frameworks are used in the researched businesses as of now. Although they have an interest in the adoption and are positive about implementing such frameworks, there is a need for a customised approach that could follow parts of the developed frameworks.

5.3.1. BALANCED SCORECARD

When the Balanced Scorecard was developed, it was designed to make it useful in any business in any industry. Both businesses in this research viewed the BSC as something positive and possible to implement, as it is easily adaptable to their specific needs confirming the creators’ idea of making it accessible to implement in any business. This research therefore acknowledges that performance measurement in the 4PL industry does not necessarily have to be different from any other industry, although a more customised approach is preferred.
Both businesses that took part in this study found the customer perspective as a natural step, being in contact with customers to get their feedback is essential to be successful. As long as the customer perspective is measured on an operational level, the business saw no problems with it. However, measurements on an operational level will not be enough according to Gunasekaran et al. (2004). When deciding to start working with performance measurements in a professional way it would therefore be advisable for businesses that are using the BSC to not only look for having KPIs within in each category, but also making sure that those KPIs are measured on an operational-, tactical- and strategic-level. This will then enable alignment along the supply chain, with metrics that can be measured by multiple businesses within the chain.

5.3.2. EFQM Excellence Model & Bassioni’s Construction Industry Framework

When the EFQM Excellence model was introduced it aimed to motivate businesses to improve their performance measurement by rewarding them with a quality award. As RC business indicated, implementing such framework is a time consuming activity and fulfilling the EFQM’s requirements does not equal the advantages the businesses get from it. The especial pragmatic approach of this business asks for an easy implement- and understandable, effective framework, specified to the business’s specific processes.

Based on the EFQM Excellence model, the framework Bassioni et al. (2005) developed for the construction industry cannot be seen as a solution for performance measurements of 4PLs. In fact not even CC saw this framework as a desired solution. The framework is complex since it has its roots in the EFQM model and has been further developed to have a better fit, but this development is not appropriate to the researched businesses.

CC has more in common with LSPs than other construction businesses. Even though they share the project based work form instead of long time strategic production co-operations, they do not produce a product, but instead plan and deliver, which is the most important aspect of their business. In logistics, the flow of information is a substantial part of the business along with planning and deliveries, even though extensive information KPIs were not among the top ranked KPIs in the view of CC’s customers. The reason for this can be the relatively new way of letting 4PLs taking care of deliveries to a construction site. If a framework is to be developed further to be more specific than for example the
BSC, the delivery aspect, alongside planning and information, instead of traditional production and production quality, has to be in focus for the framework to be successfully adopted by 4PLs.

Both businesses expressed a wish for frameworks that are possible to adjust to the specific needs of their own situations. The framework of Bassioni et al. (2005) cannot address this need as it is based on the non-descriptive EFQM model and has been further developed to include the view of many different managers, thereby making it hard to specify it to the businesses’ specific needs. In the case of CC, the complexity of the framework was not well understood by the business, caused by the lack of knowledge about performance measurement.

5.4. FURTHER DEVELOPMENT OF PERFORMANCE MEASUREMENT FRAMEWORKS
As indicated many times by the businesses’ representatives they stressed the need for a customized framework, specified to their processes. Bearing the focus of this research in mind it is hard to implement a framework that would both cover the supply chain and at the same time cover each of those businesses’ specific needs. As the scope of each of those frameworks will differ, they could complement each other, thereby covering a wide area within performance measurement.

5.4.1. BUSINESS FRAMEWORKS
The model developed by Gunasekaran et al. (2004) shows similarities with the researched businesses’ approach. Although they do not divide their metrics according to the four activities and three levels as defined in the article, nor over the entire supply chain, they follow the approach followed in his article. RC gathered input from the various departments in the organisation and translated that into KPIs specifically adapted to the business’s processes. Here the need for a more customized approach can clearly be seen. Business should therefore not focus on adapting current frameworks, but rather define a strategy that enables them to develop their own framework. As Gunasekaran et al. (2004) described the strategy of developing a customized framework, research should be directed towards providing businesses with a guideline on how to successfully develop their own framework. The currently developed frameworks, such as the BSC and the EFQM Excellence model define in what categories a business should excel, but are unclear in providing businesses with a workaround to specify the strategy towards their unique needs.
Even though the framework of Bassioni et al. (2005) is not suitable for 4PLs, the process of developing it offers a valuable insight. When specifying an existing model, collecting the views of managers in 4PLs and using their experience as guiding will enable development of a framework by and for the managers. However, the flexibility of the framework by Bassioni et al. (2005) was lost, thereby making it difficult for managers to recognise their business within the model. The development process should also make sure that it learns from the approach of Gunasekaran et al. (2004) to implement KPIs that cover all the three levels of management.

5.4.2. SUPPLY CHAIN FRAMEWORKS

Frameworks covering the supply chain have been mentioned in the literature, but were established with the remark that they should be specified to the business’ operations. By complementing frameworks within the supply chain a more effective performance measurement strategy can be established. The need for a more customized approach indicates an extension of already developed frameworks or the establishment of new frameworks. The effective use of the earlier addressed frameworks has been proven in the literature and could therefore be used within the supply chain. This framework would then function as a high level framework, extended or complemented by business specific performance measurement strategies and/or frameworks for every single actor in the SC.

The Innovation and Learning and Internal Business Perspective parts of the BSC model are not addressed in the model by Gunasekaran et al. (2004) since the frameworks differ in scope. By combining the frameworks the possibility is given to fully utilise performance measurement along the supply chain. Although Gunasekaran et al. (2004) specifically use a supply chain view and the BSC is more focused towards single business performance, the models could function as an addition towards each other. Having a combined approach will both improve the single businesses’ performance and the supply chain as a whole, thereby increasing the overall competitiveness.
6. CONCLUSION

This chapter answers the researched questions asked in chapter 2 by drawing its conclusion from the empirical study in chapter 4 and the analysis presented in chapter 5.

Question I - How do the suggested frameworks for general performance measurement fit with the reality when they are applied to 4PLs?

General frameworks for performance measurements have been developed to be able to cope with the different needs of different industries and the logistic industry is hereby not an exception. However implementation of a framework like the BSC demands a deep understanding of the correlation between measurements, employee’s behaviour and business results. Managers want a readymade solution that will work in their specific situation and therefore customised frameworks need to be developed.

Performance measurement frameworks for 4PLs have not been developed so far. To be successful a framework does not only need to follow the general rules of successful performance measurement as suggested by Ax et al. (2009), but also be designed so that KPIs from all the three levels of management are covered. The customising process of a framework needs to focus on the delivery and planning process, which separates the logistic industry from traditional production industry, for which most research has been conducted.

Question II - How do 4PLs’ performance measurement strategies align with their customers’ expectation of the delivered service?

Alignment along the supply chain would contribute to the competitiveness. As all the businesses are working towards the same goal, aligning the measurements would enable them to better adjust their operations and processes towards each other. Due to factors such as the low competition degree or the lack of awareness, the need of a well-developed performance measurement strategy is not yet present in the case of the researched businesses. Alignment of the KPIs is therefore not consistently achieved, but is reflected in the services offered or by means of communication. It is hard, with a large customer base, to create alignment when the KPIs are varying for each customer, therefore the 4PLs should be leading in defining the metrics. The 4PLs are moreover interested in alignment down the chain, instead of upwards, as that is the area they can control and carry the responsibility for.
7. Discussion

Aligning the KPIs along the supply chain incurs sharing of information along this chain. A transparent system needs to be created where all the involved businesses within the supply chain have an insight in the shared KPIs. The business’ representatives of RC mentioned that the amount of information that will be revealed depends on what the business wants to disclose to their customers. The competition for both researched businesses is currently limited, but can get affected when they will disclose too much information. Moreover, when sharing the KPIs, the businesses should make sure that they are able to perform according to what has been agreed. Agreeing on the right KPIs is therefore crucial in the contracting process.

This research was hold up by the lack of knowledge about performance measurement and as a consequence, the lack of embedding performance measurement strategies that were well developed and designed as a part of the business strategy. This leads to question about how well spread the use of performance measurement is. Case studies at two 4PLs will not be able to conclude that performance measurement strategies are not used at the same degree by 4PLs in other industries. However, alongside other research performed about KPIs in the logistic sector, Hildor and Ottosson (2011) concluded the same findings as this research with regards to the lack of KPIs used, indicating that this could be a wider problem. This is problematic for the logistic industry since research has previously been able to conclude that higher performing businesses use performance measurement to a wider degree than business that are less successful, as has been discussed in the beginning of this thesis.

The researchers have talked with representatives from the researched 4PLs and found a keen interest of how successful performance measurement should be developed and implemented; the interest and ambition is there, only the lack of knowledge is holding them back. Managers are not the only ones being liable for this lack of knowledge, since researchers have not addressed the problem of having customised solutions for LSPs so far. Especially with regards to 4PLs this is an under-developed area of research.

The interaction with customers has indicated an interest of KPIs on a Strategic level, which does not align with what managers in the researched businesses measure. A reason for this could be that when choosing what KPIs to use, there can be a gap between those KPIs that are needed and those KPIs that
are available to a manager. Not every KPI is straightforward to measure and thereby availability can become an issue when selecting KPIs.

This research has made a foundation for further research by pointing out areas that need further attention. Research that compares the success between LSPs that use performance measurement and business that do not would be valuable for managers when they argue for increased resources to launch performance measurement projects. The customer input in this research did not have enough responses to be valid as conclusive proof, but it highlights an area where further research can help managers to better understand how to align their performance measurements with its customers’ needs. They can then create more value for the end customer thereby enhancing the competitiveness of the whole supply chain.

When evaluating the findings of this thesis it is important to bear in mind that the empirical findings are based on interviews and thereby it is based on opinions from managers who can be bias in their answer, conscious or unconscious. Therefore, more research about performance measurements of 4PLs is needed, preferably using other methods for data collection, to enhance the validity of the findings and enhance awareness among practitioners. The strength of this thesis is its clear findings of the impracticability for LSPs to only use performance measurements designed for businesses focused on production, while the focus of LSPs are on planning and deliveries. Another strength of the thesis is the close collaboration between the researchers and managers within 4PLs to ensure validity.

The next step, based on this research, is to develop a framework for performance measurement of 4PLs. The difficult part of this step is to maintain the possibility to adapt it to the specific needs of different businesses, while also developing it in such a way that it becomes part an entire supply chain strategy. Performance measurement strategies often focus on single firm performance, which could lead to sub-optimisation, thereby only benefitting the competitors of the business.
REFERENCES


APPENDICES

APPENDIX A: INTERVIEW GUIDELINES

1. General questions
   1.1. Is it okay for you if we record this interview?
   1.2. What is your name?
   1.3. What is your function in this business?
   1.4. What are you responsible for?
   1.5. Can you shortly explain what the business’s strategy is?

2. Performance measurement questions
   2.1. In what way are you involved with performance measurement?
   2.2. Do you follow a certain scheme to measure the performance?
   2.3. What metrics does the business have in place? When none, go to 3.1
   2.4. Do you have any remarks about those metrics?
   2.5. Are they effectively used?
   2.6. Are they consistently used?
   2.7. Is the business evaluating those metrics every now and then or are they evaluated on a fixed interval?
   2.8. Of those metrics, which ones are considered as Key Performance Indicators? If none, go to 3.1
   2.9. How were they initially implemented?
   2.10 Were they implemented in conjunction with your direct customers?
   2.11 Are the metrics aligned with the business’ strategy?
   2.12 Are the metrics aligned with your direct customers?

3. Balanced Scorecard
   3.1. Have you heard about the Balanced Scorecard? When no, we will present them the theory behind the model.
   3.2. How well does this frameworks fit to your organisation?
   3.3. What are the advantages of using this framework?
   3.4. What are the disadvantages/limitations of using this framework?

4. EFQM Model
   4.1. Have you heard about the EFQM model? When no, we will present them the theory behind the model.
   4.2. How well does this frameworks fit to your organisation?
   4.3. What are the advantages of using this framework?
   4.4. What are the disadvantages/limitations of using this framework?
5. Gunasekaran
   5.1. Have you heard about the model developed by Gunasekaran? *When no, we will present them the theory behind the model.*
   5.2. How well does this frameworks fit to your organisation?
   5.3. What are the advantages of using this framework?
   5.4. What are the disadvantages/limitations of using this framework?

6. Construction framework
   6.1. Have you heard about the framework used for performance measurement in the construction industry? *When no, we will present them the theory behind the model.*
   6.2. How well does this frameworks fit to your organisation?
   6.3. What are the advantages of using this framework?
   6.4. What are the disadvantages/limitations of using this framework?
APPENDIX B: QUESTIONNAIRE

1. How often have you used (name of company)?
   - □ 1 time
   - □ A few times
   - □ Regularly

2. How long time was it since you used (name of company) for the first time?
   - □ Less than 1 year
   - □ Between 1 and 3 years
   - □ More than 3 years

3. For the following KPIs, check the box applicable to you for each KPI. (The boxes are, Very important, Important, Unimportant, Very unimportant and Not applicable.)

   ___ Level of customer perceived value of product
   ___ Order lead time
   ___ Information processing cost
   ___ Net profit versus productivity ratio
   ___ Total cycle time
   ___ Total cash flow time
   ___ Customer query time
   ___ Accuracy of forecasting techniques
   ___ Planning process cycle time
   ___ Human resource productivity
   ___ Efficiency of purchase order cycle time
   ___ Efficiency of cash flow method
   ___ Capacity utilisation
   ___ Utilization of economic order quantity
   ___ Percentage of defects
   ___ Cost per operation hour
4. Did you miss any KPI?

5. What do you feel is the strongest argument for using (name of company)?
### Appendix C: KPIs at Different Management Levels

Table 5 exemplifies how different KPIs can be classified depending on Supply chain process and management level.

<table>
<thead>
<tr>
<th>Supply chain activity/process</th>
<th>Strategic</th>
<th>Tactical</th>
<th>Operational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan</td>
<td>Order lead time, Total cycle time, information processing cost</td>
<td>Product development cycle time, accuracy of forecasting techniques</td>
<td>Order entry method, Human resource productivity</td>
</tr>
<tr>
<td>Source</td>
<td></td>
<td>Supplier delivery performance, supplier pricing against market</td>
<td>Efficiency of purchase order cycle time. Supplier pricing against market.</td>
</tr>
<tr>
<td>Make/Assemble</td>
<td>Range of products and services</td>
<td>Capacity utilisation, Utilisation of economic order quantity</td>
<td>Percentage of Defects, Cost per operation hour</td>
</tr>
<tr>
<td>Deliver</td>
<td>Flexibility of service system to meet customer needs,</td>
<td>Delivery reliability performance, flexibility of service system to meet customer need. Effectiveness of delivery invoicing methods</td>
<td>Quality of delivered goods, on-time delivery of goods. Percentage of urgent deliveries, Information richness in carrying out delivery</td>
</tr>
</tbody>
</table>

**Table 5: Supply Chain Performance Metrics Framework by Gunasekaran et al. (2004)**