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Purchasing Performance Measurement and Its Impact on Firm's Performance: A Case Study in Construction Industry

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ABSTRACT

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The objective of this study was to examine the role of purchasing performance measurement and its impact on firm's performance in the construction industry. To expand the understanding of the researched topic a literature survey was conducted. First, the multidimensional and the strategic role of purchasing and supply management was discussed. After this, the ultimate prerequisites to measure purchasing performance were studied. The findings from the literature survey demonstrated that PSM can contribute to company's competitive advantage through many different outcomes. Due to disordered nature of PSM, the empirical studies included both qualitative and quantitative analysis. The first study focused to investigate actual purchasing performance measurement practices and critical factors related to it. In the second study, statistical tests were utilized to investigate the impact of purchasing performance variables on case company's performance. The final results determined that PSM can contribute to firm's competitive advantage, but to maximize the impact, purchasing must transform strategy into measurable and manageable objectives.

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Tämän työn tarkoituksena oli tutkia hankintatoimen suorituskyvyn mittaamista ja sen vaikutusta yrityksen suorituskykyyn rakennusalalla. Tutkimuskohteen taustatekijöiden selvittämiseksi hyödynnettiin kirjallisuuskatsausta. Kirjallisuuskatsauksen alussa tutkittiin hankinnan moniulotteista ja strategista roolia. Sen jälkeen työssä käsiteltiin kriittiset edellytykset koskien hankintatoimen suorituskyvyn mittaamista. Kirjallisuuskatsauksen löydösten perusteella oli selvää, että hankintatoimi voi vaikuttaa yrityksen kilpailuetuun monen eri tekijän kautta. Empiirisessä tutkimuksessa hyödynnettiin laadullisia ja kvantitatiivisia tutkimusotteita johtuen hankintatoimen hajanaisesta luonteesta. Ensimmäinen tutkimus syventyi käsittelemään hankintatoimen mittaamista ja siihen liittyviä kriittisiä tekijöitä. Tilastollisten testien avulla tutkittiin hankintatoimen suorituskykymuuttujien vaikutusta yrityksen suorituskykyyn. Tutkimustulosten perusteella hankintatoimella on vaikutusta yrityksen kilpailukykyyn, mutta hyödyn maksimoiseksi on hankintatoimen pystyttävä laatimaan yrityksen strategia mitattaviksi ja johdettaviksi tavoitteiksi.

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Helsinki, September 2017

Kasper Åhman

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1 INTRODUCTION

In today, companies face ever growing changes in their competitive markets due the growth and development of global competition, improvements in technology and information availability, and never satisfying customers (Monczka et. al., 2005). Today's dynamic environment places heavy demands on companies, their performance, increases pressures to operate efficiently and focus value creating activities (Hartmann, Kerkfeld & Henke, 2011). Consequently, companies are forced to focus their core competencies, which have increased their reliance on suppliers (Kannan & Tan, 2002).

As a result, an effective management of purchasing and supply chain activities has become a key to achieve sustainable competitive advantage. In fact, few organization functions have developed more dramatically than purchasing. Purchasing is not anymore a clerical, reactive function that only affects the bottom line. At many companies, purchasing has allowed companies to become a leader in their industries (Hartmann, Kerkfeld & Henke, 2011), and the exact opposite is now true. Purchasing has become a strategic, proactive asset and should regarded as a "*competitive weapon*" of any firm (Reck & Long, 1988) contributing both bottom and top line (Chen, Injazz, Paulraj & Lado, 2004). In the future, purchasing will not only be measured by its core goals: cost savings delivered, obtained right quantity and quality of goods, but also on value created. More specifically, purchasing can impact to company's profitability by contributing to innovations, flexibility and new product development, to name a few (Das & Narasimhan, 2000).

The contribution of purchasing activities for corporate success have been studied to depend on the level of strategic purchasing exists in the company (e.g Gonzalez-Benito, 2007; Narasimhan & Das, 2001 Watss, Kim & Hahn, 1993). According to Gonzalez-Benito (2007) the purchasing function's strategic contribution to business performance is dependent on the interaction of two factors: purchasing strategic integration, which reflects the level of strategic alignment between business and purchasing strategy, and purchasing efficacy, understood as an alignment between

purchasing activities with the strategic objectives. The fit between two factors is argued to be a key element of purchasing performance.

Consequently, implementation of an established purchasing performance measurement is viewed as a necessary part of strategic purchasing and the strategic integration (Pohl & Förstl, 2011). Moreover, many scholars (e.g. Melnyk, 2004; Gunasekaran, 2003) have highlighted that new demands in the environment emphasize the need of proactive measurement design and management instead of letting metrics evolve over time. An effective performance management allows a company to understand purchasing function as a strategic provider to overall performance and makes it possible to hold the purchasing department accountable for the realization of strategic goals (Pohl & Förstl, 2011). Alternatively, it provides a useful tool to communicate purchasing success internally, which in turn can be utilized to increase the aware of importance of purchasing function. (Carr & Smeltzer, 1997) Despite of the importance of performance measurement, studies indicate that there still lack of focus in purchasing context both academia (Gunasekaran et. al, 2001; Beamon, 1999) and practice (Hallikas et. al., 2011).

The special context for this study arises from the challenging nature of construction industry. Studies have shown up that about 75-90 % of the turnover is represent by the supply chain partners (e.g Scholman, 1997; Dubois & Gadde, 2000; Vrihoef and Koskela, 2000). Since suppliers have a huge impact on organizations performance, the prime contractor’s purchasing function has a key role in driving effectiveness and efficiency in both daily and long-term activities. Hence, to leverage the full potential of the purchasing and supply chain, purchasing function must transform corporate strategy into measurable and manageable objectives internally and externally.

But what are the critical factors behind the value creation of purchasing function and what are the factors related to purchasing performance? And what impact does purchasing performance and its evolution have on measurement practices? These are the main questions that will be explored more detail in following chapters.

1.1 Problem Definition and Limitations

In general, a large share of studies have demonstrated the positive relationship between PSM activities and a multitude financial and operational performance metrics. (e.g. Carr & Pearson, 1999 ; Narasimhan & Das, 1999; Ellram, Zsidisin, Siferd & Stanly 2002; Sanchez-Rodriguez, Martinez-Lorente & Clavel, 2003) Together with the strategic raise of PSM the performance areas has developed as well, and purchasing is viewed to contribute more than solely costs (Das & Narasimhan, 2000). Common characteristic of the studies is their focus to investigate the level of strategic purchasing, strategic alignment with corporate strategy and purchasing practices, and their contribution on financial performance through quantitative analysis. However, couple of limitations can be identified in the previous empirical studies: (1) applied success variable (2) applied methodology and sample (3) and the latitude of investigated purchasing practices. Summary of previous studies can be found from appendix 1.

Most of the previous studies investigate the relationship between PSM activities and corporate success through generic corporate performance measures e.g. return on investment or market share (David et. al., 2002;Carr & Pearson, 1999 ; Ellram et. al., 2002) or are utilizing self-reported perceptual measures (Gonzalez-Benito, 2007; Cousins, 2005 ; Schiele, 2007). However, utilizing a single high level measure limits the explanatory value of studies (van der Vaart & Donk, 2008) and do not take into account PSMs wider value contribution. Secondly, large share of studies are focusing on specific PSM activities such as level of purchasing sophistication (Schiele, 2007), supplier selection (Kannan & Tan, 2002), purchasing skills (Carr & Smeltzer, 2001) or other organization design practices (David et. al., 2002) and their impact on corporate performance. Thirdly, most studies remain limited as they are built on survey based data. Finally, there exist a clear gap regarding studies that investigate actual purchasing performance measurement practices. Hence, a research gap can be identified in two areas: actual purchasing performance measurement practices and utilization of more objective success variables to investigate the relationship between PSM and corporate performance.

Based on the previous perspectives, this thesis addresses the gap by focusing on actual performance measurement practices in a broad single case study by combining qualitative and quantitative studies. Accordingly, these studies focus on performance measurement in the case company's purchasing function in the construction industry. At first, the research utilizes qualitative studies to explore actual purchasing performance measurement practices and crucial prerequisites. Secondly, the link between purchasing practices and the overall performance of the company is investigated through quantitative studies, where the financial performance of case company's projects is applied as a success variable. Supplier performance evaluations are applied to complement studies and have an insight into more operational areas.

From the previous perspectives, this research involves couple of restrictions. Since the research focus is on a single case company, a single industry and on the main contractor side, the generalization of the results for different industries and companies of a different size should be treated with caution. Additionally, the study is limited to buying side of the supply chain and thus focuses to internal performance of purchasing. Particularly, the study is also limited to investigate performance measurement from strategic point of view. Therefore, the thesis is deeply rooted in the concept of strategic alignment of purchasing with the company's competitive edge. Due the limitations, classical operational metrics e.g. inventory and logistics are limited out of scope.

In this thesis, the term *supplier* covers subcontractors, material suppliers and service suppliers. The term *customer* covers the internal stakeholders and the external stakeholders as the role of procurement function is supportive.

1.2 Objectives and Research Problems

Due to identified research gap, the main focus objective of this study is to explore how can purchasing performance be measured and how it influences on the overall financial performance of the company in the project-based construction industry. In this thesis, it is hypothesized that well-established and strategically aligned purchasing practices and measures do contribute on financial performance. A case company along with its

purchasing performance measurement practices and financial performance of the projects will be utilized as a real-life example to explore this connection. To provide strong theoretical background to support empirical studies, principles behind the purchasing and supply chain and purchasing performance measurement are explored. The main research question is formulated into following:

How to establish purchasing performance measurement so that it supports company's overall strategy and performance?

The main research question roots from the identified research gap, but remains quite comprehensive in nature. Thus, it is researched with the help of three sub-questions. Before going deeper to purchasing performance and its measurement, it is crucial to understand the underlying factors behind PSM to contribute on firm's competitive advantage. PSM has transformed from clerical function to strategical and together with strategic raise, the performance areas has developed as well (Reck & Long, 1988; Rozemeijer, 2000). However, PSM is multidimensional in nature as it plays important role between internal and external parties, and contributes more than solely costs (Das & Narasimhan, 2000). The conceptual problems makes purchasing performance measurement complex (van Weele, 2002, p. 255) and are the reasons why purchasing is found to be one of the most challenging areas to measure (Easton, Murphy & Pearson, 2002). Moreover, purchasing performance measurement must be in line with business goals and indicate its contribution to total success (Paulraj et. al., 2006). Thus, the question of any purchasing measurement system crosses of how corporate strategy can be transformed into measurable, manageable and strategically aligned actions (Pohl & Förstl, 2011). This is key area that purchasing can support firm's competitive advantage (Gonzalez-Benito, 2007). Consequently, the first sub-question is as follow:

SQ1) ***What factors are included in balanced purchasing and supply chain performance measurement and management?***

The second sub-question has two important roles. First, multiple qualitative studies will be utilized to present and find out the current state of company's existing performance measurement practices to mirror theoretical findings on existing performance

processes. Second, it provides a systematic way to understand selected measures and their linkage to company's strategic goals and financial performance. It can be formulated as follow:

SQ2) What is the current state and the greatest challenges of case company's purchasing performance measurement system?

In this thesis it is hypothesized that purchasing performance through purchasing performance measures influence on corporate performance. This connection is researched through statistical tests. However, purchasing performance is not easy to directly identify in monetary value as it also provides many indirect benefits. Thus, supplier evaluations from the project sites are included in quantitative analysis. The final sub-question is formulated into following:

SQ3) How does the purchasing performance influence on the overall performance of the projects in the case company?

In order to answer these questions, theoretical research and empirical investigations were established with main objective to provide strong literature background and fresh perspectives of researched phenomena.

1.3 Research Framework and Definition of Key Concepts

Below, figure 1. represents the top-down hierarchy of the main concepts of this study. It is built on the premise that the overall corporate strategy set limits for the purchasing strategic objectives, which are the basis for different purchasing decisions. Further, these decisions are implemented to more practical level and the success of purchasing organization is evaluated through performance measurement. However, the performance measurement itself is inadequate and thus the performance management is highlighted as the main enabler to achieve strategic objectives. Following Gonzalez-Benito (2007) the performance of the purchasing can be divided into financial and commercial performance. Furthermore, we hypothesize a positive relationship between purchasing performance and performance of the company for following reasons. First, purchasing performance in terms of cost reductions influences positively on company's

bottom-line on the profit and loss statements (Ellram, 2000). Moreover, purchasing performance contributes to higher sales and market share in terms of innovation and quality (Paulraj et. al., 2006). Finally, purchasing performance positively contributes the balance sheet through more efficient usage of assets and reduced capital (Ellram & Liu, 2002). Thus, the case company along with its purchasing performance measurement practices and financial performance of the projects will be utilized as a real-life example to explore this connection by executing qualitative and quantitative studies.

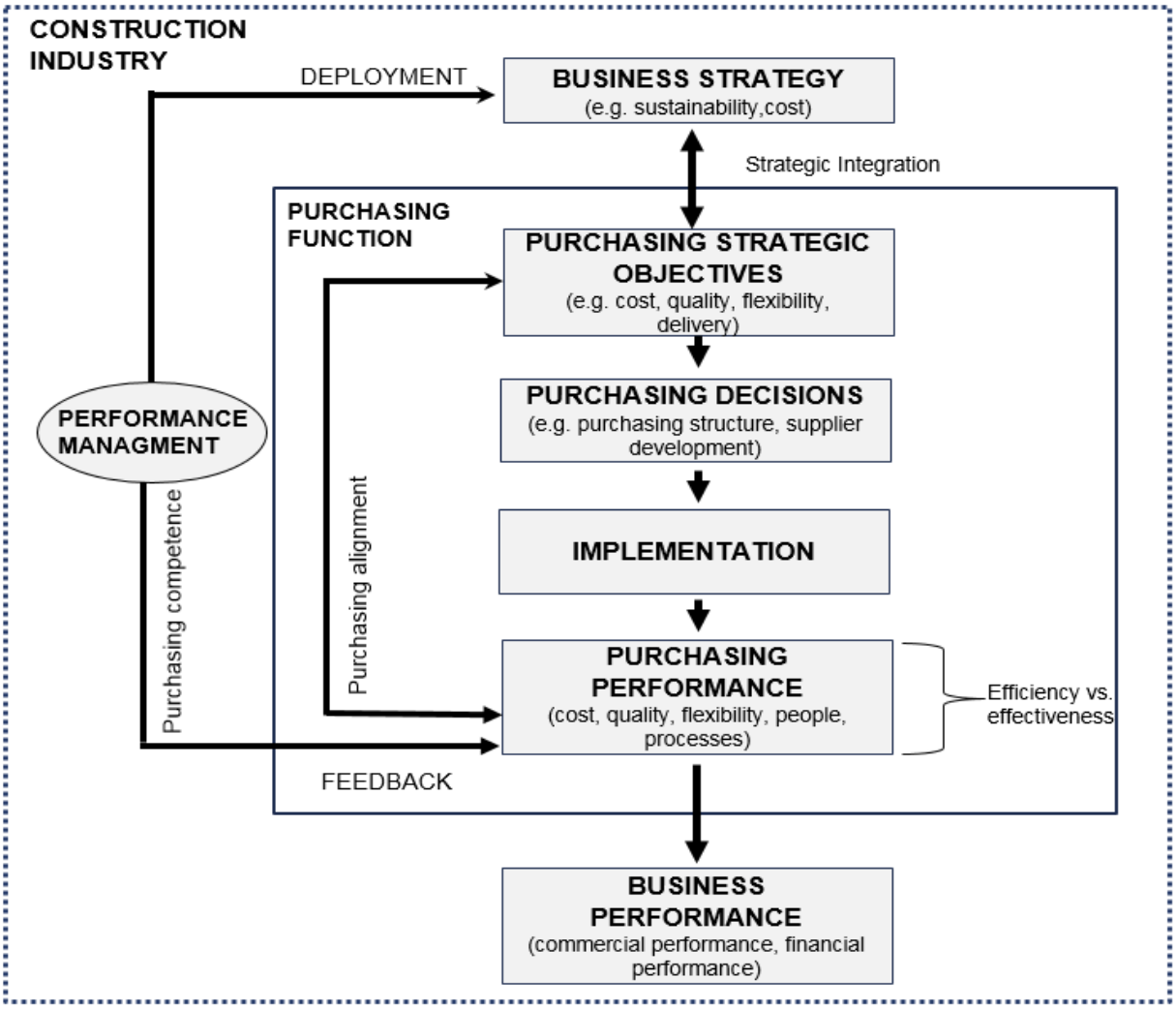

***Figure 1**. Research framework*

Purchasing and supply chain management (PSM) is an interchangeably utilized term that covers terms like procurement, purchasing, sourcing and supply

management. (Leenders et. al., 2002, p.6) Traditionally, purchasing is related to different process of buying and viewed as a short-term operational task, and it is focusing on functional level activities (van Weele, 2002, p.14). In contrast, the term supply management is a wider concept than purchasing and it is more strategic in nature. At this level purchasing can viewed more integrative and purchasing encompasses cross-functional areas. Thus, activities are more long-term oriented and proactive. (Monczka et. al., 2005, p.8). This turns to concept of strategic purchasing that consist of operational and strategic perspectives. It can be defined as "*the process of planning, evaluating, and controlling strategies and operating purchasing decisions for directing all activities of the purchasing functions toward opportunities consistent with the firm's capabilities to achieve its long-term goals*." (Carr & Smeltzer, 1997, p. 201)

Strategy is a term that explains why there exists differences between organizations performance (e.g. Porter, 1991). It can be defined as a long-term activity, which focuses to allocate firm's limited resources to achieve sustain competitive advantage in the operating environment (Johnson, 2006). According to Porter (1991) organization's performance is dependent on the special characteristics of an industry and its strategic position in the industry. Furthermore, it has found that success is related more to company's strategic choices, which are not easily imitable by competitors than characteristics of industry (Spanos et. al., 2004). Therefore, **purchasing strategy** can be defined as *"the pattern of decisions related to acquiring required materials and services to support operations activities that are consistent with the overall corporate competitive strategy"* (Watts, Kim & Hahn, 1995). Purchasing strategy can be viewed as a link between purchasing practices and corporate strategy. To support an organizations overall competitive advantage, purchasing function must be strategically integrated, cover all functional areas and based on the mutual strategic choices of an organization (Paulraj et. al., 2006).

Performance is typically conceptualized by terms *efficiency* and *effectiveness.* These terms are widely utilized in the field of PSM as well. **Performance measurement** can be defined as "*the process of quantifying the efficiency and effectiveness of action*". In

the same vein a **performance measure** can be defined as "*a metric used to quantify the efficiency and/or effectiveness of action*." Further, a **performance measurement system** can be defined as "*the set of metrics used to quantify both the efficiency and effectiveness of actions."* (Neely, Gregory & Platts, 1995) However, once performance measurement has took place, the performance review will have consequences that is used to evaluate the impact of actions agreed upon in the corporate hierarchy. Thus, performance measurement must understand as a management and strategic control tool (Melnyk et. al., 2013; Aguinis, 2009). This turns to concept of **performance management** that can be defined as "*a continuous process of identifying, measuring and developing performance in organizations by linking each individual's performance and objectives to the organization's overall mission and goals"* (Aguinis, 2009. p.2).

1.4 Structure of thesis

The research consists of seven parts. The research started with introduction that described background of the research, objectives and research questions, limitations, the scope, key concepts and the research questions. After introduction, it continues to theoretical part, which is divided into two chapters. The first theoretical chapter presents the multidimensional and strategic role of purchasing and supply chain management. Chapter three presents the previous literature and ultimate prerequisites related to purchasing performance measurement. After the literature survey, the research continues to the empirical part of the study. First, the research methodology and data collection is presented. This is followed by the presentation of the case organization, which consists of the analysis of performance practices in the case company's purchasing organization. After this, statistical tests are utilized to explore the relationship between purchasing performance and firm's performance through case company's projects. Finally, the last chapter offers the conclusions and assesses the main research limitations and implications of this study which lines further research areas.

2 THEORETICAL BACKGROUND OF PURCHASING

The main focus of this chapter is to create background related to main concepts, which build the framework for purchasing organization's performance measurement and explains it as a source of competitive advantage. In addition, the aim is to present the special characteristics of purchasing in construction.

2.1 Theories to Explain Purchasing

The aim of this section is to explore main theories in order to place purchasing and supply management in a wider theoretical context. The following theories are the most well-known in purchasing context. As well, these theories include aspects that are strongly related to purchasing performance and its measurement.

Transaction cost economics (TCE) is a dominant paradigm of this study and it was introduced by Coase in 1937 and later developed by Williamson in 1975. It builds a framework to understand different decisions related to organization structures and transaction costs (Williamsson, 2008). According to Schneider, Bremen, Schönslebsen and Alard (2011) the basic statement is that a proper alignment of transactions with the equivalent governance configuration provides an organization to economize on its costs, which have impact on better performance. In general, three basic type of transactions can be identified that originates from *asset specify*, *transaction frequency* and *uncertainty*. Asset specify is understood as the extent to which assets that support a specific transaction may be moved to a transaction outside the exchange relationship. Uncertainty presents the degree to which transactions can be subjected to disturbance, and frequency illustrates the degree of reoccurrence is present in transaction. (Nikolarokos & Georgopoulos, 2001) In PSM context, TCE builds a theoretical basis to understand different purchasing strategies related to make-or-buy-decisions, organization formats and partnerships (Williamsson, 2008).

Resource based view (RBV) is a central theory in strategic management and it has been widely utilized on the field of PSM. (Hitt, Xu, & Carnes, 2016) It is built upon on the view that organization's sustainable competitive advantage is based on its

resources and capabilities, which are valuable, rare, inimitable and non-substitutable. In the context of PSM, RBV can explain how to achieve a competitive advantage through its external resources through different supply chain activities. The greater the role of resources is, the more an organization is dependent on them. (Barney, 1991) RBV refers to decisions related to outsourcing and explains why companies focus to utilize their external resource instead of internal capabilities. By integrating the resources through supply chain and collaborative partnerships, an organization may achieve a higher level of performance in terms of cost reductions and other value improvements. (Hitt et. al., 2016) This changes the role of PSM being a reactive clerical function as a strategical contributor to firm.

Contingency theory is one major theory used to describe differences in organizations. It is built on the insight that there is not only one best option to manage an organization. In fact, the structure of an organization is characterized by its strategy and specific conditions in its unique context. Contingency theory views maximum performance or effectiveness resulting from the selection of most appropriate structure, which fits in its contingencies such as operating environment, size and technology. (Child, 1975). Further, varying contingency factors are the reason behind the difference in purchasing activities and purchasing performance results (Stanley, 1993).

Organizational learning is a central theory in performance measurement and it is closely linked to evolution of PSM as well. Organizational learning is used to describe an organization's capability to develop and improve its performance in all the dimensions, which are the basis of its competitive advantage. Moreover, it establishes a link between the operating environment and organization to transform a reactive behavior to proactive. (Pérez, Peón & Ordas, 2005) In PSM context, organizational learning can contribute to understand two important dimensions of PSM evolution. It explains the different stages of purchasing evolution models and why most companies haven't realized the strategic importance of purchasing function. These evolutionary stages are closely linked on performance measurement practices and the aspect of continuous improvement (Pohl & Förstl 2011).

Knowledge Based View (KBV) encompasses the issues of boundaries, existence and the internal organization of an organization and it is closely linked to organizational learning. According to Levinthal and March (1993) a success in organizational learning lies in the translation of knowledge. It assumes the importance of knowledge as the most important explanatory resource of an organization. According to KBV, there exists performance differences between organizations due to differences in organizations knowledge and capability to create and develop it. By creating, transferring and transforming knowledge, knowledge becomes a key element in creation of competitive advantage. In PSM and performance measurement context, the importance of collecting, sharing and managing knowledge through internal and external parties are extremely important areas. Table 1. summarizes previously presented theories to explain PSM, its evolution and it as a source of competitive advantage.

Table 1*. Theories to explain PSM and its performance*

Theory	View	Original author
Transaction Cost Economics	Appropriate configuration of transactions with equivalent governance structure enables an organization to economize its costs.	Williamsson (1975)
Resource Based View	Sustainable competitive advantage is based on resources that are valuable, rare, inimitable and non-substitutable.	Barney (1991)
Contingency Theory	The structure and methods of an organization is characterized by its specific contingencies.	Child (1972)
Organizational learning	The process and capability to develop organizational factors more effective through continuous improvement.	Cyert and March (1965)
Knowledge Based View	The most important asset of an organization is knowledge.	Grant (1996)

2.2 Defining Purchasing and Supply Chain Management

The term purchasing and supply management has been used quite interchangeably in the literature and practice. Mainly, there can be identified three different views of purchasing by different schools: SCM (Supply Chain Management), IMP (Industrial Marketing and Purchasing) and IPSERA (International Purchasing and Supply Education and Research Association).In this thesis, the concept of purchasing is based on IPSERA, which looks purchasing and supply chain management as a

multidimensional function through business and relationship, barely focusing on logistics.

Historically, purchasing has viewed to be mainly an operational function, which main tasks were related to different process of buying (Monczka, Trent & Handfield, 2005, p. 23) Given an operational role, the purchasing function's role and performance was mainly evaluated through five operational factors: quality, place, time, material and cost (van Weele, 2009, p.9) In the turn of 1990's the interest towards purchasing started to increase, due to growing competition, globalization, technological advances and material shortages, to name a few. (Easton, et. al., 2002) As a consequent, the purchasing volume as part of a firm's turnover has increased substantially (Schiele, 2007) and companies' performance is driven and reliant upon on their suppliers than ever before (Kannan & Tan, 2003). This has allowed firms to realize purchasing functions strategic importance and its role to remain competitive (e.g. Carter & Narasimhan, 1996)

According to Hogan and Armstrong (2001) purchasing function with strategic role may help a company to achieve competitive advantage in three ways. It can provide value by having a place in company's cost management. Secondly, it may contribute to make better decisions and reach strategic goals by providing beneficial market intelligence of supply chain trends. Lastly, it helps to foster more close relationships with appropriate suppliers to increase performance in terms of quality and delivery. Having an intermediary role between suppliers and internal customers, contributing to more wide value contribution and providing support to company, purchasing becomes a source of wider competitive advantage than purely costs (Stolle, 2007, p. 13). Given the strategic role of purchasing, van Weele (2009, p.9) defines purchasing as:

> *"The management of the company's external resources in a such way that the supply of all goods, services, capabilities and knowledge which are necessary for running, maintaining and managing the company's primary and support activities is secured at the most favorable conditions*".

As, van Weele's definition emphasizes, purchasing is not solely an operational function – it crosses of both operational and strategical perspectives and aims to increase the alignment and transparency through coordination activities internally and externally. Therefore, it is essential to understand that dealing with the suppliers is related materials and services procured, but also to knowledge sharing over the supply chain. According to the status of purchasing, the function should understand as an integral part of the firm's primary activities, which demand cross-functional cooperation. Figure 2. presents an illustration of typical purchasing supply chain and emphasizes the importance of fluent flows between numerous internal and external parties.

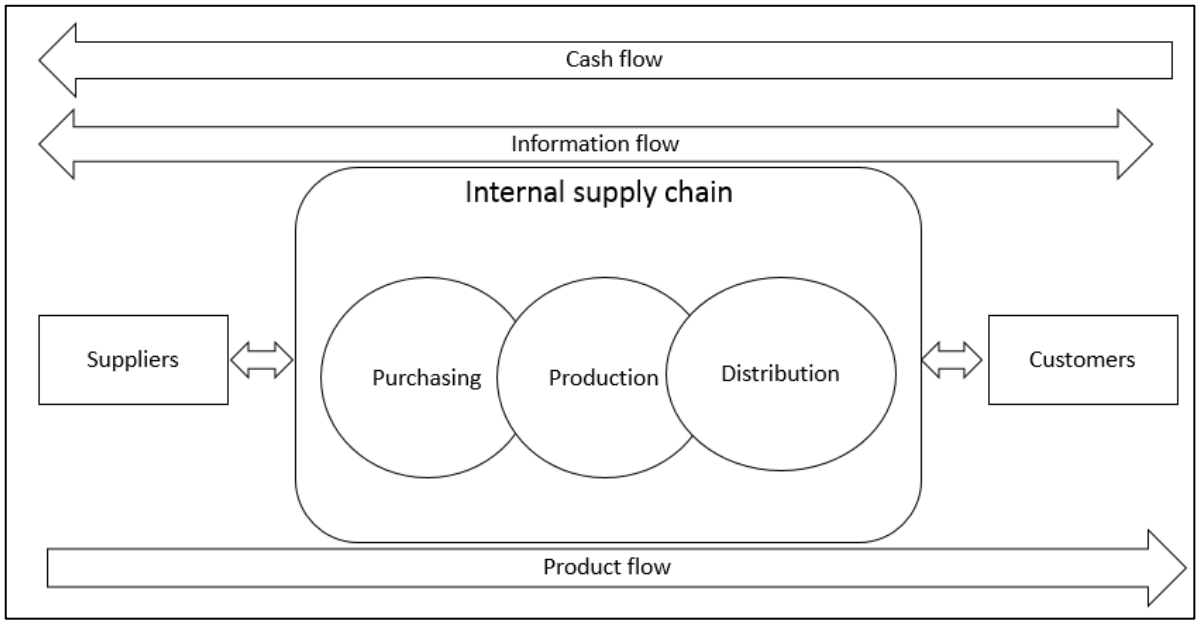

***Figure 2**. An illustration of purchasing and supply chain (Adapted from Chen & Paulraj, 2004)*

2.2.1 Purchasing as a Process

Purchasing processes establish the basis of purchasing function. They have a central role by enabling the operational buying of the materials and services the company needs. Together with the strategic raise of PSM, purchasing processes have also developed from transactional purchasing to more strategic orientation (Monczka et. al. 2005). Typically, there exists different methods regarding the core purchasing process.

For example van Weele (2005, p. 29) and Monczka et. al., 2005) have divided purchasing process into six stages: define specification, select supplier, contract agreement, ordering, expediting and evaluation. A well-established measurement system should naturally cover the whole process.

	Define specification	Select supplier	Contract agreement	Ordering	Expediting	Evaluation
Purchasing function's role	Get specification, identify need	Assure adequate supplier selection	Prepare contract	Establish order routine	Establish expediting routine	Assess Supplier
Elements	Functional specification, technical changes, bring supplier knowledge to	Pre-specification of suppliers, request for quotation	Contracting expertise, negotiating expertise	Develop order routines, order handling	Expediting, trouble shooting	Supplier evaluation, supplier rating

Figure 3. *Purchasing process stages (adapted, van Weele, 2005, p. 29)*

The purchasing process starts with identifying the users need for the product or service (Monczka et. al., 2005). In the past, purchasing function's role was generally to process purchase orders without challenging user needs by rationalizing and standardizing specification. However, according to A.T. Kearney's (2002) survey, leading purchasing companies do systematically rationalize the purchasing specifications, leading to value creation in more mature organizations. (Stolle, 87, p. 87) Once user needs are identified, suppliers must be selected and it should be done with measurement systems (Trent & Monczka, 1998). Typical criteria concern price, quality and delivery reliability, but as Kannan and Tan (2003) have found, there is place for softer evaluation criteria such as strategic commitment and fit between supplier- buyer relationships. Furthermore, total cost of ownership and categorical methods have become useful in this stage (Stolle, 2007, p. 87) Supplier selection requirements should vary between routine and critical items and the whole selection should target to capture the total costs of the relationship, but this demand orientation from price to strategic (Trent & Monczka, 1998)

The next stage concerns receiving requests for quotation and negotiations, which should be automatized and standardized as well. The key in this stage lies in systematic processes that improve efficiency and provide consistency of practices (Monzkca et. al., 2005). According to Stolle (2007, p. 88) they also provide a strong fact based

information for cross-functional teams. The next stage concerns purchasing approval processes that should made in accordance with firms formal purchasing policies (van Weele, 2005, p. 30). If purchases are not made in accordance with purchasing regulations and involve purchasing function, it limits the possibilities to add value. To overcome problem, many organizations invest to advanced systems to ensure compliance with purchasers and systematically track purchase spend. (Stolle, 2007, 88)

The evaluation of the purchasing process is undoubtedly the least examined activity of the six even it provides beneficial information to purchasing function (Monczka, et al., 2005). The shift towards strategic orientation has emphasized the importance of the evaluation stage and it should be in the heart of purchasing function. However, it has been studied that only most advanced purchasing organizations comprehensively manage their supplier's performance (Carr & Pearson, 1999). It is evident that such a practices contribute positively to supplier performance and enables more deep relationship during parties (Hartmann et. al., 2011).

2.2.2 Roles and Organization Structures

Purchasing organization structures and roles have an important role in implementation of selected purchasing practices. Typically, purchasing activities have differentiated according to responsibilities, authority and the nature of purchasing tasks, and divided into strategical, operational and tactical level. (Van Weele, 2002, p.236-237). Strategical activities are more long-term oriented and influence to company's position in the markets. These activities include developing of operational guidelines and procedures as well as the processes behind the actual purchasing. The emphasis is strongly on the company's competitive strategies and managing the long-term purchasing relationships. In the operational level, purchasing activities are more administrative oriented and the focus is in the executive and daily routines such as ordering and sourcing goods by following company's purchasing instructions. (Monzcka et. al., 2005) Tactical purchasing activities are more cross-functional focused and medium-term impact in nature. They are grounded to improve processes behind

the actual purchasing –typically focusing product quality, purchasing processes and supplier selection. In addition, these activities deal with annual supplier agreements, supplier base reduction, certification programs (e.g. audits) and other value-analysis aiming to simplify processes. (van Weele, 2002.p.236-237).

The second issue is concerning about the different organizational structure types and design of purchasing function. Mainly, structure types in purchasing have categorized as centralized, decentralized and hybrid (e.g. van Weele, 2002. p. 224-223; Cousins et. al. p. 129). Due to several advantages of centralization, centralized structures are more popular these days (Wu and Lin, 2012). However, only a few companies represents extreme of these models, because every model have their advantages and disadvantages (van Weele, 2002. p. 224-223; Cousins et. al. p. 129-134).

In the centralized mode, a purchasing function is found in the corporate level, where all the activities and decisions are executed centrally. Centralized purchasing function is responsibility of all the decisions according to product specifications, supply strategies, supplier selection and the other agreements. These decisions are long term in nature and aim is to provide the better purchasing conditions (in terms of price, cost, quality and service), but operational activities such as call-offs are executed locally by operative personnel. In the decentralized structure, the responsibility of all purchasing activities and decisions are located in local business units due to reasons of uniqueness of products or markets. (van Weele, 2002.p. 238-239)

By centralizing purchasing activities, companies can utilize economies of scale, their bargaining power and better standardization. These initiatives are strongly focusing on cost savings as they influence on companies' possibilities in terms of cost savings and efficiency. Additionally, company gain advantages from common ICT-systems, better financial control, removing duplicates and company-wide purchasing strategies and plans. Centralization also increases expertise and competencies of purchasing personnel as same tasks are repeated constantly. (van Weele, 2002, p.238-239; Cousins et al., p.129) In the point of performance evaluation - performance measurement, management and rewarding are also more feasible (Pohl & Förstl,

2011). By decentralizing purchasing authority, a company can gain advantages from the infidel decision making and better interaction between the local suppliers. These will influence on better responsiveness, speed, local knowledge of markets and deeper relationships with suppliers. However, decentralization may lead on competition of suppliers and their capacity between business units, lack of communication and difficulties in financial controlling. (van Weele, 2002, p.238-239; Cousins et al.,2008 p,129)

2.2.3 Purchasing Performance Drivers

A multitude of studies have been published to describe, categorize and provide practices how purchasing could look in terms of world-class. Moreover, many studies have investigated the link between actual purchasing management practices and company performance (Stolle, 2008, p.16). According to Hartmann, Kerkfeld and Henke (2012) the most typical PSM drivers in earlier studies refers to supplier management, cross-functional integration, strategy development, human resource management and purchasing controlling.

The first core responsibility of purchasing function refers to supply base management. The main priorities are (1) ensure the competitiveness of the current supply base (2) identify new suppliers with the potential of excellent performance and develop closer relationships with them and (3) improve and develop the competitiveness of non-competitive supply base. (Monczka et. al., 2005, p.31) Consequently, the shift has turned to supplier base reduction to allocate companies resources to more efficient use. Notably this has been identified as a core element of contemporary supply chain such as construction industry. (Chen et. al., 2004) In addition to cost and quality, it has been reported to provide advantages in terms of new-product development, learning and communication (Narasimhan & Das, 2001). The growing reliance on the supply base has increased the importance of supplier performance, and thus many companies have invested to managing the capabilities and performance of the suppliers (Hartmann et. al., 2012).

The second driver refers to cross-functional integration and collaboration with other internal groups. It has become increasingly significant since the importance of cross-boundary communication has become clear (Monczka et. al., 2005, p.32). By participating, purchasing function can contribute in terms of improvements of other functions (Hartmann et. al.,2012) and influence on more favorable design and process solutions, which have impact on more efficient purchasing methods (Haponova & Al-Jibouri, 2009). Furthermore, participating in cross-functional collaboration increases the level of how purchasing is accepted and legitimized by other units and senior management (Carr & Smeltzer, 1997). To have more strategic presence in corporate hierarchy and strengthen the capability to participate strategic activities, purchasing must involve with the corporate planning process and provide supply-market intelligence for other functions (Hartmann et. al., 2012; Monczka et al., 2005, p.33).

The third driver refers to human resource management (HRM). An effective HRM combines selection of employees, their training and appropriate creation of job structures. (Hartmann et. al., 2012) Particularly, it has been studied that the transformation of purchasing toward strategic contributor requires more mature skills and knowledge from purchasing personnel (Keough, 1994). Especially, cross-functional collaboration requires to being responsive to the needs of internal customers and providing market intelligence (Hartmann et. al., 2012). Higher confidence with purchasing will result to the better control of purchasing (Monczka et. al., 2005, p. 32) and acceptance from other functions (Hartmann et. al., 2012).

Finally, the alignment of PSM with the company's strategic goals creates the basis for PSM's contribution to corporate success. Purchasing must participate in strategy development and direct PSM activities toward opportunities consistent with the company's capabilities to support the strategic goals. Several studies have illustrated the importance of PSM involvement in strategic planning process in order to be nominated as a strategic function. The alignment is strongly supported by PSM controlling mechanism, because PSM can only be viewed as a strategic contributor if it is accountable for strategic issues.(Hartman et. al., 2012; Pohl & Förstl, 2011) However, too often purchasing goals are not consistent with organizational goals and

purchasing is viewed solely as a tactical function. But why have other firms not simply imitated purchasing best practices and purchasing is not viewed as a strategic function. These will be explored more detailed in next chapter.

2.3 Towards Strategic Purchasing

As presented earlier, purchasing can provide and support an organization's competitive advantage in several ways. However, the contribution to competitive advantage can be provided only if the purchasing function is understood and operates at a strategical level in the organization (Carr & Pearson, 1999; Watts et. al., 1993).

2.3.1 Purchasing Evolutionary Development

In today, purchasing is increasingly regarded as a strategic asset, but it still includes a several of different roles from supportive to strategic in nature and ranges from clerical ton integrative (Cavinato, 1999; Carr & Smeltzer, 1999). Numerous researchers have studied and emphasized the key dimensions of strategic purchasing. Strategic purchasing requires a proactive, long-term focus and managing strategically important relationships leading to cooperative, closer partnerships with suppliers (Chen et.al., 2004; Carr & Smeltzer, 1997, Reck & Long, 1988). According to Carr and Smeltzer (1997) the strategic concept of purchasing depends mainly four distinct types:

- The strategic status and alignment of purchasing within the company
- The skills and knowledge of the purchasing, understood as their ability to contribute to an organization's objectives
- Purchasing functions ability to take risks, understood as taking advantage of new opportunities
- Resources, including purchasing function's access to information and its utilization

However, there exists lot of differences among the companies how they distinguish purchasing functions strategic importance, which effect extremely on measurement of purchasing performance in terms of its contribution to company success (Gonzalez-Benito, 2007). As a consequent, numeral studies have been developed around

theoretical models, which describe several different stages of purchasing function need to encompass to become to functional peer from sole facilitator. (e.g. van Weele, Rozemeijer & Rietveld, 1998 ; Reck & Long, 1988). Perhaps one of the most famous models is presented by Reck and Long (1988). It consists of four development stages a function has go through to become a strategic part of the firms competitive strategy – and be a "competitive weapon" for the firm (Reck & Long, 1988). The main stages definitions and major characteristics are illustrated in the table 1.

***Table 2**. Strategic evolution of a purchasing function (adapted from Reck & Long, 1988)*

	Stage 1 Passive	**Stage 2 Independent**	**Stage 3 Supportive**	**Stage 4 Integrative**
Definition	The purchasing function has no strategic direction and primarily reacts to the requests of other functions	The purchasing function adopts the latest purchasing techniques and practices but is independent of the firm's competitive strategy	The purchasing function supports the firm's strategy by adopting purchasing techniques and practices which strengthen the firm's competitive position	Purchasing's strategy is fully integrated into the firm's strategy and constitutes part of an integrated effort among functional peers to formulate and implement a strategic plan
Charasteristics	High proportion of purchasers time spend on routine operations and quick fix	Performance is mainly based on cost reduction and efficiency measures	Purchasers are included in sales proposal teams	Cross-functional training of purchasing professionals is made available
	Purchasing function and infidel performance are based on efficiency measures	Coordination links are established between purchasing and technical disciplines	Suppliers are considered a resource which are carefully selected and motivated	Permanent lines of communication are established among other functional areas
	Little interfunctional communication present because of purchasing's low visibility	Top management recognizes the importance of professional development	People are considered a resource with emphasis on motivation, experience and attitude	Permanent development focuses on strategic alignment of the competitive strategy
	Supplier selection based on price and availability	Top management recognizes the opportunities in purchasing to contribute profitability		Purchasing performance is measured in terms of contribution to the firms success

Reactive **Proactive**

The stage one, defined as *passive* is the most undeveloped level of purchasing in terms of contribution to company's business and strategy. Purchasing is viewed as a clerical function without strategic direction and its focus is on operational tasks. In the second stage, purchasing is characterized as an *independent* function. Purchasing adopts the newest practices and techniques, but doesn't have direct contribution to company's competitive advantage. In the third stage, purchasing is viewed as a *supportive*

function, having a growing strategic role in the company. It supports the firm's strategy by embracing more advanced practices to support and strengthen firm's competitive position. In the final stage purchasing is characterized as *integrative*. Purchasing strategy is fully aligned into overall company's strategy and it participates in strategic implementation. Thus purchasing performance is measured in terms of contribution to the firm's success. Furthermore, purchasing function's focus is more collaboration and thus more cross-functional skills are emphasized. In a sum, the shift to more developed function identifies PSM as a strategic contributor for the company and its focus turns more proactive, instead of just being a reactive enabler of the company. In addition, purchasing employee's skills and capabilities have an increasing importance. (Reck & Long, 1988)

2.3.2 Purchasing Maturity

However, the previous evolution model is strongly focusing on organizational aspects and do not provide any insights to the maturity in purchasing function. Maturity in purchasing context can be defined as "*the level of professionalism in the purchasing function*" and it is argued to be a key factor of the purchasing function and its performance (Rozemeijer, van Weele & Weggman, 2003). To date several models have been developed to investigate the level of purchasing maturity (e.g. Schiele, 2007; Keough, 1993; Rozemeijer, 2000; van Weele, 2005).) A common characteristic is that models describe several stages an organization has to go through to reach more sophisticated level of maturity, and that every stages are auditable (Schiele, 2007). The higher is the level of maturity, the greater are the possibilities of purchasing function to adopt world-class purchasing practices (Ellram et. al., 2002). The figure 4. presents the maturity model of van Weele (2002, originally van Weele & Rozemeijer, 1998). The model describes six development phases, and presents the main areas in terms of purchasing planning, the structure of purchasing function, purchasing embeddedness in the firm, human resources and leadership, purchasing controlling structures and process organization (Bemelmans, Voordjik & Vos, 2013).

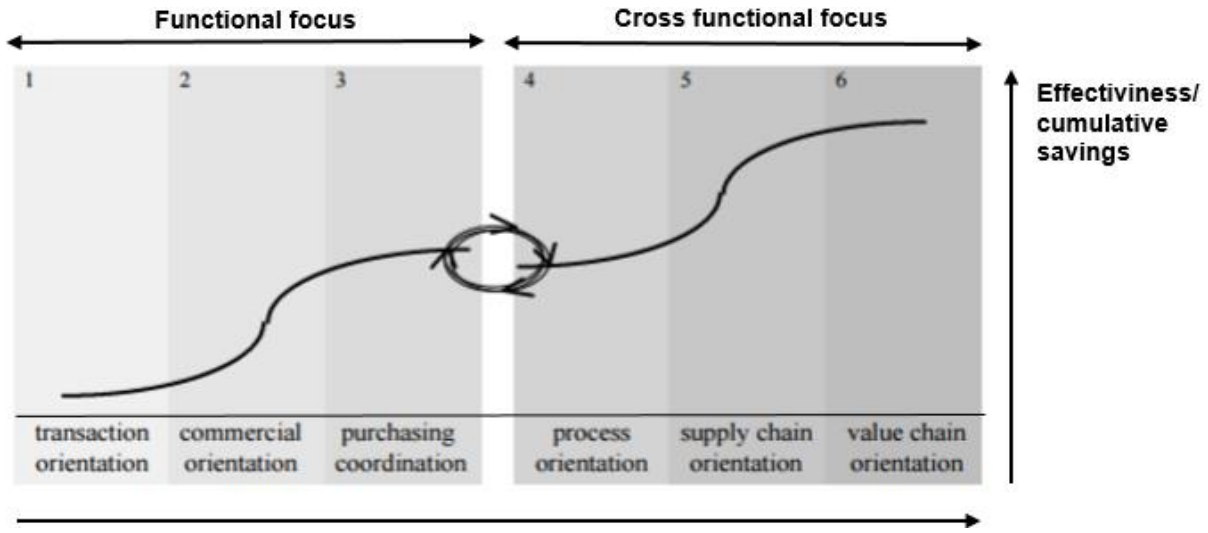

***Figure 4**. Purchasing development model (adapted, van Weele, 2005; Rozemeijer, 2000)*

In the first stage, the main task of purchasing is find appropriate suppliers and ensure material flows. No explicit purchasing strategies exist and purchasing organization is viewed as a decentralized sub-department. The focus is on operational aspects. In the second stage, purchasing strategy and buyers are focusing to decrease prices with suppliers by negotiating. Management and performance measurement is focused primarily on prices, cost savings and delivery performance. In stage three, more developed purchasing strategies aiming to capture benefits by improving communication and coordination between centralized and decentralized business functions. In addition to cost and price, purchasing has a central role influencing on quality. Formalized purchasing processes and procedures are imperative. (Bemelmans et al., 2013; van Weele, 2005, p.108-11)

The following three stages are more integrative in nature and emphasize the strategic role of purchasing. In the fourth stage, purchasing function is TCO oriented. Here, the emphasis is on cross-functional problem solving and communication. Suppliers are involved into problem solving by forming partnerships. Improvement actions are based on integrate and harmonize purchasing processes among the business units. Information systems are integrated within organization, but not with suppliers. In stage five, suppliers have a base within purchasing organization. They are involved in new

product development, process improvement and production planning is proactive. Organizations invest largely to involve supply partners in a business processes, rather than only focusing procure as effectively and efficiently as possible. Responsibility of purchasing bases on cross-functional teams and advanced purchasing techniques (e.g. e-auctions) are utilized. Information systems are integrated internally and externally with partner suppliers. In the highest level is value chain integration. To satisfy the end customers, subcontractors and their suppliers cooperate. Suppliers are involved to support company's strategies and they participate actively in product development. The objective is to design the most effective and efficient value chain to serve the end-customers. Information systems are integrated and focus is both upstream and downstream. (Bemelmans et al., 2013; van Weele, 2005, p.108-111)

According to Schiele (2007), the more developed or professional the purchasing function is, the greater its contribution to the overall corporate performance by cumulative savings. In his study, Schiele (2007) found a positive correlation between the maturity and savings potential, but the capability to absorb more developed practices is dependent especially on internal knowledge sharing, cross functional integration and the organizational structure. However, the development of the maturity and related benefits are strongly dependent to the absorptive costs and time. Thus, understanding the concept of "*a minimum maturity point*" provides a basis to avoid overinvesting for the methods an organization is not capable absorb yet and importance of in-house competencies. Furthermore, maturity models have utilized as a quick scan tool to identify improvement possibilities in a limited timeframe. They allow to prioritize lagging characteristics of the organization and identify development areas. In doing so, the purchasing function increases its potential to contribute company's performance in general and its financial performance in particular (Schiele, 2007).

2.4 Purchasing and Supply Chain Management in Construction

The objective of this section is to shed light on special characteristics, and challenges, increasing the complexity of construction firms in managing purchasing and supply

chain. More specifically, the aim is to provide an understanding of special factors that affect later to performance measurement.

The construction industry can be characterized as a project based industry, where each project can be viewed as decentralized network of parties (customer, suppliers, design, team) that disperses after finishing a certain project (Bemelmans, Vos, Voordijk & Buter, 2009). As a consequent, the industry sector has largely criticized from low productivity and inefficient methods related to other industries. (Love, Irani, Edwards, 2004; McKinsey, 2017) According to Cox and Thompson (1997), the specific models developed for manufacturing industries (e.g. automotive) are often limited use in construction, because production do not take place in controlled factory environment. In addition to temporary locations and networks, the industry sector can be characterized as highly fragmented, local markets with low barriers to entry and low independencies (Azambuja & O'brien, 2009). Below figure 7. illustrates the dubious problem of construction industry's productivity development compared to others industry sectors.

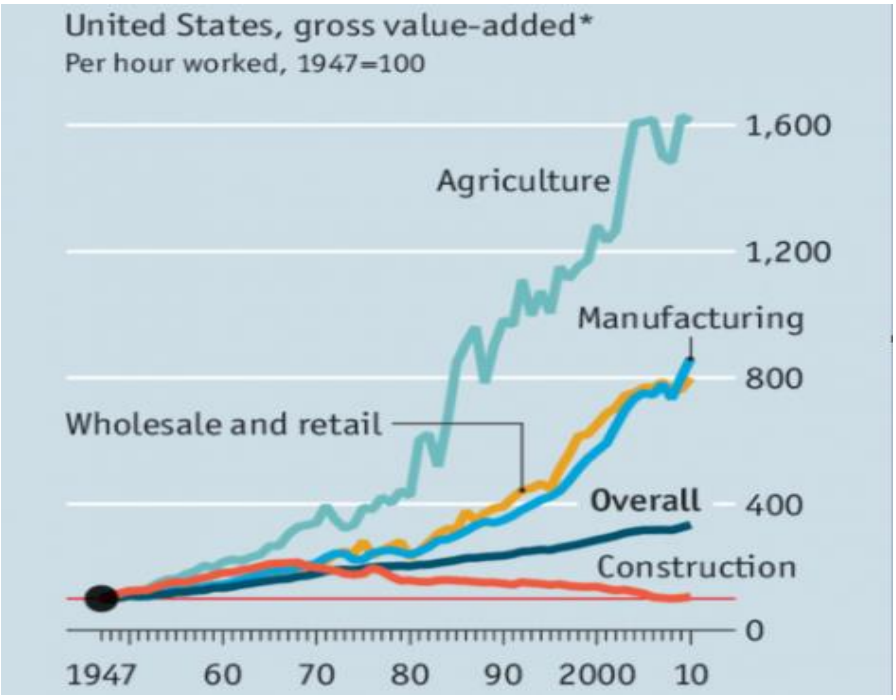

Figure 5. *Productivity development at constant prices by industry sectors, 1947=100 (McKinsey Global Institute, 2010)*

Typical characteristic of construction industry is the approach of utilizing specialized subcontractors and material suppliers by main contractors (Eriksson,Dickinson & Khalfan, 2007). Consequently, 75-90 % of the turnover is represent by these supply chain partners (e.g Scholman, 1997; Dubois & Gadde, 2000; Vrihoef & Koskela, 2000). Despite the importance of managing supply chains, recent studies indicate that industry sector is still one of the unsophisticated industry in the field of PSM (McKinsey, 2017). In construction industry, the relationships are mainly in transactional in nature, leading to mistrust and conflicts between the partners (Eriksson et. al., 2007). It has been studied that the contemporary nature of projects and smaller level of specialization are the major reasons, why buying firms are not so capable to improve performance by changing the nature of relationships with suppliers. (Dubois and Gadde, 2000) Problems in forming the long-term relationships are decreasing possibilities for process and product innovations (Eriksson et. al., 2007; Dubois & Gadde, 2000). In fact, suppliers are still price-based selected without understanding the added value of deeper cooperation (Love et.al., 2004).

Figure 5. below presents a traditional view of supply chain in construction industry, where both information and material flows have a central role due the amount of different incentives.

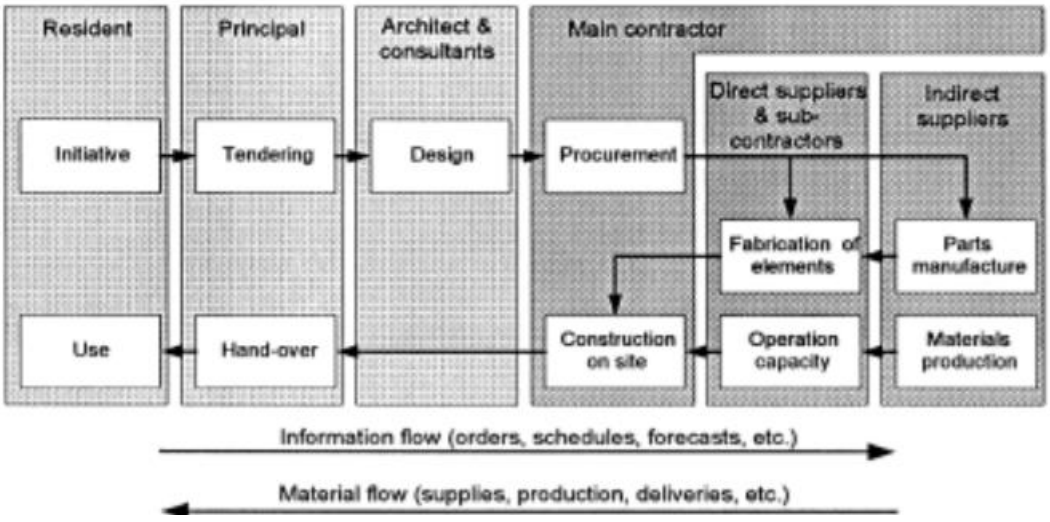

Figure 6. *Traditional supply chain in construction industry (Vrihoef & Koskela, 2000)*

According to Vrihoef and Koskela (2000) construction industry can be characterized by four specific elements, which impact especially on the more efficient purchasing methods. Being a project based industry, there is not direct manufacturing system, where similar and repetitive products are manufactured same stationary factory and then distributed to several customers. Vice versa, the project is set up around the single product, where the product is manufactured from incoming materials directed to the construction site by converging supply chain. Thus, it is a classic example of make-to-order supply chain without wide possibilities to repetition and standardization. Lastly, it is forced by a temporary supply chain and represented by instability, fragmentation and particularly by the separation between the design and the build of specific project.

Recently, more collaborative partnerships have become common in construction to increase the interplay between partners and transform relationships from adversarial to cooperative (Eriksson et. al., 2007). Especially, early involvement of subcontractors has showed great potential to increase level of partnering. According to study of Briscoe, Dainty, Millet and Heale (2004) earlier participation in key decisions may increase understanding of resident needs and project objectives, speed up schedule, improve communication and innovation in value creation tasks, and thus results in added value. However, this demand that purchasing function is also integrated in the pre-project phase process as decisions made in design and planning can't be changed without significant impact on the project costs and the process (Hapanova & Al-Jibouri). To develop more long-term relationships with the suppliers, the main contractors' purchasing functions have transformed in the centralized mode. This enables to optimize supply base and decrease the risk related to amount of suppliers. (Briscoe et. al., 2004). In addition, it has reported to bring several advantages in terms less fragmented supply chains and better control of quality (Karim, Marosszeky & Davis, 2006).

Previous findings seem evident among all the biggest main contractors in Nordic area, when going through their annual reports. Purchasing function and the entire supply chain seems hold great potential in every company by ensuring the cost-efficiency and sustainable business. (e.g. Peab, 2015; NCC, 2015, YIT, 2015; Skanska, 2015) In

order to maximize the efforts of purchasing, several companies have put effort on developing the purchasing function (Lemminkäinen, 2015; NCC, 2015; PEAB, 2015), increasing purchasing power by concentrating volumes in the Nordic level (NCC,2015) and focusing to re-engineering their purchasing methods to more efficient and sustainable (PEAB, 2015; NCC, 2015). In addition, companies are increasingly focusing on more wide collaboration between the internal and external stakeholders (Skanska, 2015). Finally, there is clear shift of looking beyond price by giving emphasis on supplier monitor and developing practices with key suppliers (NCC, 2015; Peab, 2015; YIT, 2015).

From the performance measurement perspective – the measurement environment may be considered extremely complexity, uncertainty and much more inaccurate than other industries for multiple reasons (Fearne & Fowler, 2006). As industry sector is stressed by the fragmented supply chain base, poor information flows, adversarial and short term relationships between parties and a high level of dependency between tasks and activities – it is still struggling with the traditional problems related to cost, quality, time and inefficient design solutions (Love et. al., 2004). These underlying conditions do not only cause many problems, but also limit the possibilities of capturing efficiencies (Junnonen and Kärnä, 2016). Consequently, construction organizations have started to develop and reorganize their business and project processes. Most of the initiatives have been focused to improve productivity, safety, quality and client satisfaction (Junnonen & Kärnä, 2016). However, softer and subjective measures, which refer to the satisfaction with the different project participants have gained more popularity, since the development of collaboration between project participants has been identified as one of the biggest opportunities in construction industry (Junnonen and Kärnä, 2016). Arguably, all of the previously mentioned perspectives are areas where purchasing has a major role in the construction industry.

3 PREVIOUS LITERATURE ON PURCHASING PERFORMANCE MEASUREMENT

"Measurements are the key. If you cannot measure it, you cannot control it. If you cannot control it, you cannot manage it. If you cannot manage it, you cannot improve it." As quotation from Harrington (1991) describes, the role of performance measurement can't be emphasized too much. Applied to complex purchasing context, comprehensive performance measurement must include operational and strategic measures, be multidimensional, balance with financial and non-financial measures, include leading and lagging measures, and have stretch and standard targets. Finally, arguably as most important – the measurement results should be used in the management to determine desired actions that are in line with strategy.

However, performance is argued to be a socially constructed term that tells something to everyone but appears to mean very different things to different people (Otley, 2001; Lebas, 1995). The reality in PSM context is even harder. In fact, purchasing function is found to be one of the most challenging areas to measure due to its multidimensional nature (Easton et. al., 2004) and several conceptual problems (van Weele, 2002. p. 255). Furthermore, showing a value contribution of PSM activities on financial outcomes of the company increases the whole complexity of measurement process (Hartmann et. al., 2011). Despite the challenges, previous studies (e.g. Evans, 2004; Ellram, Zsidisin Siferd, Stanly, 2002) have demonstrated a noteworthy positive impact between company success and advanced purchasing performance measurement.

To address the previous perspectives, the main purpose of this chapter to present the core areas that effect on the development of purchasing performance measurement system. First the wide roles and typical problems related to purchasing performance measurement are presented. Then the chapter continues by providing a framework for purchasing performance and presents the most important characteristics of measures. Further, the critical key performance areas are explored by utilizing balanced view of the factors to draft a systematic overview of the performance dimensions. Due the limitations of the research, more weight is given for strategic and internal measures.

3.1 The Five Roles of Performance Management

Performance measurement and management constitutes a backbone for effective purchasing and supply chain management in any organization. It provides information on the direction a firm is heading towards and beneficial data of organizations current stage. Notably, measuring performance is essential for continuous improvement and effective management of the any organization (Bititci et. al., 2000). Next, according to study from Franco-Santos et. al., (2012), the five functional roles of performance measurement system are presented in the field of PSM. They are as follows:

1. ***Strategy management***. This role encompasses the roles of planning, strategy, formulation and implementation and the strategic alignment
2. ***Measure performance***. This role includes the role of monitoring progress and evaluate performance.
3. ***Communication***. This role consists of internal and external communication, benchmarking and compliance with regulations.
4. ***Influence behavior***. This role includes rewarding, compensating behavior, managing relationships and control.
5. ***Learning and improving business***. Last role encompasses the roles of feedback, double-loop learning and performance improvement.

The first role emphasizes the strategic role of performance management. The specific measures in purchasing should be derived from purchasing strategy, which reflect the objectives of corporate strategy and enable measurement of purchasing performance's contribution along strategic objectives. (Pohl and Förstl, 2011). In practice, the strategic linkage is existent also in most of the performance measurement frameworks such as Balanced Scorecard. According to Gonzalez-Benito (2007) the strategic alignment of purchasing with corporate strategy is a key element of purchasing competence to maximize the strategic, operational ant tactical areas of purchasing (e.g Gonzalez-Benito, 2007). Furthermore, it allows internal stakeholders to understand purchasing function as a strategic, value-adding function and makes possible to hold the purchasing accountable for the realization of strategic objectives. (Pohl & Förstl, 2011).

Figure 6. below illustrates the top-down flow of purchasing performance measures, where the strategic alignment is a key to achieve internal congruence with the corporate strategy.

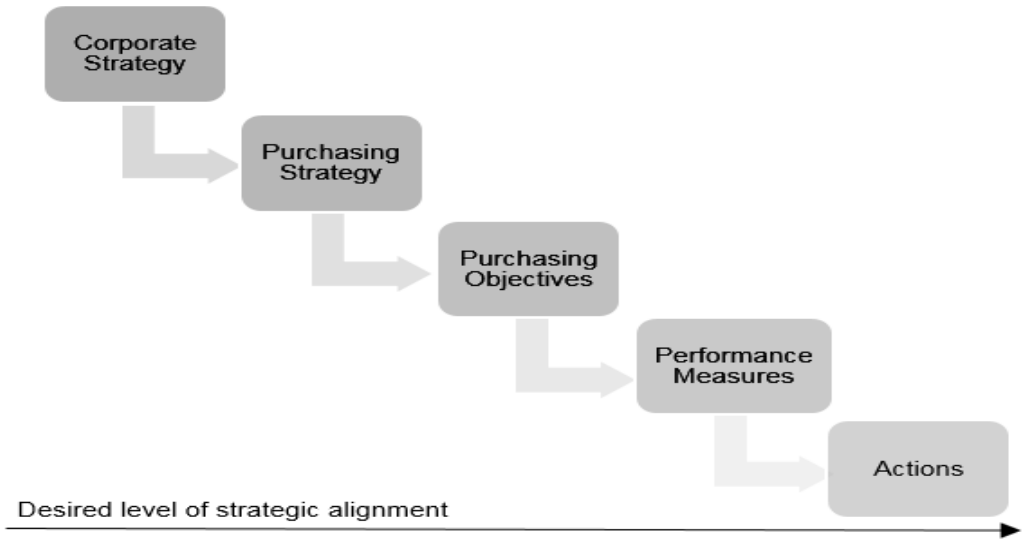

***Figure 7**. Hierarchy of performance measures and strategic alignment (Cousins et. al., 2008, p.147)*

The second role emphasizes the importance of utilize performance measurement information in monitoring. (Franco-Santos et. al, 2012). A central issue in purchasing is to format a system that is close the key purchasing activities that lead on the actual performance (Reck & Long, 1988). Consequently, purchasing practices and determinant purchasing performance must develop continuously, reflect the changes on the market characteristics, services and products – and include internal and external dimensions to have a holistic and up-to-date view of operating environment. For example, in accordance with the ideas of supplier segmentation by Kraljic (1983), optimal purchasing practices are depend on market and supplier characteristics, and thus resultant measures and their targets may vary. By implementing performance measurement system – the effects of purchasing activities are made observable to manage, track and develop practices. (Pohl & Förstl, 2011) Furthermore, Franchesini et. al. (2007) argue that performance measurement has a central role to justify programs and their costs. Having a proof from performance measurement, managers can shape a believable business case to support suggestions for requests for additional

investments or changes, as links between strategies, metrics and excepted outcomes such as operational efficiency can be easily demonstrated (Amaratunga & Baldry, 2002). However, Otto and Kotzab (2002) argue that in PSM context it might be challenging to allocate the costs and benefits exactly. In a short term, investment pays if it reaches goals, but in the long term reaching goals do not guarantee net savings through the supply chain.

The third role underlines the importance of increase the visibility and accountability by communicating the results (Franco-Santos et. al, 2012). For example, a study from Bourne et. al., (2005) have identified that more mature and high-performing units utilize measurement information more intensively and proactively than less-performing units. In PSM context communication is even more important – according to Ellram et. al. (2002) it is a core requirement of PSM in order to be received as strategic function. Thus, purchasing success in terms of cost savings, quality or innovation has to be made known internally to operate at strategic level and increase the alignment with other functional units (e.g. production, R&D). (Pohl & Förstl, 2011) Moreover, it enables to participate in the strategic planning process (Narasimhan & Das, 2001). Concerning the external dimension – supplier related measures has to made visible both internally and externally to increase the transparency of company's supply base, and further utilize data in supplier development (Pohl & Förstl, 2011).

The fourth role is linked to behavioral perspectives of performance management. By measuring purchasing people or team performance, the management can motivate staff behavior towards purchasing actions that are strategically aligned with corporate objectives. (Franco-Santos et. al, 2012; Carter et. al., 2005, p.3) However, this requires that purchasing objectives are cascaded down and committed to the lowest organization level – to regional, category and buyer level (Carter et. al., 2005, p. 11) Rewarding mechanisms have a central role by motivating to use appropriate purchasing processes and methods. Thus, performance targets should be closely linked to personnel's infidel compensation system to boost their contribution to company's success (Carter & Narasimhan, 1996). Finally, supplier performance measurement is needed to increase transparency of supply base. As a result, company

can influence on supplier selection and increase the usage of more capable suppliers (Pohl & Förstl, 2011).

Concerning the last role – learning and improvement, purchasing performance systems should constantly reflect the changes in dynamic environments and challenge the purchasing or corporation strategy by demonstrating the effectiveness of selected purchasing practices. This evolutionary characteristic of performance measurement leads to continuous improvement, which is core part of any performance measurement. Furthermore, actual results also demonstrate if selected purchasing practices were suitable and if right strategy were implemented or not. (Pohl & Förstl, 2011)

In a sum, PSM performance management is needed to translate corporate strategic objectives into strategically aligned purchasing practices with measurable targets – to track, evaluate and report actual performance results into manageable measures that link both internal and external dimensions of PSM by rewarding mechanism to ensure continuous improvement. In this process, information flows and systems have an essential part. Thus, they are discussed next.

3.1.1 Importance of Information Systems

With the volume of both internal and external data, only few corporate function generate as much data as purchasing (Ellram et. al., 2002). As organizations have become knowledge intensive in nature, they are in need to consider what information they really need to achieve strategic goals, drive value and how to deliver it efficient manner. According to Bitcici et. al. (1997) the information system that is capable to integrate all relevant information from all the relevant systems is in the heart of this process. Gonzalez-Benito (2007) argues that the adoption of capable IT-system is main enabler to achieve strategic objectives and improve the performance as recent studies have shown positive effect of IT-investments on productivity. In addition, a significant positive impact has shown on business performance through advanced performance reporting tools (e.g. De Burca et. al., 2006; Heine et. al., 2003).

According to Sriman and Stump (2004) purchasing function can achieve competitiveness from two dimensions. The first dimension refers to the operational

efficiency and effectiveness by enhanced supplier evaluation capabilities and reduction of internal transaction costs and time. The second dimension refers to enhanced inter-organizational processes and communications to increase transaction efficiency. Together these two dimensions reflect the perspective functions that can be viewed in terms of information flows and information processing capabilities.

In today, the purchasing operations and information are mainly operated by Enterprise Resource Planning (ERP) systems. From the operational perspective, they may provide transactional and operational considerations and automatize whole purchasing process (Sriman & Stump, 2004). Additionally, it allows more standardized processes and greater transparency of operations (Wu and Lin, 2012) and ensures compliance with purchasing policies (Carter et. al., 2005, p. 33). From more strategic purpose, IT-systems should be capable to provide and integrate valuable information of the whole value chain, including all the stages from supplier to end-customers (Akkermans, Bogerd, Yücesan & Wassenhove, 2003).

Recent information technology, through its capability to provide timely, reliable and accurate information is seen a major contributor to a better integration of supply chains, which enables shift from passive management to reactive decision making (Gunasekaran et. al., 2004). With managing and coordinating information, a company can influence to the quality, costs and time. As well the data, can be used to identify needs of different parties and to continuous improvement (Titus & Bröchner, 2005). Dewett and Jones (2001) conclude the role of adopting IT in order to increase the strategic integration of purchasing in competitive environment. IT-systems are major enabler to provide competitive advantage by developing more collaborative partnerships, sharing information timely, evaluating suppliers and involving them earlier to product design and development (Shiran & Stump, 2004).

However, a recent studies by Nudurupati, Bititci, Kumar and Chan (2011) and Bititci et. al., (2012) emphasizes the importance of information technology and its capability to integrate data from multiple system to one integrated system. Lack of system capability is a major problem in terms effort, time and money needed to set up an effective

performance measurement system. Furthermore, it results to challenges with confident and fast decision making and may arise questions of the data validity. Problems with data automation hinders dynamic communication with right people and at the worst, companies are not able to measure the most critical areas of their business. (Nudurupati et. al., 2011). In fact, a case study of nine purchasing organizations and their purchasing performance measurement practices from Caniato et. al. (2012) indicates that biggest barrier with all studied companies relates to information systems.

Summarizing the above an effective performance reporting in PSM context should be capable of accommodate and incorporate all the measurement perspectives (internal, external), integrated within the existing business systems, cover both operational and strategical perspectives and be able handling simple rules (e.g. alarms, data collection) to facilitate performance. According a case study from Vukcic et. al.(2013), these major drivers of measurement system are crucial to:

1) Supporting internal and external parties in the continuous assessment
2) Optimizing and improving of processes and firm performance
3) Delivering precarious business information to end-users about value chain stakeholders, such as suppliers

3.2 Problems in Purchasing Performance Measurement

Purchasing function remains still one of the most challenging functional units to evaluate (Easton et. al., 2002). This is something what van Weele already argued in 1984. According to Baily (2005, p. 390) the utmost problem behind purchasing evaluation that companies are operating with a large number of specific and operational measures without direct relationship to company's strategic goals. Consequently, most metrics lack the strategic and effectiveness perspective of purchasing and thus metrics are outdated, guiding wrong direction and do not reflect changes in operating environment and the maturity stage of purchasing function (Nollet, Calvi, Audet & Cote ,2008; Hughes et. al., 1998).

The first problem in PSM performance refers to lack of formal objectives and performance standards (van Weele, 2005, 257-258). To address the first problem, purchasing performance should be evaluated by comparing the alignment of purchasing objectives with the strategic goals of company. This demand more qualitative criteria, such as the development of supplier relationships. (Nollet et. al., 2008) In addition, it is argued that the scope of purchasing and responsibilities may differ across the supply chain and company (Van Weele, 2002. p.257-258). For example, Chao et. al., (1993) have found that the differences with scope and lack of mutual targets may lead that the personnel in same company evaluate purchasing performance with different criteria. Thus, it may lead incoherent execution and evaluation of the purchasing activities.

Furthermore, according to van Weele (2002, p. 254-255) one of the most important areas that influences purchasing evaluation is related to maturity of purchasing and how management may consider the importance of purchasing. Below table 1 presents different viewpoints, hierarchical position of purchasing, focus areas and typical measures in each stage.

Table 3. How management may look at purchasing (adapted from van Weele, 2002, p.256; Baily et. al., 2005, p. 394).

Alternative viewpoints	Hierarchical position of purchasing	Performance measures	Focus
Purchasing as an administrative function	Low in organization	Number of order, order backlog, purchasing administration lead time, authorization, procedures etc.	Efficiency
Purchasing as a commercial function	Reporting to management	Savings, price reduction, ROI-measures, inflation reports, variance reports	Efficiency
Purchasing as a part of logistics function	Purchasing integrated with other materials-related functions	Savings, cost reduction, supplier delivery reliability	Efficiency
Purchasing as a strategic business function	Purchasing represented in top management	“Should cost”-analysis, early supplier involvement, make-or-buy , supply base reduction	Effectiveness

Second problem refers to an inaccurate measurement system, which even increases the complexity (van Weele, 2005, p. 257). There is no universally applied definition of

what really constitutes performance and problem with scoping: purchasing performance is resultant of many activities without direct input-output relationships due to its multidimensional nature (Nollet et. al., 2008 ; Easton et. al., 2002). Specifically, it is challenging to isolate responsibility of performance: poor quality may result from internal processes, market situation or be dependent on supplier (Baily et. al., 2005, p.392). In addition, benchmarking purchasing function with other functions can be difficult, since many metrics in purchasing lack the efficiency perspective of performance i.e. the amount of investments that had to be put forth in order to capture that certain level of output (Easton et. al., 2002).

Traditional accounting based performance measurement system have received criticism being short-term oriented, encouraging local optimization and therefore failing to support continuous improvement. (Chan et.al., 2004) According to Hughes et. al., (1998) problems are present in purchasing context as well, if the measurement process doesn't provide any insights into how a company actually realizes the required goals. Too often companies are focusing to measure symptoms or outcomes, but not addressing underlying causes. Thus, metrics should be categorized as an activity outcomes and more causative factors – business process drivers to ensure continuous improvement (Hartmann et. al., 2012). Examining critically the characteristics of potential measures, company can ensure that selected metrics drive to future business performance and address direct interventions to performance improvement, instead of only incremental improvements. (Hughes et. al., 1998)

3.3 A Framework for Purchasing Performance Measurement

The simplest way to look at purchasing performance is to evaluate the financial outcomes of the purchasing function (Hartmann et. al., 2012). However, evaluating purchasing performance through financial outcomes limits the explanatory power of PSM drivers and do not provide full insights into the purchasing process (Ellram et. al., 2002). According to Easton et. al. (2002), until the 1980's the focus was mainly on cost reductions as the main performance area. Nevertheless, with PSM developing into more strategic role, showing a substantial value and other additional operational

outcomes such as supplier performance, quality or customer satisfaction have become increasingly important both in practice and academia (Hartmann et. al., 2012).

In determining purchasing performance, a framework from van Weele (1984) is still the most dominant paradigm in the literature. In his framework, purchasing performance is considered to be the result of two dimensions: purchasing *efficiency* and *effectiveness*. According to van Weele (2002, p. 258-259) effectiveness can be defined as the "*extent to which, by choosing a certain course of action, a previously established goal or standard is being met*". It is the relationship between actual and planned performance. Alternatively, efficiency can be defined as "*the relationship between planned and actual sacrifices made in order to be realize a goal previously agreed upon*". Therefore, purchasing efficiency is related to the resources which are needed to realize previously established goals and standards and their related activities. (Van Weele, 2002, p.258-259) When the overall purchasing performance is generated through these two different but interrelated definitions: purchasing performance can be defined as "*the extent to which, the purchasing function is able to realize its predetermined goals at the sacrifice of the minimum of the company's resources (i.e. costs)"*. (van Weele, p. 258-259)

Figure 6. below presents the model from van Weele. In the model, purchasing performance is separated into price/cost dimension, product/quality dimension, logistics dimension and an organizational dimension. First three dimensions are related to purchasing effectiveness and characterized more by qualitative and judgmental criteria as these metrics are linked on strategical aspects of purchasing. Furthermore, more complex guidelines and techniques are used to evaluate the progress of purchasing performance. Last dimension focuses on internal organization aspects and the nature of metrics is more operational as this dimension is measured by more simple and quantitative metrics. (Van Weele, p. 255-256)

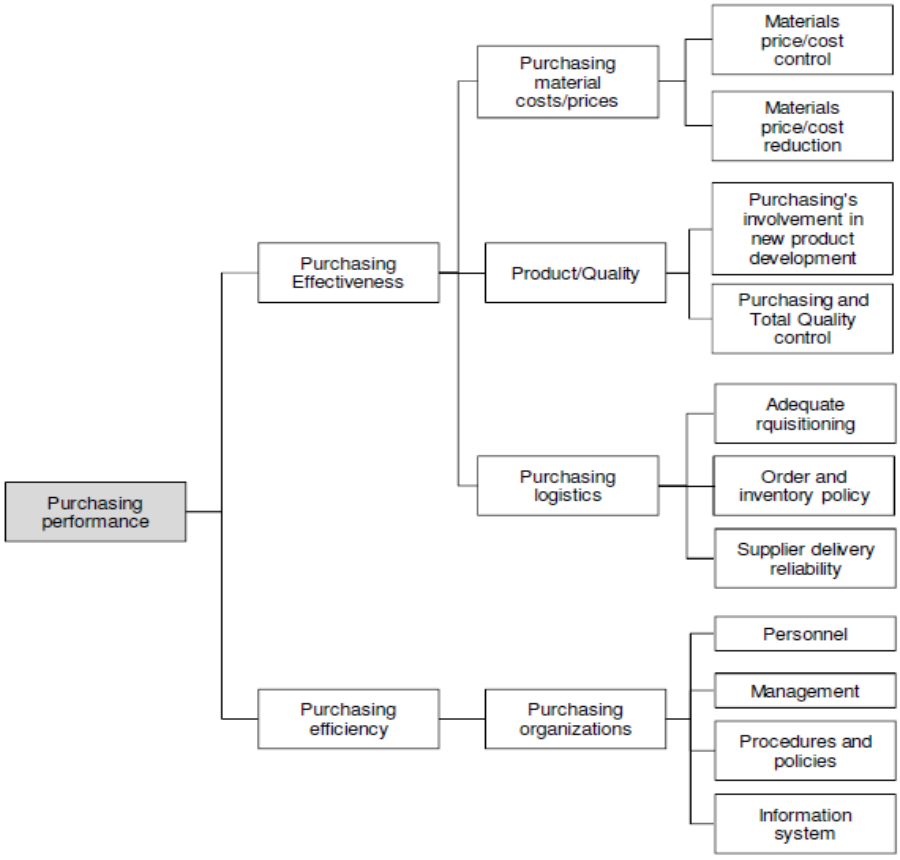

Figure 8. *Key areas of purchasing performance measurement (Van Weele, 2002, p.259)*

According to Bals and Turkulainen (2017), the strategic raise of PSM has turn focus on effectiveness beyond efficiency such as new product development, ability to introduce new technology from supplier and ensuring sustainability. A performance measurement system, which barely focuses on transactional metrics and underlines efficiency over effectiveness is not comprehensive to meet increased competition. However, this demand that purchasing organizations is understood as a strategic contributor and alleged accountable for strategic objectives (Kaufmann, 2002). Despite the importance of having outward focus and concentrate more on firms external variables related to the supplier market, several surveys (e.g. KPMG, 2014; Basu 2001) have illustrated that a major share of companies are still strongly focusing on internal measures and failing to capture external variables. Operating completely in its own vacuum organizations are not able to characterize where they fit against supplier market or competitors to make proactive decisions based on relevant measures. To achieve

sustainable competitive advantage and ensure long-term success companies are in need to understand both organization internal capabilities and relative positioning in the supply chain. (Williamson, 2000)

According to Paulraj et. al. (2004), the implementation of more outward-focus is strongly depend on the level of strategic purchasing present at the company. In practical level, companies must create a win-win situation for both buyer and supplier firms, because suppliers also expect the benefit from the partnership. Accordingly, the study from Paulraj, Chen and Flynn (2006) indicates that when purchasing is strategic, it creates considerable advantages for both buyer and supplier. Thus, strategic decisions in supply chain requires understanding the dynamics of SC and development issues for the whole chain that increase the competitiveness of the company as a part of supply chain or the network of supply chains (Huang,Sheoran & Wang, 2004).

Finally, in order to link the key concepts of this study: maturity, purchasing performance and subsequent financial performance of the company – figure 9. below presents a framework from Hartmann et. al. (2012). In their model, PSM performance is operationalized trough PSM performance drivers (e.g. supplier management) on the input level and performance outcomes refer to three operational results (cost, quality, innovation) that are directly generated by purchasing maturity. Thus, purchasing maturity is viewed as an antecedent to these mediating outcome constructs and subsequently to financial performance of the firm. (Hartmann et. al., 2012)

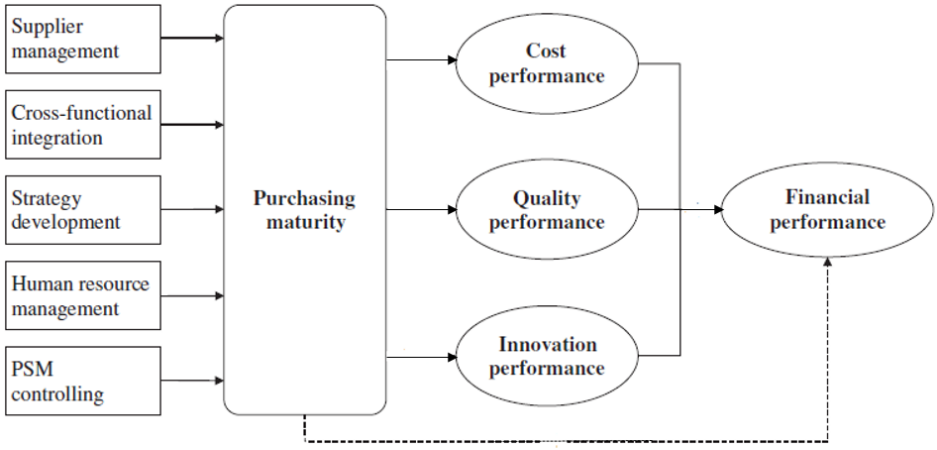

***Figure 9**. A framework of purchasing performance (Hartmann et. al., 2012)*

3.4 Characteristics of Measures

In the previous section, the metrics in purchasing context were categorized related to the main dimensions. However, these dimensions do not shed light for the actual characteristics of the measures. Next, the most important characteristics of measures are presented.

According to Melnyk et. al. (2004) and Neely et. al. (2000) there is only two basic types of measures – leading and lagging measures. Measures that focus relate results (financial performance, competitiveness) are lagging measures as they give feedback on past business performance. Alternatively, measures that focus on determinants of the results (flexibility, quality, innovation and resource utilization) are leading measures as they are enablers behind the lagging measures. Traditionally, financial measures have been popular as they are easy to find, comparable and give a clear view of the business. Due their lagging nature various shortcomings can be identified as measures do not cover strategically important factors or provide guidance for future actions and tell what must be fixed as they are more focused on describe consequences than causes. (Tung & Baird, 2011) Furthermore, focusing to maximize short-term financial outcomes may lead on gaming behavior at the expense of long-term performance. (Langfield et. al. 2009) For example, if the emphasis is definitely on savings that usually decrease over time, it might be impossible to get affordable prices – unless purchasers feel justified to accept lower quality or suppliers assume a loss, which transfers the problem forward in the supply chain (Nollet et. al., 2008).

In order to clarify and assign metrics to most suitable purchasing decision level, Gunasekaran et al. (2001) have classified performance metrics into strategic, tactical and operational levels of management. The framework deals with supplier, customer service, delivery, logistics and inventory costs in the each management level. At the strategic level, measures should influence top level management decisions and driving company broaden policies, corporate financial plans, competiveness and communicating adherence level of organizational goals. (Gunasekaran et. al, 2001; Gunasekaran et. al, 2004) At the tactical level, measures are reflecting resource

allocation and indicating measurement results against targets, which has been specified earlier at the strategic level. Performance measurement at the tactical level has a major role in contributing valuable feedback on mid-level management decision-makers. At the operational level, accurate data are gathered in order to support and communicate results on low level decision makers. (Gunasekaran et. al, 2001; Gunasekaran et. al, 2004)

3.4.1 Design

An effective performance measurement system not only depend on the actual measurement selection, but also design of measurement framework. A multitude of interesting studies has been subjected to illustrate the potential benefits and challenges with performance measurement design (Kagioglou, Cooper and Aouad, 2001). In terms of commitment, the basis of any measurement system is that measures are defined and accepted by the senior management. The importance of common goals is extremely important in PSM context since several empirical studies have found the biggest barrier in implementing purchasing measures lies in the commitment of business and functional units to pursue the same targets as PSM (Ellram et. al., 2002). To enhance the benefits of common objectives, measures must be cascade throughout an organization and all of the responsible stakeholders must be included in strategic planning sessions to identify measures, goals and targets (Kerzner, 2011; Parmenter, 2007).

From the technical perspective, Neely et. al., (1997) have suggested that the performance measure framework must cover following elements:

- **Measure title** – The title of measure must be clear. A well-defined name is self-explanatory in nature, explains what the measure is and why it is important.
- **Purpose and relates** - The underlying reason of the measure has to be specified and it must be related to business objectives.
- **Target** - The process of setting targets is one of the most challenging stages in measurement, but may be as important as the actual outcomes. (Ferreira & Otley, 2009). Target levels can based on past levels of performance or they can

based on internal or external benchmarks. In large company, well-defined targets should provide a competition between different business units, but based on realistic facts (Melnyk et., al, 2004).

- **Formula –** The way performance measure is measured must be specified and induced good business practices, because it has impact on how people behave.
- **Frequency and source of data** – The frequency and data of a measure must be specified and reported. Frequency is a function of the importance of the measure and the volume of data available, whereas specifying source of data is vital in terms of comparability, reliability and validity.
- **Who measures –** The person who is responsible to collect and report data must be specified.
- **Who acts on the data** – The person or unit who is to act on data must be identified.
- **What do they do?** – There is no point to measure if any actions is not taken. Thus, the process must include concrete actions (e.g. investigation of reason, set-up of teams) if measures appear to be unacceptable.

Finally, all of the measures and depend IT-system must fulfill four necessary characteristics: *validity, reliability, relevance and practicality.* Validity is defined as the capability of a metric to measure what is proposed to measure. Reliability defines the consistency of measurement results, consisting of characteristics such as precision and accuracy. Relevance indicates the usefulness and value of a measure for the decision makers and users. Practicality defines the cost-effectiveness of a measure and indicates the benefit-burden level of measurement. (Hannula, 2003)

3.5 PSM Performance: A Balanced View of the Factors

As the objective of this study is to establish strategically orientated and balanced view of purchasing performance measures – the Balanced Scorecard (BSC), tailored to the purchasing environment is presented next. The original BSC was developed in the 1990's by Kaplan and Norton and it is still the most adopted performance measurement framework (Gadenne, 2000). Notably, BSC is identified beneficial in strategy formulation with clearly defined targets, missions and measures – adding strategic non-financial measures to traditional financial metrics, thus providing a "balanced" view of organization's performance. (Gunasekaran & Kobu, 2007) The original BSC evaluates corporate performance from four perspectives: financial, customer, process and learning improvement (Bhagwat & Sharma, 2007).

However, in order to make BSC suitable for complex purchasing and supply chain environment and cover the whole purchasing process, a multitude studies have developed different approaches to operationalize BSC in the field of PSM. For example, Hoffman et. al. (2014, p. 136) presents a model of five perspectives – taking monetary and non-monetary operating variables into account. Contrary to original BSC, supplier management is vital part of purchasing function. In this respect, purchasing BSC is supplemented by the supplier perspective. Furthermore, the buyer perspective is replaced in terms of employee perspective. According to Hoffman et. al. (2014, p. 137) this adjustment strengthens the position of employees since their activities are made for more visible. Therefore, the purchasing BSC is built on following perspectives: financial, employee, supplier, process and internal. Deploying this approach shifts organizational focus (resources, processes, systems) towards activities that truly have an impact. Figure 9. below presents these perspective and typical measures of each dimension.

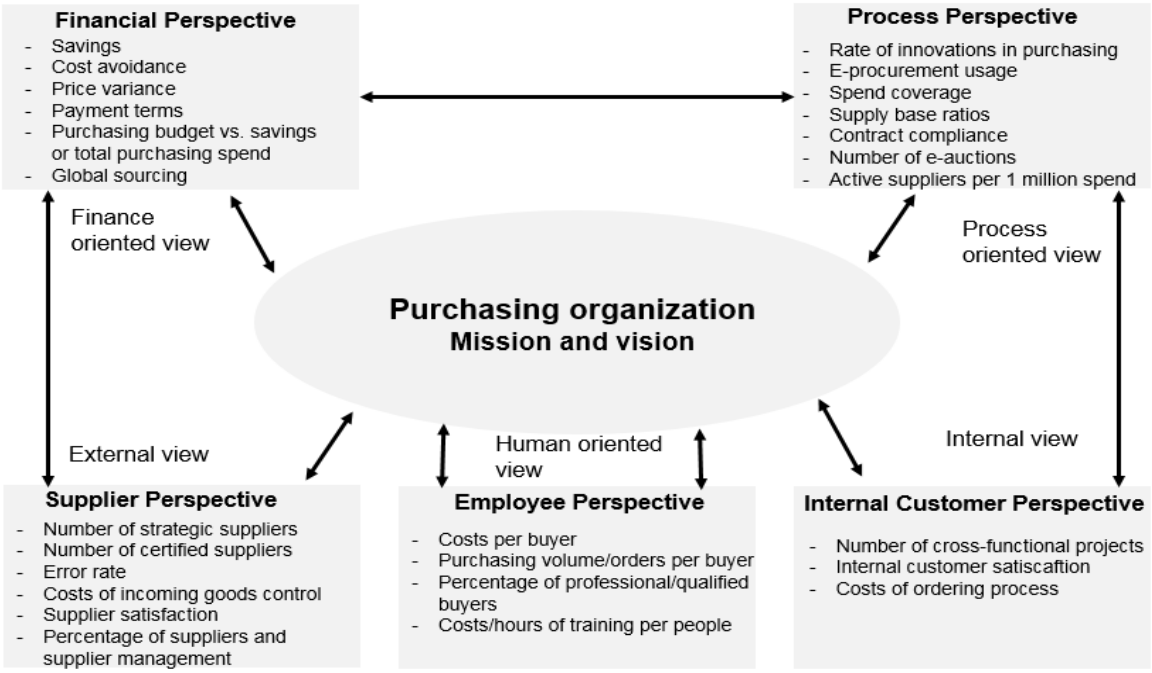

***Figure 10**.Purchasing BSC and typical measures (Adapted from Hoffman et.al. 2014, p.138; Cousins et.al. 2008, p.159; Bhagwat and Sharma, 2007)*

All of these objectives should be connected to each other with a cause-and-effect link as they are not by themselves. For example, having more talented buyers will lead more innovative processes, which will in turn increase the usage of more capable suppliers. This in turn increases the financial performance generated by purchasing. (Bhagwat & Sharma, 2007) In the next chapters, the most critical factors related to purchasing performance from wide literature survey are presented and categorized by following the principles of purchasing BSC.

3.5.1 Financial Related Metrics

Regardless of the industry, the size of a company or the maturity of procurement organization, the primary objective of purchasing is related to effective cost management (Hartmann et. al., 2012; Nollet et. al., 2008; Van Weele, 2002) since it can influence up to 80 % of an organizations costs (Carr & Pearson, 2002). According to study from Evans (2003) over 95 % of organizations measure cost savings contributed by the purchasing. However, most academic articles exploring savings are still based on Total Cost of Ownership (TCO) or *soft savings*. Surprisingly, only a few

articles have examined the evaluation of *hard savings* even hard savings are a major component of measuring purchasing performance. The third commonly discussed category refers to *cost avoidance*. Unfortunately, the common problem is in defining what constitutes a cost saving and thus there is no generally accepted methodology through researchers for presentation of savings (Nollet et. al., 2008). In fact, the process of calculating and quantifying realized cost savings, addressing them with internal stakeholders and tracking cost savings to the bottom line are one of the purchasing department's biggest challenges. (Putters, 2013; Nollet et,al., 2008)

Hard savings are quantitative in nature, since only tangible information is required for measurement. It is measured through cost reduction that is evaluated by comparing the negotiated price with a baseline price or comparing actual cost with a budgeted cost. (Nollet et. al., 2008; van Weele, 2005, p.260) Hard savings are related to all purchasing actions that directly impact the bottom line, such as reductions in price, in the workforce, or in transaction costs. According to van Weele (2002, p. 260) hard savings should be measured through a structured way by utilizing approaches such as searching of new suppliers or substitute materials, coordination of purchasing requirements among business units and value analysis. As a consequence, the level of global sourcing has become a major strategic issue due to its impact on cost savings, quality, competition among suppliers and access to new innovative technologies. (Hoffman et. al., 2014) However, product related characteristics (volume, weight, perishability, standards) often limit the possibilities to buy globally. (Quintens, Pauwels & Matthyssens, 2006)

However, purchasing should not only be measured on direct cost savings delivered, but also on value created. (Hughes et. al., 1998. p. 214). More strategic orientation and indirect benefits of PSM underline the importance of measuring soft savings. According to Nollet et. al. (2008) soft savings refers to savings generated by outcomes based on qualitative criteria. The purchasing department influences a broad range of costs and savings of other departments and therefore impacts positively to actual financial outcomes of them. For example, a saving could result from a higher quality, efficient procurement tools, payment terms and technical solutions, which increase the

additional value contributed by purchasing procedures. Due more subjective nature, the complexity of measuring soft savings accurately is greater than for hard savings. Thus, most soft savings should be converted into hard savings by using industrial standards to be capable demonstrate their value to business. (Nollet et. al., 2008)

Third saving type refers to cost avoidance that is the elimination of a future cost (Nollet et. al., 2008). As the purchasing function is dependent on market prices, general economic situation and the production portfolio can vary largely – measuring only achieved cost savings is not reasonable. Notably in economic uptrend, the performance of purchasing function is tested by avoiding price increases and ensuring the competitiveness and security of supply chain. (Hoffman et. al., 2014) Especially, this is emphasized in cyclical construction industry. However, some critical voices have questioned that cost avoidance is not saving as "*whilst it can involve significant procurement activity to negate inflationary pressure for instance, it does not contribute to the financial accounts.*" (Nollet et. al., 2008) Figure 10. illustrates the development of savings measurement system and the tradeoff between measurement complexity and benefits that organizations face in practice.

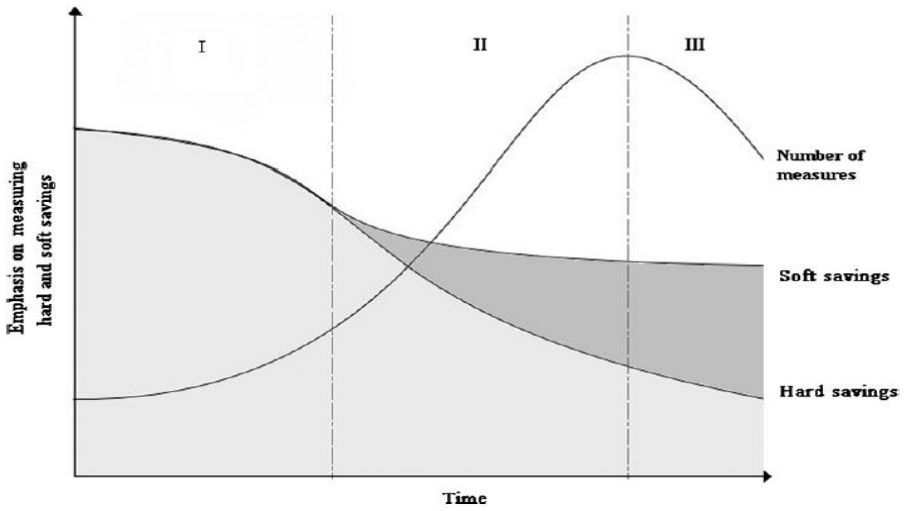

Figure 11*. Complexity of savings measurement systems (Nollet et. al., 2008)*

According to a study by consultancy PWC (2011), many companies discover that a major share of the savings purchasing function promises seems to disappear. More specifically, most companies realize no more than 50 percent of the planned savings.

In addition, one-third of those savings consists of cost avoidance, which never contributes to the bottom line. According to survey, the major reasons for leakage are:

1. ***Overestimating*** – Too often, targeted savings are too aggressive and optimistic, which are result of poor benchmarks, incomplete understanding of current and forecasted spending, or misunderstandings about the cost drivers that influence savings. Arguably, a lack of rigor and departmental input are in major role as well.
2. ***Dubious budgeting*** – After determining expected savings, expectations may be intentionally cascaded down when they are incorporated into departmental budgets – the objective being to provide a budgetary cushion to ensure expectations are met. Thus, the total amount of the expected savings never appears.
3. ***Poor demand management and compliance*** – Savings disappear when firms start buying products from suppliers other than those agreed in the sourcing process. Maverick buying made without a clear understanding has a huge impact on targeted savings and other additional benefits such as standardization.
4. ***Changes in baseline assumptions*** - Despite the great purposes, the impact of inflationary pressures such as price increases in raw materials may generate changes in prices. To be able to investigate the impact of inflationary pressures and account them into the savings calculation, firms must have a well-documented baselines.

When comparing different internal business units or one company to another, the maturity level and its impact on cost savings should be understand. For example Schiele (2007) and KPMG's (2012) survey of 585 purchasing organizations across all industries have demonstrated the positive relationship between maturity and savings. On the other hand the opposite should be possible: an organization or business unit with a low level of a maturity, which have failed to identify saving opportunities in the past might have a huger savings potential at present (Schiele, 2007). In addition, the general trend in benchmarking reports is heading towards more comprehensive measures such as procurement ROI (the ratio of total purchase cost savings to the total cost of procurement) to include the efficiency perspective.

To cover other cost factors and additional benefits of purchasing, total cost of ownership (TCO) has become a remarkable approach. TCO is a useful tool which aims to look beyond the purchase price by identifying and estimating the total costs related to acquisition of products, construction works or services over the total life cycle. TCO can utilized as a tool to increase the awareness of the total costs and related savings opportunities. By better analyzing and illustrating other softer factors associated to costs during life cycle, a company can gain information about the other performance factors such as delivery, order cycle-time, quality and other costs associated with the business and purchase processes. (Ellram, 1993) Unfortunately, as Ellram (1995) claims, lack of available and integrated cost information, lack of human skills and problems to change corporate culture from a price orientation view to more strategic orientation are the biggest challenging in implementation of TCO.

3.5.2 Process Related Metrics

Process-related metrics presents statements related to the economic efficiency of purchasing processes. They also examine the extent of introduced processes are fulfilled according to company policy and carried out in efficient use of time. These metrics also indicate the efficient utilization of purchasing volumes and are useful optimize internal processes and further to make comparisons between other purchasing organizations. (Hoffman et. al., 2012, p. 144) A capable and efficient information system, which is required to support purchasing employee and to automatize necessary information flows related to purchasing is vital to achieve several benefits of strategic purchasing and improve efficiency (van Weele, 2004, p. 262; Cousins et. al, 2008, p. 158). It has reported to lead 42 % savings in the transaction costs and several benefits such as supply base reduction, purchasing cycle time and decreased prices (Davila, Gupta & Palmer, 2003). Furthermore, it provides visibility of core processes and increases the transparency of supply base, which in turn provides necessary information to performance management.

With the growing importance of strategic purchasing, the supply base optimization and its successful managing has become one of the main competitive advantage of firms.

(Chen, Paulraj & Lado, 2004) Supply base optimizing involves parts volume consolidation and bundling by purchasing in order to deepen relationships and gain several advantages such as cost, quality, delivery and capacity (Narashiman & Das, 2002; Handfield, 1993) From the internal perspective, by operating with fewer suppliers with an efficient system, a firm can keep base manageable level and eliminate transaction costs that are related to the processes of ordering, receiving and paying the purchases (Davila et. al., 2003). Despite of some critical voices have questioned that the reduction of a firms supplier base may increase the risk arising from loss of flexibility and supplier opportunism (Williamson, 1991), a centralized supply base is argued to will bring several collaborative advantages related to dependability, greater trust and cooperation (Chen et. al., 2004).

As a consequent, seasonal contracts are utilized for larger purchasers to centralize supply base and purchases. It is measured by contract coverage ratio (CCR). A higher CCR is related to better purchasing conditions such as payment terms, deliveries, quantity discounts and risk mitigation. In addition, a higher internal customer satisfaction can be achieved as buyers are able to purchase through e-procurement systems from contract suppliers. (Van poucke, van Weele & Matthyssens, 2000) In fact, maverick buying has been studied to negatively impact on purchasing costs (Karjalainen & Raaij, 2011). Besides this, an increased control of purchases is associated with more strategically developed purchasing department, which in turn reflects higher level of purchasing maturity. Furthermore, transactional activities can be replaced by less, but cooperative, long-term buyer-supplier relationships as purchasing develops in contrast to single transactional purchases. (Van Poucke et. al., 2000) Several studies have illustrated that cooperation with suppliers positively contributes to quality of purchasing services which has reported to increase internal customer satisfaction. (Narasimhan & Das, 2002).

Innovations are one major area in purchasing performance and it is argued to be the second option to survive in competitive environment (van Weele & Rozemeijer, 1996). For example, Melnyk (2010) argue that especially cost-driven supply chains demand standardization of processes and products. PSM’s access to supply base opens the

opportunity for several strategically important innovations than firms can achieve from internal resources. The innovation can be addressed by integrating PSM into the product development process as a major share of costs and innovation are determined in early phase. PSM can also involve suppliers also in early phase by developing relationships and integrating suppliers to purchasing organization to innovate jointly. (Hartmann et. al., 2011) The closer the supplier in the value-added-chain from the purchasing organization, the higher the supplier's real net output ratio will be in terms of innovations in cooperation (Hoffman et. al., 2014). Closer integration and investments to R&D will not only increase the level of internal competence, but also increase the competence to learn from others as well (Schiele, 2007). For example Hackett Group's benchmarking report (2014) found that the top-quartile of purchasing companies drive over twice more incremental revenue through supplier innovations.

All of these perspectives emphasize the importance of measure e-procurement usage, contract compliance, supply base related metrics and rate of innovations in the purchasing processes. (Chen et. al., 2004) Together they permit assessments according to efficiency and potentials of process optimization, which will especially generate cost and time savings and to avoid errors by automatizing purchasing processes. (Hoffman et. al., 2014) Finally, it is evident that these metrics are related strongly on company's general procedures and thus they should be communicated to influence behavior to receive appropriate data of its core processes and suppliers. (Pohl & Forstl, 2014).

3.5.3 Employee Related Metrics

As the resource-based theory presents, people and their skills are one of the most important resource that create a competitive advantage of any firm. (Grant, 1991) A purchasing skill presents the ability gained by knowledge or practice and for example Carter and Narasimhan (1996) have found that purchasing skills influences the effectiveness of purchasing decisions and further in total success of firm.

Due to multidimensional nature of PSM, the purchasing personnel must have a wide set of skills including strategical, tactical and operational capabilities to effectively

handle purchasing activities. As purchasing has evolved towards strategic orientation, the emphasis has shifted towards more strategical skills in the value chain instead of transactional capabilities (Giunipero, Handfield & Eltantawy, 2006). As a consequent, for example Keough (1994) have claimed that purchasing people with appropriate purchasing skills or innovative capability will be more capable to actively pursue more efficient practices and question status quo. Furthermore, they have a central role by boosting the shift towards more strategic orientation by selecting and developing suppliers, forming long-term supplier relationships and distinguishing between non-strategic and strategic activities. (Keough, 1994) In order to match the future requirements of the function as a strategic contributor and be more attractive, companies must invest and develop their selection standards (Chapman, Demspey, Reopel & Ramsdell, 1997). According to Hartmann et. al. (2012), a success of relieving PSM employees from transactional work to more innovative tasks lies in supplier relationship management to benefit from their expertise.

However, the skills of existing employee must be also developed and extend through training and other improvement activities such as job rotation. It has been studied that leading companies do not only develop and offer specific training capabilities inside purchasing function (e.g. category management, negotiation, IT-systems). In fact, they apply job rotation across functions to widen the capabilities and experience of the employee. (Foerstl, Hartmann, Wynstra & Moser, 2012) According to Carr and Smeltzer (2002), such a two-sided focus will increase the effectiveness to support and strengthen strategical capabilities, which in turn enable the strategic integration with the company as well. Thus, recent reports indicate that leading companies provide much more training investments per employee. (e.g Hackett Group, 2014; Stolle, 2007, p.74)

Finally, retention and career planning of PSM employee seem to be relevant measure in purchasing performance. According to Stolle (2007, p. 75) a major issue in purchasing organizations is related to how long people will stay in same purchasing position and how their skills can be broaden inside the company. Conversely, Accenture’s (2002) survey reported that many purchasing organizations are losing

employees to other organizations and only 15 % of companies have systematical career development paths for the employee (Stolle, 2007, 74). These findings indicate problems of offering attractive long-term solutions and according to Hackett Group's survey (2014), the leading purchasing companies invest much more in retention planning.

Summarizing the above, organization's personnel may provide an exceptional source of competitive advantage. An established measurement system should provide information of costs related to personnel of purchasing organization's employees, their performance and contribution to the overall result of a company. They also establish the basis for evaluating purchasing personnel's qualifications and specify where improvement areas exist for internal processes or training. (Hoffman et. al., 2014, p. 144) Moreover, development of PSM towards strategic orientation requires specifying the role between strategical and operational people. Unfortunately, as the questionnaire survey of purchasing and supply chain capabilities from large Finnish companies (2011) indicates, the measurement of personnel skills and its managing is still defective (Hallikas et. al., 2011).

3.5.4 Internal Perspective Related Metrics

There is a growing interest to adopt performance management to communication purposes in order to emphasize purchasing functions role as a service provider and especially a value creator to both internal customers and suppliers. (Caniato et. al., 2014) For example, Cavinato (1987) has earlier recognized internal satisfaction to be the most central factor of purchasing performance. A balanced measurement system must comprise the collaboration of purchasing with the firms' functional units such as production and logistics. Thus, the metrics should focus to the intensity of cooperation and customer satisfaction, but also provide beneficial information of new possibilities such as the level of procurement directly controlled by purchasing department (Hoffman et. al., 2011, p.138).

According to Schiele (2007) and Stolle (2007, p. 89) early involvement of purchasing is one of the most important drivers of a mature purchasing organization. For example, in

construction industry, it has been studied that the decisions made in the pre- stages (e.g. planning stage) influence the possibilities to achieve performance in the later stage without large impact on the processes and project costs. The earlier the purchasing is involved, the better they can influence the costs of a project by better standardization, estimation and design solutions. (Haponava et. al., 2009). Furthermore, it offers a possibility for purchasing to increase its performance as more knowledge is being shared and cross-functional strategic consensus is reached (van Poucke et. al., 2010) Thus, purchasing should be integrated with the company's competitive priorities and viewed as a strategic. A better purchasing is integrated, the greater are the possibilities to evaluate strategic options and bring supplier market intelligence. These have an impact to important purchasing decisions (e.g. value portioning in new products and processes) coordinated through with other strategic functions of the company. (Narashimhan & Das, 2001)

A multitude studies have demonstrated that presence in strategic decisions and level of cross-functional integration have a measurable impact in terms of quality, cost, customer satisfaction and delivery performance to manufacturing performance, when integration with internal stakeholders is high. For example, Dell Computer has reported to achieve 54 % increase in returns, based on tight integration between manufacturing and purchasing. (Narasimhan & Das, 2001) According to Van Poucke et. al., (2010) a degree of cross-functional integration is associated with the possibilities with which purchasing can drive its beneficial practices such as savings and to which extent purchasing's advice with respect to the TCO is implemented in the purchasing decision process. This covers areas such as supplier selection, contract terms and specifications with other functions.

In a sum, measures relating to internal customers of purchasing are of extremely importance because this will have an impact the status of purchasing within the company and their possibilities to provide competitive advantage. However, since other functional units can also impact the ratios of purchasing, the challenge lies in providing a clear separation of measures concerning internal perspective.

3.5.5 Supplier and Partnership Related Metrics

Focusing on core competencies have increased companies' dependency and reliance on suppliers. Consequently, companies have paid more attention on supplier relationships (Kannan & Tan, 2002) and an effective supplier management have become as a core competency of firms (Paulraj et. al., 2006). This has led to an increasing need of supplier performance data (Carr & Pearson, 2002) According to Minahan and Vigoroso (2002) supplier performance measurement is "*the process of measuring, analyzing, and managing supplier performance for the purposes of reducing costs, mitigating risk, and driving continuous improvement in value and operations*". Consistent and shared measurements are important to help organizations focus resources, develop strategies for supply chain improvements, identify performance bottlenecks and determine the total cost of ownership of supply partnerships, products and entire supply chains (Minahan & Vigoroso, 2002).

Supplier performance measurement is an undeniable part of an effective supplier management that covers supplier selection and supplier development (Kannan &Tan, 2002). Notably the capability to measure supplier performance is crucial for supplier development as it focuses on identifying possible performance improvements (Pohl & Förstl, 2012). In addition, the measurement results should be shared internally to evaluate suppliers for future business and predict future performance of suppliers (Minahan & Vigoroso, 2002). However, a benchmarking report of the supplier performance measurement practices across multiple industries from Aberdeen Group (2002) indicates that supplier performance measurement is poorly managed through organizations. According to study, only half of companies have formalized procedures to collect performance data and typically it covers of less than half their supply base. In fact, the study from Carr and Pearson (2002) reports that typical supplier performance measurement program covers less than a third of the firms supply base. Supplier performance measurement can be viewed as a multidimensional concept that consists of a wide share of tasks.

According to Maestrini, Luzzini, Maccarrone and Caniato (2017) the ultimate goal of any supplier performance measurement system is to cover the whole sourcing process into one integrated system that integrates and ensures timely information flows between through the whole process aiming to create value for customer. Figure 11. illustrates the most typical supplier performance measurement criteria according to Aberdeen's study.

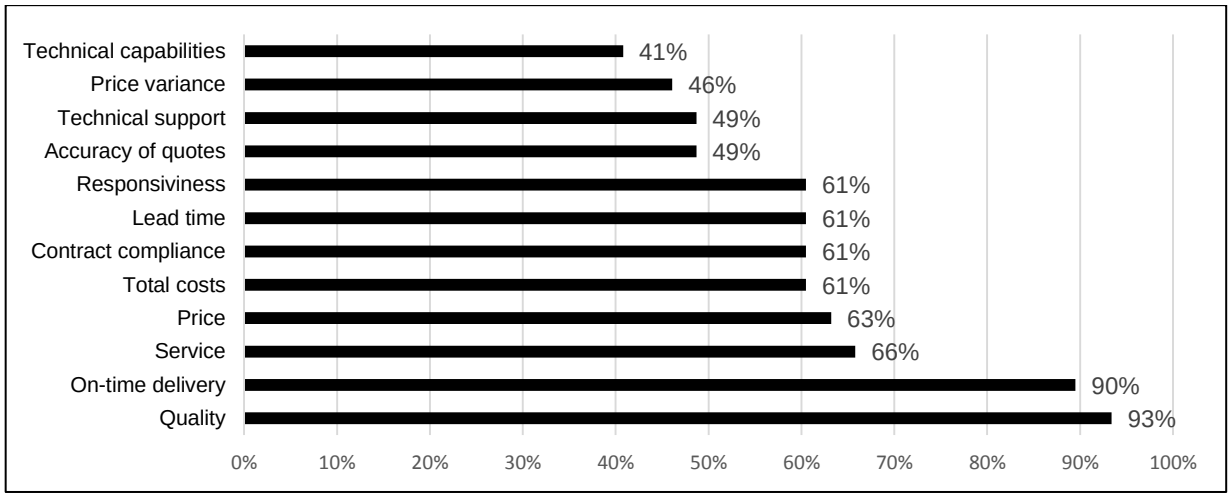

***Figure 12**. Most typical performance measurement criteria (Minahan et. al., 2012)*

According to survey from Aberdeen' the most typical supplier performance measurement criteria can be presented in terms of quality, on time delivery and service. This is in the line with Hartmann et. al. (2012) who argue that superior quality can be achieved through successful supply management through three different levers, which are supply base optimization, smart supplier identification and selection, and supplier development. To influence on quality, Hartmann et. al. (2012) identify four most critical performance areas that can be presented in terms of cost improvement, delivery reliability, access to new technology and financial health.

However, the strategic development of purchasing has transformed the focus from single measures on total value created to customer, where the most important features of supplier measures are alignment, agility and adaptability (Ketchen, Rebarick, Hult & Meyer, 2008). In specific, dynamic supply chains are built on the measures that focuses on the shared interests of supply chain instead of invidual party's interests. Therefore,

the main objective is to ensure customer satisfaction over narrowly focusing on operational efficiency through the utilization of temporary supply chains. The greater is the resultant agility, the better are the possibilities to react changes in the dynamic supply chains. (Ketchen et. al., 2008).

Similarly, Gunasekaran et. al. (2004) argue that successful supplier performance must include metrics that measure the performance the quality of relationship. Selected measurement areas must stimulate and strengthen partnerships in order to develop more collaborative partnerships and integrated supply chains (Gunasekaran et. al, 2004). To improve the extent between parties through measurement Gunasekaran et. al. (2004) summarizes five major partnership evaluation criteria: (1) level and degree of information sharing, (2) buyer-vendor cost saving initiatives, (3) extent of mutual co-operation leading to improved quality, (4) the entity and stage at which supplier is involved, and (5) the extent of mutual assistance in problem solving efforts.

Fisher (1997) highlights also the importance of frequent evaluation to ensure that supplier abilities meet organizations long term needs in terms of general growth plans, future design capability, production capacity and role of buyer organization in the suppliers strategic planning. The failure in the partnership formation will result losing attractive suppliers and therefore decrease the level of company's competitive supply base. (Ellram, 1991) Aberdeen's study (2002) also presented evidence of the value that can be contributed from effective supplier measurement. The study identified four key strategies that were common to the enterprises achieving the greatest return from supplier performance measurement. The identified strategies and their influence as a percentage on improved supplier performance is as follow:

- Track the performance of larger share of the supply base
- Standardize supplier performance measurement across the enterprise (27 %)
- Collaborate with suppliers on performance measures, reporting and improvements (61 %)
- Automate key supplier performance measurement practices (57 %)

In addition, Graham (1996) has listed several aspects, how world-class establish their supplier relates performance measures: purchasing organization has regular feedback of its own performance from suppliers and suppliers are emphasized to utilize key process metrics together with traditional quality and price metrics. Having a feedback of buyer's performance from suppliers has important role to achieve so called preferred customer status (Bemelmans et. al., 2013). Recent studies (e.g. Schiele, 2010) have illustrated the effect of being preferred customer. If buying company reaches a better status, it benefits by enjoying privileged resources allocation in terms of product development, innovation, production capacity or an exclusivity agreement by its key suppliers.

3.6 Benchmarking

Benchmarking is an important factor in performance measurement and from a purchasing perspective can be defined as "*the formal process of gathering and analyzing information about the purchasing process and purchasing performance of other organizations (competitors and non-competitors) in order to improve the company's own purchasing process and performance".* (Sánchez-Rodríguez, Martinez-Lorente and Clavel, 2003). It is a popular method, mainly used as a tool to improve organizations performance and competitiveness in the business and remain at the forefront in their operating industry. (Wong and Wong, 2008).

Benchmarking process has mainly three numbers of levels that can be used in the performance analysis. According to Camp (1989) these levels are:

- *Internal benchmarking* – benchmarking against internal operations or standards, usually in large, multinational or multi-division organizations.
- *Industry* (or competitive benchmarking) – benchmarking against other organizations in the same industry, whether organizations are direct competitors or not

- *Process* (or generic) benchmarking – benchmarking generic processes (e.g dispatch process or order receipt) against leaders or best operations in any industry.

Sánchez-Rodríguez et. al., (2003) argue that the academic research about benchmarking in purchasing function is still scarce, even though its importance has been widely justified in purchasing literature (eg. Dobler and Burt, 1996; Monczka and Morgan. 1993.) However, in the last decade it has become more common tool in purchasing functions and purchasing managers have started to utilize and understand its necessity in order to reach world-class standards (Sánchez-Rodríguez et. al., 2003). Sanchez-Rodriguez et. al. (2003) have investigated the impact of purchasing benchmarking on purchasing and business performance by collecting questionnaire based data from 306 Spanish manufacturing companies. They found that, benchmarking has a significant impact on purchasing performance and it improves business performance. Notably, benchmarking of purchasing process and purchasing performance seems to influence high levels of quality of incoming materials, achievement of inventory goals, on-time deliveries, better frequency to internal customer inquiries and overall internal customer satisfaction. Thus, researchers came to conclusion that benchmarking should be used to:

- as a tool to identify more innovative purchasing practices
- to draw challenging purchasing performance targets
- to achieve better understanding of purchasing functions strengths and weaknesses with relation to competitors and implementation of improvement activities based on needs

A typical benchmarking process is illustrated in figure 13. Understanding benchmarking as a double-loop process should lead to continuous improvement of performance measures. The basic process starts with identifying the company's critical success factors (Hughes et. al., 2009, 202). In order to complement Hughes' model, the benchmarking in larger companies should start from internal functions in order to find the best practices from inside the organization (national, global). At the next stage,

these levels are compared to other organizations or industries, which excel at excellent performance. After the performance gaps are identified, both strategic and operational initiatives should be developed and agreed. In the final stage, measures are needed to implement and the process must be revised frequently.

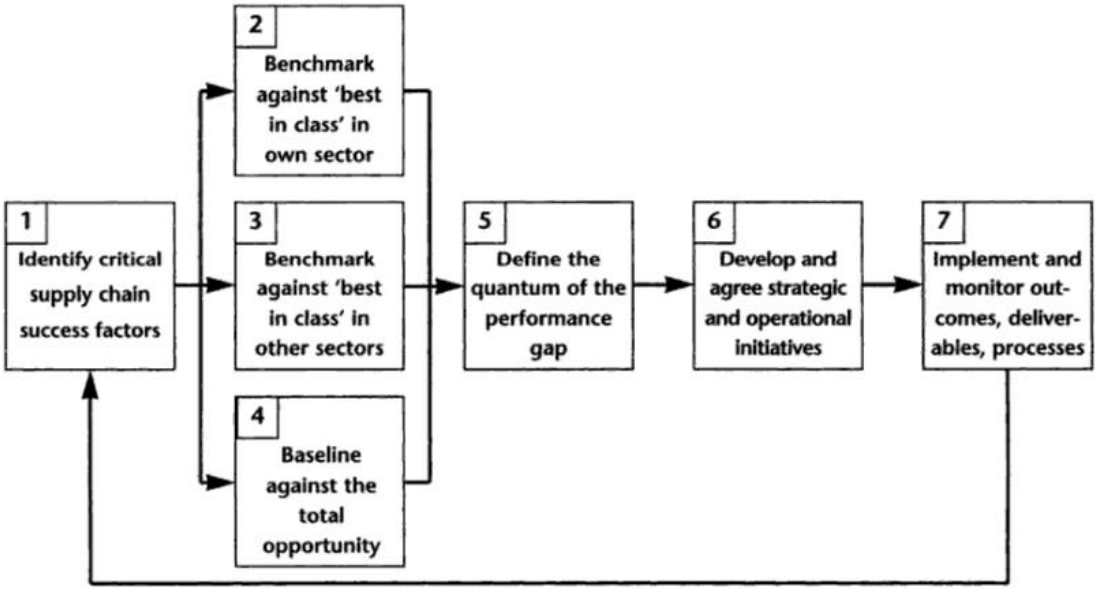

***Figure 13**. Purchasing benchmarking process (Hughes et. al., 1998)*

4 METHODOLOGY AND RESEARCH DATA

The theoretical background of purchasing performance measurement were presented in the previous chapters. To link the theoretical concepts to practical level and gain better understanding of the researched phenomenon, the empirical part of this study was carried out by a single case study. In this chapter, the research methodology and data used in empirical studies are presented more briefly. First, typical strengths and weaknesses of selected research methodology will be described to understand possible limitations with the findings. Then the data for the empirical studies and collection phases are described.

4.1 Research Methodology

As explored in theoretical chapter, purchasing performance measurement is strongly based on the level of strategic purchasing present at the firm. Moreover, performance measurement systems are invidually tailored to firms and are strongly based on their surrounding dynamics. Consequently, a single case study was selected as a research methodology. Narrowing the scope down, the research was made for a case company's purchasing department, which is part of a large and international company operating in a construction industry. The main focus of the empirical part was in the purchasing performance measurement practices of its Finnish subsidiary. Thus, the study utilized both quantitative and qualitative studies to establish an understanding of current measurement practices and test their contribution for financial performance of the company through statistical tests.

4.1.1 A Case Study

Case studies are workable in the situations, where a topical phenomenon is investigated in real-life contexts (Eskola & Suonranta, 1998), and aim is to seek answer "how" and "why" questions (Yin, 2009). Despite the case studies are mainly utilized in topical and real-life context, the earlier theory should guide the collection and analysis of the research material (Yin, 2009). Case studies can be mainly divided into extensive

and intensive studies. This case is intensive in nature, as the objective is to provide a concentrated description, understanding and interpretation of a unique but theoretically interesting case. This underlines the importance of a thorough presentation of the context of case. (Eriksson & Koistinen, 2014) For example Lukka and Kasanen (1995) have argued that a well-defined case study should generate deep understanding of the research objects and be capable to provide offer new perspectives and solutions of researched phenomena. All of the previous definitions are suitable for this research as the main object of this thesis is understand the current state of performance measurement in case company, find the answers related to research questions and finally provide fresh perspectives and solutions for the case company and other researchers.

According to Lukka (1999, 129) a case study originates from ethnography, wherein the participative observations has a strong role in research material collection. The participative observations and exploring of the internal documentation has a significant role in the collection of the research material, as the researcher has been working in the company's purchasing department and participated performance measurement process. In the past, a more extensive involvement would be probably seen harmful for the research, but as the case studies have become more common - a participatory research method has become accepted and the researcher is even expected to attend to the researched phenomenon (Lukka, 1999). Due to longer participation, the nature of the study is also longitudinal and contains descriptive and explorative characteristics, which are typical for case studies (Yin, 2009).

For the actual research approach, the mixed method research is utilized. The mixed research method makes possible to utilize both quantitative and qualitative research approach in the same empirical study. It combines the specific benefits from the both viewpoints by providing a method to utilize positivistic aspects of quantitative research and the constructivist aspects of qualitative research. The main strength of the selected approach is that different methods complete gaps that may arise from the utilization of a single approach. (Eriksson & Koistinen, 2014) Thus, research questions may be answered more widely and the researcher have a possibility to gain extensive analysis

and deep understanding of researched phenomenon. Furthermore, by having the evidence from multiple sources allows the researcher make hypotheses according to research material (Yin, 2009).

4.2 Data Collection

A multiple of different methods and data sources were utilized to collect data. Qualitative data was utilized to provide comprehensive view of the current measurement practices. To complement the study quantitative data was utilized to investigate the relationship between the purchasing performance and financial performance of the case company's projects. The data collection methods and details of the each method is presented in table 3.

***Table 4**. Data collection methods*

Nature of method	Type of method	Details
Quantitative	**Statistical tests** (Data formation with Excel, statistical analysis with Minitab)	(1) Purchasing statistics from the internal BI-tool (2) supplier evaluations from procurement database (3) financial performance data of the projects from internal accounting tool (4) supplier data (credit ratings) from external database
Qualitative	**Observations**	(1) participatory observations during thesis (2) meetings and working within the performance measurement group
	Interviews	(1) interview with CPO (2) formal and unformal interviews with stakeholders
	Other sources	(1) internal qualitative data sources: intranet, internal database, presentations, annual reports etc.

4.2.1 Qualitative Data

The objective of qualitative research was to build an understanding of the current performance measurement practices and their interactions with the strategy. Moreover, the execution of qualitative studies was seen extremely beneficial before testing selecting measurement areas quantitatively. The employment in the case company allowed to include all the existing performance reports from the past years, raw data from several sources, documentation of the measures and other materials from the internal databases. Furthermore, participatory observations and both formal and

unformal interviews constituted the backbone of qualitative research. The list of core questions of the semi-structured interview is available in appendix 3.

4.2.2 Quantitative Data

For the quantitative studies, data was collected from four different databases. The first type consists of purchasing statistics from the internal business intelligence tool. It allowed to categorize spend into desired level such as per supplier, per project and per buyer, to name a few. The second type was related to supplier performance evaluations and other statistics such as supplier classifications in the company's project specific purchasing tool. Furthermore, the advantage were taken of having the access to external service provider's database. This allowed to complement purchasing statistics with the credit ratings and other financial information of suppliers. Finally, the financial performance of the projects were collected from the internal accounting tool. The data consists of hundreds of projects that were built all over the Finland. As the projects vary, the data was standardized by calculating the overrun or downturn according to original target profit. Excel was utilized to format and combine different data sources into one database. In the last stage, statistical software Minitab was utilized to investigate the relationship between the purchasing performance and the financial performance of the past projects. Preliminary analysis were conducted before statistical tests to ensure no violation in the data. Relationships between the parameters were investigated through regression and correlation analysis. Moreover, ANOVA was utilized to seek comparisons between parameters.

4.3 Data Analysis

The results of these analyses are presented briefly in the following sections. First empirical study presents the findings according to qualitative data of case company's purchasing performance measurement system. In the first study, the current performance measurement are analyzed according to the five category framework of Franco- Santos et al. (2007), which have also utilized successfully by Pohl and Förstl

(2011) in PSM context. This allowed to present a detailed analysis of the findings and separate them systematically. A summary of findings is presented in chapter 5.4.

Second empirical study presents the results quantitative findings of statistical tests. Finally, suggestions based on the qualitative and quantitative analysis are provided for the case company on how to develop their purchasing performance measurement systems.

4.4 Reliability and Validity of the Study

Evaluation of validity and reliability are important parts of any academic research. Together they permit the quality of the selected research method (Yin, 2009; Eriksson & Kovalainen, 2008). However, especially in the qualitative case studies the reliability and validity may be hard to scientifically verify (Eriksson & Kovalainen, 2008).

Reliability refers to the consistency of the collected data. It demonstrates that the results of a study can be repeated with the same data by using different data collection. (Eriksson & Kovalainen, 2008).To overcome reliability issues, collection of data was presented and multiple sources of data was utilized of the researched object to have a systematic and repeatable view of the studies (Yin, 2009). In addition, all of the interviews were executed anonymously and recorded. Thus it follows a case study protocol as suggested by Yin (2009).

Validity can be divided into internal, external and construct. Internal validity refers to the degree how well a study explores the researched phenomena, as distinguished by a researcher (Yin, 2009). Whereas, external validity establishes the extent in which the findings of the study can be generalized and construct validity establishes correct operational measures for the phenomenon being studied (Pohl & Förstl, 2011). To tackle the problems of validity, this thesis utilized multiple quantitative and qualitative methods.

5 1st EMPIRICAL STUDY – Purchasing Performance Measurement Practices in Case Company

This chapter of the thesis will present the background of case company, analyze the current state of performance measurement system in the purchasing organization and present the main findings of the qualitative studies.

5.1 Company Description

The case company wishes to remain anonymous and will be called later *Yellow LTD* in the empirical studies. The company is one the largest main contractors in Finland in the areas of residential and commercial development along with construction services which consists of civil-, building, - and environmental construction. Globally, Yellow PLC provides employment to over 50 thousands of employees on selected home markets in Europe and North America. In the 2016, the total revenue in Finland accounted for a total of over 900 million euros and the number of employment was over 2000. The revenue was capitalized by hundreds of different projects across the Finland.

5.1.1 Strategic Objectives

The corporate wide strategy outlines the strategic objectives and the direction of the company. As a large and publicly-listed company, the aim is to increase shareholder value and the profit, but at the same time provide contribution of developing sustainable future for the different stakeholders. According to the company's annual report - to achieve the strategy, the corporate level strategies are strongly focusing on best people, operational efficiency and a long-term collaboration with the stakeholders. Therefore, several values such as are ethics, occupational safety, risk management, commitment to customers, eco-efficiency and human resources management are emphasized through all of the operations. In Finland, profitability and safety are particularly emphasized in the current strategy period.

5.2 Purchasing in Case Company

Yellow LTD's own inputs and personnel makes up only a small part of total revenue. This means that almost 75 percent of Finland's total revenue is made by the subcontractors or other suppliers, which is general ratio in the construction industry (e.g. Vrihoef & Koskela, 2002). In 2016 company had a total of 7,500 invoiced subcontractors or suppliers. A large volume of purchasing and a huge amount of suppliers contributes to a lot of challenges and increases the complexity of supply chain. It also sets challenges to meet the company's safety, ethical and green premises. Thus, it is evident that purchasing organization within company contributes to the competitive advantage, execution of profitable projects and other core values such as safety.

5.2.1 Purchasing Organization

A great volume creates lot of opportunities for purchasing organization and underlines its strategic role and operational importance. Consequently, Yellow LTD's purchasing structure have formed as a hybrid. In the centralized structure, the case company has centralized purchasing units from Nordic countries into one organization. The aim of concerted purchasing organization is to create common operating models, consolidate volumes and find the best practices from each country through collaboration. Under the centralized mode of the purchasing, each business unit has their own regional purchasing department with responsibility and authority of their own business unit. This ensures that each region has all necessary resources in order to operate effectively and support local projects. Despite the strategic benefits of centralized structure, over half of the purchases are still capitalized by operative purchasing in the project sites as they have a final word according to supplier selection. Decentralized purchasing from project sites is the main reason for the huge amount of suppliers and increases the whole complexity of supply chain.

Consequently, purchasing activities can be divided into strategical, operational and tactical according to responsibilities, authority and the nature of purchasing tasks.

Figure 13. illustrates these activities based on the strategic importance (i.e. business impact) and complexity.

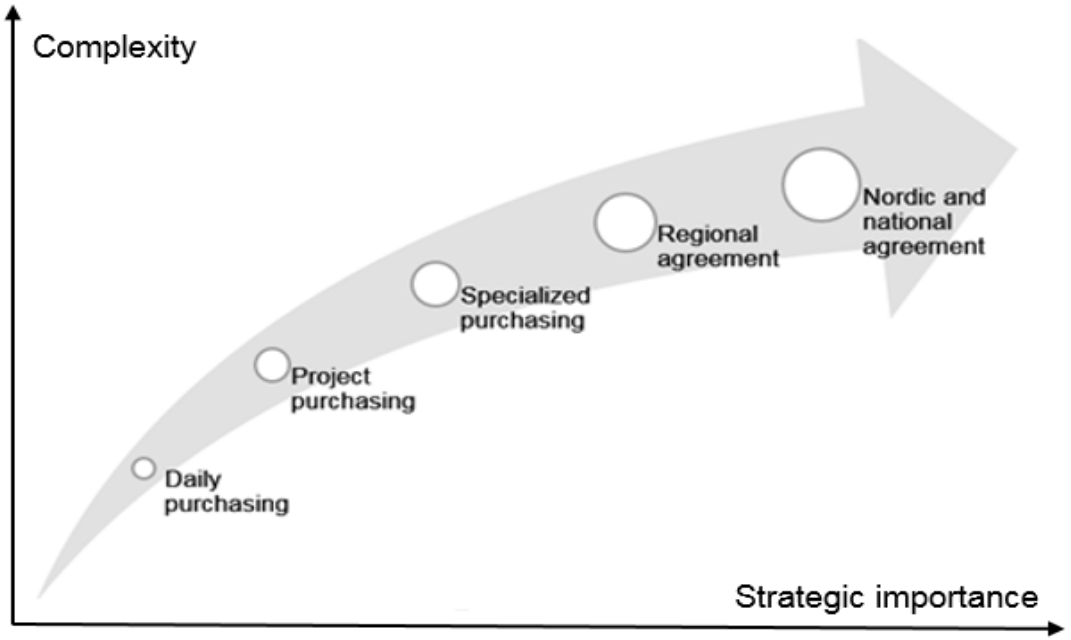

Figure 14*. Different purchasing activities*

The centralized function is responsible of the strategical decisions and purchasing policies. These activities consist of supplier relationship development, e-procurement systems, logistics and other important processes, which aim to ensure that purchasing can be carried out in profitability and sustainability manner. Since over 50 percent of the purchasing volume is not directly controlled by the centralized purchasing function, it has a central role to clarifying operational purchasing processes by providing support and first-class tools. In order to clarify operations, automate routine tasks, prevent the use of harmful suppliers and gather valuable information of suppliers, the guidance is that purchasing should made through company's own purchasing systems in order to improve transparency and efficiency. Furthermore, the purchasing organization in Finland has over a hundred of national, regional and Nordic-wide framework agreements (FWA) in the selected categories. The framework agreements have an important role enabling high price reductions and better service from strategically important suppliers resulting into competitive advantage for the company.

However, perplexing nature of construction industry with varying locations and uniqueness of projects limits the possibilities to buy repetitive and standardized products. Consequently, a major share of purchasing is made by operational persons by the project purchasers and specialized title-purchasers. The project purchasers are typically technically oriented and they have the best knowledge regarding the project schedules, technical details and volumes. In a contrast to project purchasers, the specialized purchasers have the highest technical competence and they have a major responsibility of certain product portfolio in their business unit. This increases the competency and allows to bundle volumes in each region. The figure x. summarizes the different purchasing activities and presents their share of the total spend.

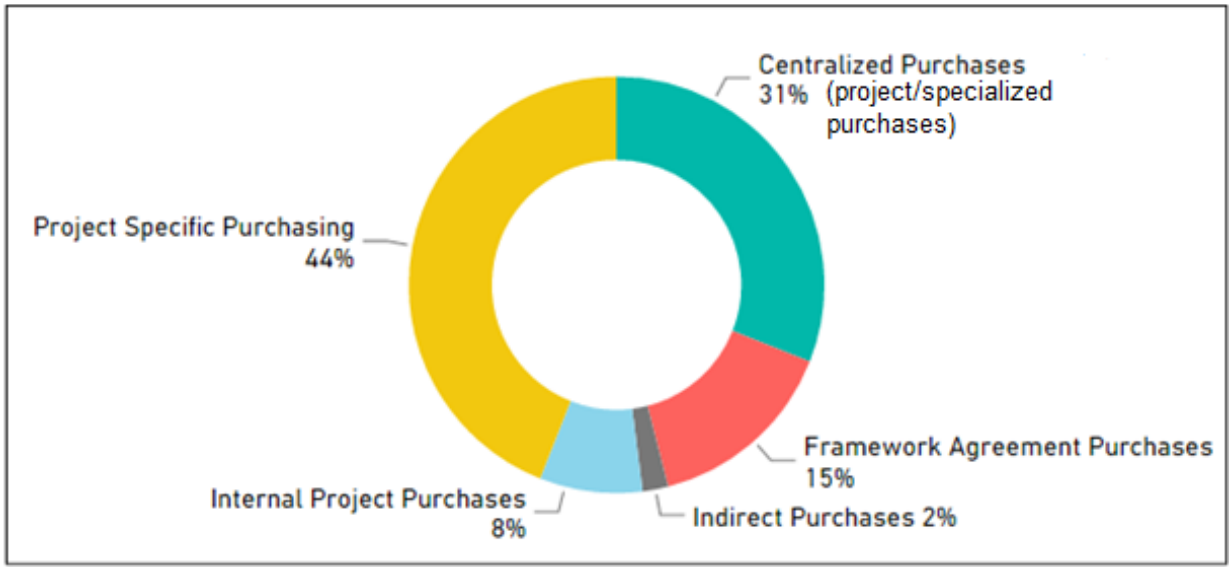

***Figure 15**. Different purchasing activities and share of total*

5.2.2 Strategic Objectives of Purchasing

The corporate wide level strategies are the base of purchasing goals. However, the Finnish purchasing organization is also part of the cross Nordic organization and has a main task to support local business unit. Therefore, the purchasing strategy must be connected to the corporate focus areas, drive targets of local business plan and its priorities, and support cross Nordic strategic areas. All of these strategic objectives must be taken into account in performance measurement and should be implemented

up to the project level. To reach the expected strategic objectives, purchasing department has identified four major focus areas:

1. **Common goals and ways of working**
2. **Cost effective supply chain and the best solutions**
3. **Competent people and great teams**
4. **Responsible, efficient and innovative suppliers**

The first cornerstone of Yellow LTD concerns common goals and procedures. The purchasing objectives must be in line with corporate objectives and actual purchasing practices must support the achievement of company's strategic goals. Therefore, purchasing organization has a central role by drafting general principles and procedures to guide the company's and projects' purchasing in desired orientation. However, the challenge lies in the implementation on the lowest level to the project line. This not only ensure efficient and cost effective purchasing for the project sites, but also leads to comprehensive risk management for the whole company. As a large company with a multiple functional units and projects, the interplay with line organization, estimation and design is highly underlined.

The second strategic objective covers the whole purchasing process from the beginning of supply chain to the delivery of final product to the customer. This demand that purchasing function is also integrated in the pre-project phase with other functional units. The earlier purchasing function is involved, the greater are the possibilities to influence the cost of a project and more favorable purchasing solutions, which in turn impacts on company's competitive advantage. Category work in both national and Nordic-level and specialized purchases have a central role by influencing more standardized and affordable solutions. In addition, lot of emphasis is given on international procurement due to its impact on costs and possibilities to challenge existing markets. Final important area concerns effective logistics, which is essential part in terms of safety, productivity and environmental impact.

Naturally, a workforce that reflects the other strategic objectives have a central role in strategy. Trained and motivated employee are needed to execute purchasing activities

in professional and responsible manner. Moreover, they create conditions for collaboration, knowledge transfer and exercise of best practice. As a result, lot of emphasis is given for development of human resources and capabilities. Finally, purchasing people with more collaborative focus is a pre-requisite in order to participate early-phase both with internal and external stakeholders.

The competitive supply base is identified as a final focus area. A lot of emphasis is given for supplier management to ensure that company's supply base is risk free, effective and commitment to the company's values in terms of ethical and green premises. A successful execution of supplier management is based on four key areas: prequalification, audits, supplier development and cooperation. By preselecting suppliers and managing the supply base through common procedures, a company can create competitive advantage, increase cost-effectiveness, mitigate risks and develop more innovative products to the customer's needs. Consequently, supplier evaluations are a pre-requisite for supplier development, which is closely linked to developing more cooperative relationships with critical and strategic suppliers. In fact, the construction industry is increasingly shifting towards more collaborative project types that requires company's expertise in designing functional and cost-saving solutions, which demand early involvement both from the contractor and supplier side. Thus, the interplay between suppliers and transformation of relationships from adversarial to cooperative are important pre-requisites – leading to early identification and commitment of suppliers.

5.3 Purchasing Performance Measurement Practices

Yellow LTD measures the performance of the purchasing function through eight different KPIs. Selected KPIs are clustered into three categories and thus reflecting the previous focus areas of purchasing. In the table 5. the current performance measurement system adopted by the company is presented from different perspectives: purchasing focus area, purpose, measure's focus and the nature of measure.

Table 5. *Current performance measures of case company*

Procurement focus area	KPI	Purpose	Focus	Nature
People	Professional purchasing*	Procurement is made by competent people	Efficiency	Lagging
	Best people*	Commit and develop staff	Efficiency	Lagging
Sustainability in supplier base	Supplier prequalification*	Spend comes from prequalificated suppliers	Efficiency	Leading
	Supplier audits	Audits to increace suppliers capablity, sustainability, quality etc.	Effectiveness	Leading
	Supplier meetings	Develop suppliers capablities to increase their competitiveness	Effectiveness	Leading
	Smart supplier selection	Increase spend from sustainable and competent suppliers	Efficiency	Leading
Cost effective supply chain	Share of international procurement	Improve competitiveness and profitability through international procurement	Effectiveness	Lagging
	Procurement ROI*	Savings related to procurement budget	Effectiveness	Lagging
* Nordic-level measure				

Four out of eight measures are cross Nordic-level metrics and they drive common purposes of the centralized Nordic organization. These are marked as a star in the table. Last four metrics are mainly utilized in Finland and they drive local purposes. Next selected measures are analyzed through the five category framework: strategy management, measure performance, influence behavior, learning and improvement and communication, as presented by Franco-Santos et. al. (2007).

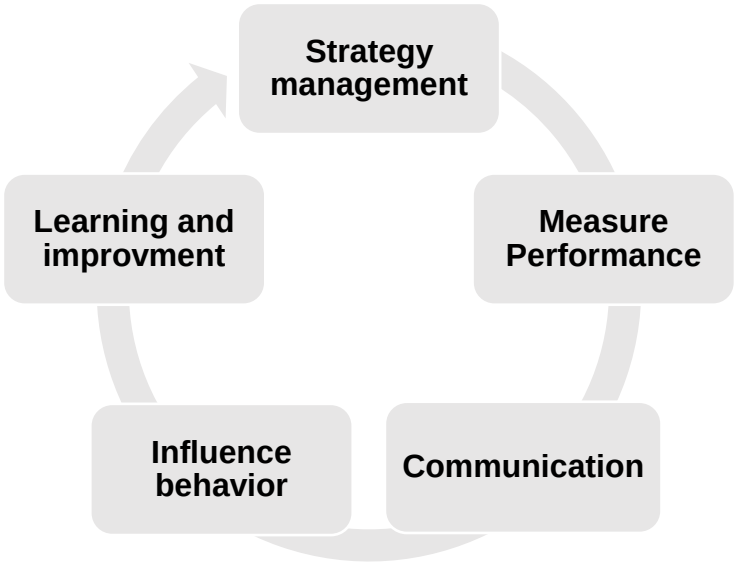

Figure 16. *Category framework to analyze measurement practices*

5.3.1 Strategy Management

As stated earlier, the implementation of purchasing performance measurement system is a necessary part of strategic purchasing. Moreover, purchasing performance measurement should be based on the company strategic objectives as the contribution of purchasing activities is depend on the strategic integration.

In Yellow LTD, the strategic linkage with performance measures and corporate objectives are clear. Applied performance measurement system is derived from purchasing strategy, which reflects the generic strategic goals of the whole company, thus constituting the fundamental elements of any performance measurement system (Carr & Smeltzer, 1997). Furthermore, Yellow LTD utilizes a wide of range of measures, balancing between efficiency and effectiveness - thus having an internal focus on purchasing function's core competencies and externally to supplier market, as suggested by multitude of studies (e.g. Paulraj et. al., 2006; Williams, 2000). Applied measurement framework is also accepted by the purchasing function's steering group, which receives measurement results in every quarter. Finally, the importance of the purchasing department has been largely underlined in company's business plan, because purchasing function plays an important role in the achievement of strategic objectives. According to these findings, it can be stated that purchasing is regarded as a strategic asset (Carr & Smeltzer, 1999) and is quite integrative in nature (Reck & Long, 1988). Moreover, purchasing function is not only viewed to deliver cost savings and operational benefits, but also impacting on wider value creation, thus indicating of more mature purchasing function (van Weele, 2002, p. 394).

However, if the current measurement system is analyzed from a larger perspective – there is no such a measure at the whole company level that is followed by business management or directly linked to result making business units. This is one of the major problems, identified by CPO as well. Consequently, lack of visibility leads to dilemma that who takes the responsibility of purchasing performance results. Lack of commitment and presence decreases clearly purchasing functions possibilities to execute its strategic objectives. Alternatively, previous experiences have proved the

positive development with the measurement results, if the responsibility and commitment are shared. The following statement of the CPO greatly emphasizes the finding:

> *"The current situation is largely that procurement function measures itself - not so that the company and its management measures and addresses concrete targets for us… What if were to say someday that we do not measure anything any longer?"*

On the other hand, CPO emphasizes that as purchasing function measures itself, it creates the transparency concerning the situation of purchasing in the company. As a result, a better target setting by upper management would not only increase the level of strategic alignment, but also simplify the execution of purchasing practices that drive the strategic goals of the company. Moreover, practical implementation of certain purchasing activities or strategies would be easier to justify if the goals are required by upper management. This finding is in the line with Franchechisini et. al., (2007) who argue that performance measurement has a central role to justify investments – by having a proof from measurement, purchasing function can shape a believable case for requesting additional investments (e.g. IT-investments to collect data) as links between strategies, metrics and excepted outcomes such as operational efficiency can be easily demonstrated.

Relating to the previous problem, it was also identified that Yellow LTD didn't provide any measure for its strategic goal of collaboration and be early involved in the project planning stage. However, this is largely related to purchasing function's status. Hence, if purchasing is considered as an important part of strategy – providing more than operational benefits and the general trend is heading towards more collaborative project types that demand early involvement from both purchasing and suppliers – the level of collaboration should be measured or followed. But, this turns to previous dilemma: are purchasing performance measures defined bottom-up or top-down? Furthermore, during the interview it was identified that the level of collaboration has been tried to measure, but the major problem refers to the information sharing. The

problem is that the procurement does not have the access to valuable information of new projects enough early, which is actually one of four pre-requisites for purchasing to operate at strategic level, stated by Carr and Smeltzer (1997). The lack of integration with functional peers seriously limits the implementation of strategic plan, thus neglecting company's competitive advantage and long-term business advantages.

Despite the importance of strategic integration through measures, many strategic goals are usually more qualitative, not-traceable and hard to directly translate in PSM performance objectives. This finding is line with van Weele (2002, p.255), who mentioned that as PSM performance develops towards more strategical areas and effectiveness – more complex guidelines and techniques are needed to evaluate the progress of purchasing performance. Thus, in the context of case company, different views should been included to create a common understanding of what exactly constitutes purchasing performance. This development would not only feature the strategic understanding of purchasing, but also foster the awareness and integrity in the company. Moreover, it would enable stronger commitment with the actual purchasing targets.

Finally, performance measurement systems are designed to be able characterize where organizations fit against company's overall strategy or market conditions to make proactive decisions. Therefore, one missing area refers to company's sustainability targets in terms of becoming greener. In fact, construction industry capitalizes about a third of greenhouse gas emissions in Finland, and as part of the EU, Finland has committed in the Paris agreement to a reduction of at least 40 percent by 2030 (Ympäristöministeriö, 2017). For instance, PSM performance measurement should considered as a tool in which feedback is used to identify future changes of the supply chain and make adjustments to strategies, thus guaranteeing a continuous "fit" of strategy with the environment as assumed in contingency theory (Pohl & Förstl, 2011). Thus, well-defined PSM performance measurement system should endlessly challenge the corporate or purchasing strategy to enable strategic alignment.

5.3.2 Measure Performance

Yellow LTD measures the performance of purchasing organization by applying internal and external measures. Lot of emphasis is given for external measures due to perplexing nature of construction industry. Consequently, many measures are supporting for purchasing function's strategic goal of "*Responsible, efficient and innovative suppliers",* which goes hand in hand with strategic goal to have cost effective supply management with the best solutions. The applied measurement system consists both leading and lagging indicators, as suggested by Neely et. al., (2000) and Melnyk et. al. (2013). Some of them present direct outcomes such as achieved cost savings, others present direct activities such as amount of prequalified suppliers. Balancing between the two dimensions is not only important to catch the all critical aspects of the purchasing process, but also have future and past-orientated view.

In the Nordic-level, Yellow LTD measures the performance of purchasing function through four measures: *professional purchasing, best people, supplier prequalification and procurement ROI*. The first measure, indicates the share of total spend that is managed by professional procurement by including framework agreement spend, spend based on purchasing personnel's competence and internal purchasers from the same concern such as asphalt services. The centralization of purchases to the qualified personnel and suppliers is expected to result in internal efficiency as well as improved risk management, better compliance with purchasing process and increased profitability. The second measure "*best people*" indicates how well purchasing organization is committing and developing their people. In Yellow LTD, it is largely understood that appropriate purchasing skills influences the effectiveness of purchasing decisions and further in total success of firm. The third measure "*supplier prequalification*" is measured to minimize supply chain risks around Yellow LTD's core values. By preselecting suppliers, the aim is to ensure that supply base is competent, productive, and committed to follow the Finnish legislation and company's minimum requirements. However, due to enormous amount of suppliers and varying commitment with company's general procedures, there exists noteworthy differences with the measurement results across business units.

The last Nordic-wide measure was implemented during the research and it relates to the amount of periodical savings compared to the purchasing department's operational budget. Thus, it is typical indicator of purchasing organization's effectiveness as common in benchmarking reports (e.g. Hackett Group, 2014) In Yellow LTD, the savings are measured through cost reduction, cost avoidance and other added values. The applied savings measurement system covers savings, which are based on negotiated framework agreements and project savings generated by centralized organizations staff. From FWA perspective, savings are calculated according to price change between new and old agreement, existing supplier spend and contract compliance. Alternatively, project savings are based on the difference between target cost and actual purchasing price per each procurement task.

Consequently, the calculation method have attracted lot of discussion in Yellow LTD according to reliability. Notably, there should be a common understanding related to savings terminology, the level of staff costs to be included on the cost side and data collection in terms of data collection method, source of data and particularly, what is actually a saving? Moreover, as measurement develops towards softer savings instead of emphasizing direct hard savings – it becomes too complex and acquires changes to current information systems. In addition, if purchases are not made in accordance with purchasing regulations through e-procurement systems, it limits the possibilities to track purchases and gain valuable information regarding purchasing process. Also, in more cooperative project assessments, it might be impossible to gain direct savings, if suppliers are already involved into design and planning phase. The following statement describes the problem with calculating savings:

> *"The major problem with measuring savings is that it does not include all the valuable work that is done by procurement, for example, sustainability. However, procurement spends a lot of time with many non-measurable areas in form of safety, ethics, more effective solutions, better cooperation and even by assisting to win new projects if we are able to find good suppliers and product innovations. These are areas that do not appear directly in monetary value. In addition, if we haven't been enough accurate in cost accounting, and as a result procurement*

can deliver great savings according to target level - is that in truth an indication of great performance?"

Last four measures are mainly utilized in Finland. Three of them are driving the purposes of supplier management and thus they are strongly outward-focused. Two of them: supplier audits and supplier meetings are naturally focusing on the development initiatives with the current or potential supply base. By auditing and developing suppliers with the common procedures, the aim is to develop them more competitive and mitigate supply risks. As a third supply management metric, Yellow LTD measures the share of spend that is capitalized from the suppliers, which have the highest supplier classification in the supplier database. The purpose of the metric is to increase spend from sustainable and competent suppliers. The final metric, international purchasing aims to increase share of international purchasing in order ensure cost competiveness, profitability and other benefits related to utilization of global suppliers such as product innovation or challenging monopolized markets.

As an own dimension, Yellow LTD measures supplier performance through three core areas safety, reliability and quality. These are presented in table 6. Supplier performance measurement is a basis for successful supplier development and the identification of possible performance deviations. It ensures that suppliers are performing according to agreement, but also creates a tool to increase transparency of the whole purchasing process. In addition, supplier performance information in terms of amount and quality is a prerequisite behind other performance measures.

***Table 6**. Supplier performance evaluation criteria in case company (scale: 1-5)*

Safety (S1-S4)	Reliability (S5-S8)	Quality (S9-S12)
S1: Attitude towards safety	S5: Representatives/supervisor's availability & expertise	S9: Contract compliance
S2: Cleanliness, order & environmental consideration	S6: Compliance with agreed timetables	S10: Quality of the products / performance
S3: Compliance with safety instructions	S7: Unfounded demands related to the contract	S11: Development activity
S4: Development activity with safety	S8: Billing & payment terms	S12: Reactions and corrective actions towards claims/remarks

Finally, concerning the amount of different measures, there is a tradeoff between the amount of measures and having the focus on the most important things, as identified CPO. If Yellow LTD wishes to keep the number of measures meaningful and avoid complexity, an alternative option could be to create another measurement system for category level, which is responsible of developing strategically important purchasing categories and suppliers. This would better allow to differentiate the objectives of performance measurement and control according to purchased items such as routine products or leverage items, as suggested by Kraljic (1983).

5.3.3 Influence Behavior

Purchasing performance measurement are designed to create transparency of purchasing activities and particularly to motivate employee' behavior towards strategically aligned practices. Despite of having formal purchasing processes, rewarding mechanisms through performance measures are needed to make purchasing practices such as supplier selection more understandable and visible. In Yellow LTD, performance approvals are largely applied at purchasing level to reward people.

Nevertheless, couple of major problems were identified during the interview. As mentioned before, there is no such a measure at the whole company level that is followed by business management or related management's bonuses. Secondly, the projects are ultimately responsible for the financial performance of the project, and thus they make the final decision of what suppliers to use. For example, lot of valuable work has been made to increase the level of international sourcing, but the decision whether to select international suppliers is made at the project site. The following statement of the CPO best illustrates the finding related to commitment and purchasing organization's possibilities to influence on the final execution of purchasing practices:

> *"However, all of the purchasing measures are not influenceable by purchasing organization. For example in our case, there is still a lot of potential in the international procurement and many times suppliers are audited, well-known, have strong preferences and impact on cost savings is demonstrable.. Sure, there*

> *are always risks involved, but on the other hand, the potential for savings is clear... The major problem is that the risk is always realized at the project site and the project is evaluated on the basis of its financial performance, not on the basis of the purchasing measures."*

Furthermore due to organizational issues, it remains questionable whether the projects and different stakeholders such as projects will support more balanced execution of purchasing practices if their evaluation strongly depends on the financial performance projects. For example, if people are only evaluated through savings delivered, in some phase, it could be impossible to get more affordable prices, unless buyers feel justified to accept lower prices at the expense of quality or other sustainable areas. Focusing on direct prices also limits the implementation of the case company's framework agreements. The higher compliance would enable purchasing function to deliver more competitive agreements in the future and capture the full benefits of the contracts. The solution would be a scorecard to supplier selection, where other issues are emphasized together with price. In the last resort, all the previous perspectives will support a balanced pursuit of purchasing – leading to greater cost reductions in the long term.

Previous issues are strongly related to rewarding and target setting that has both internal and external perspective. From the internal perspective, rewarding mechanisms are part of the certain measures in purchasing, applied mainly at leading buying personnel and managerial level. More operational personnel are rewarded with trainings and career opportunities as a result of great results. However, as mentioned earlier the business functions are not evaluated by any purchasing measure. This is part of the dilemma in balancing long-term competitiveness and short-term financial performance. Thus, lot of is needed to realize the more long-term benefits of the purchasing by committing internal stakeholders to pursue common objectives.

Finally, a considerable idea regarding the external perspective would be utilization of performance rewards or targets with selected suppliers to boost continuous improvement.

5.3.4 Learning and Improvement

Purchasing performance systems should constantly reflect the changes in dynamic environments and challenge the purchasing or corporation strategy by demonstrating the effectiveness of selected purchasing practices. This evolutionary characteristic of performance measurement leads to continuous improvement, which is core part of any performance measurement. In Yellow LTD, there can be identified two perspectives: internal perspective focused on developing the purchasing organization, whereas the external perspective aimed at improving company's competitive supply base.

From the internal perspective, for example Keough (1994) have claimed that purchasing people with appropriate purchasing skills will be more capable to actively pursue more efficient practices and boost the shift towards more strategic orientation. However, Yellow LTD didn't provide any separate measure concerning for internal learning and development in personnel expertise. Even though, internal development was a separate dimension of two measures related to people, these measures didn't take the staff development directly into account and are lagging in nature. A solution could be a measure that allows identify and developing personnel capabilities.

Furthermore, as purchasing organization has an intermediary role as a service provider and value creator to both internal customers and suppliers, a largely recommend factor from the wider perspective relates to collecting feedback from both internal and external stakeholders. On the one hand, as Yellow LTD wants to be recognized as the leading construction company and as a preferred customer, there would be a place to collect and analyze feedback of its own performance from the key suppliers. On the other hand, purchasing organization should be concerned about how its internal customers are satisfied by to be considered as a strategic provider and to be integrated with the company's competitive priorities. Thus, by measuring both external and internal satisfaction of the most essential factors in terms of importance and the current level of satisfaction – Yellow LTD can characterize where they fit against supplier market and internal functions to make proactive decisions based on relevant measures.

From the external perspective, development activities with supply base were strongly present since two of measures are focused on improving company's current and future supply base. Notably, supplier evaluations from the project sites have a central role to identify current development activities and predict future performance of suppliers, whereas supplier audits are more comprehensive in nature and utilized with potential suppliers as well. Furthermore, a large share of supplier evaluations in company's database allows to benchmark suppliers in specific product categories or against best-in-class suppliers. However, one of the biggest drawback of supplier measurement program is that it doesn't cover the whole supply base or all of the activities made by a single supplier. This problem originates from organizational issues as the project sites are not familiar or motivated to evaluate suppliers, do not understand the value of giving regular feedback of familiar suppliers or worst of all, all of the orders are not made through e-procurement tools or catalogue-suppliers are not even evaluable at the moment. Consequently, as an amount and quality of supplier feedback is not only valuable itself, but is also pre-requisite behind other measures, a considerable solution for Yellow LTD could be a measure that tracks the number of supplier performance evaluations. This would provide better transparency of supply chain across multiple projects to inform future supplier selection and development initiatives.

As there are major differences between units in performance results, it could be valuable to utilize benchmarking as a tool to foster learning and improvement. In Yellow LTD, benchmarking is only utilized by comparing different business units and over a specified time. To stimulate continuous improvement and share best practices among company, benchmarking may be expanded. Notably, this would encourage of better understanding what drives performance in case company. However, external benchmarking should be utilized more widely in order to allow a comparison with other companies or industries which excel at high level of performance in terms of efficiency and effectiveness. This would help to identify best practices from different industries and help to achieve better understanding of strengths and weaknesses with relation to other industries. Finally, more challenging target setting may be supported.

5.3.5 Communication

An integral part of any purchasing performance measurement is communicating and reporting the results both internally and externally. Moreover, they are core requirements to increase purchasing function's visibility, accountability and strategic integration with corporate. In Yellow LTD, all of the measures are communicated quarterly to purchasing function's steering group. In addition, the measurement results and other additional information related to measures are internally visible in company's intranet. Although, the current measures are largely available now, lack of frequent and more comprehensive communication to responsible stakeholders such as regional units was found one of the major barriers. In order to increase transparency, emphasize the strategic linkage of measures and be a more proactive, the reporting content should revised. In fact, studies (e.g. Bourne et. al., 2005) have found that more mature and high-performing units utilize measurement information more intensively and proactively than less-performing units.

However, information systems and their capability to provide comprehensive, timely and accurate data was found to be one of the major development issues in the company, identified by CPO as well. Thus, it is in line with studies of purchasing measurement systems from Caniato et. al., (2012). Lack of information system capability do not only limit the design of new measures, but also harms an effective communication as data is not integrated automatically from the multiple systems into one database. In fact, only two of measures were available on-demand as a dashboard in the current BI-tool.

For future consideration, the possibility to change a more capable measurement system or advanced data integration would be important to be investigated. Despite the costs of implementing or maintaining the exist system, it would provide benefits regarding reporting frequency, automatization and data validation as manual work is not needed to handle data. Moreover, it would enable to have important knowledge of what company has bought, allow to structure data into desired level and free resources to more productive tasks. However, if there is not demand from the internal

management for more effective measurement system, investments may be hard to justify. A statement by the CPO best illustrates the finding regarding information systems and communication:

> *"In an ideal situation, all of the measures would be available real-time and whoever, for example me, has the possibility to check the current situation whenever needed. In the era of digitalization, this would be a minimum requirement and systems should be built with respect of measuring…Perhaps problems with IT-systems illustrates the fact that the company is not mature enough and measure orientated: we in the purchasing organization are following the most closely these measurements, planning and designing them in regular basis."*

Couple of interesting findings were found concerning the previous studies (e.g. Carr & Smeltzer, 1997; Paulraj et. al., 2006) of communicating purchasing performance results internally to executive management in order to receive attention as a strategic function and increase the awareness of the purchasing contribution to company performance. Contrary to previous findings, this was not emphasized so strongly in the case company:

> *"In my opinion, excessive communication of the procurement and the measurement results will go against us. The existence of the purchasing should be self-evident since over 70% of turnover relates to purchasing... However, very rarely, procurement function alone can do nothing. There must be support and assistance from the project organization, technical know-how and you have get along with suppliers. Taking honor of success and advertising for example massive savings is wrong. There must be common goals and we need to work together with other functions."*

From external perspective, detailed information and measurement results of suppliers are internally visible in company's supplier database. Furthermore, Yellow LTD collaborates with suppliers on performance measures by having meetings with suppliers. Thus, tracking the performance of suppliers and communicating them are

an undeniable part of company's supplier management in order to boost the extent of mutual co-operation leading to improved quality and other benefits in the future. Finally, supplier performance results and possible deviations in supplier's performance are internally reported in regular basis. The aim is to increase transparency of supplier base and predict future performance of suppliers by taking corrective actions.

However, one of the major issues with current communication practices refers to lack of agility to quickly react supplier evaluations. For future consideration, Yellow LTD should automatize key supplier performance measurement practices both internally and externally. From internal perspective, a capability to automatize alerts regarding possible deviations with supplier's performance would be valuable as company operates with a number of different suppliers. It would not only allow Yellow LTD to take corrective actions more responsible, but also mitigate risks in the upcoming projects, if company has better and rapid awareness of changing circumstances such as quality or safety deviations.

From the external perspective, an interesting option concerns of sharing valuable information directly to key suppliers. This would have an important role to achieve so called preferred customer, as presented by Schiele (2010). Increased extent of mutual cooperation would allow Yellow LTD to benefit by privileged resources allocation and increase their supply base's competitive advantage. Moreover, as the trend is heading towards early supplier involvement, it would be one remarkable approach to separate Yellow LTD from the competitors and drive deeper buyer-supplier relationships.

5.4 Discussion of the Findings and Suggestions

This chapter provides the summary of the main findings and presents suggestions for the case company in order to develop and implement purchasing performance measures.

5.4.1 Summary of the Findings

The previous analysis proved that purchasing performance measurement systems has a major role in the purchasing function. Particularly, for the companies which operate with complex and huge supply base as the case company. Measurement has a key role in integrating purchasing with the company, creating transparency and making purchasing activities more manageable. However, the contribution through measures is strongly linked to the status of purchasing. Mutual commitment and shared responsibility through business units were found to be one of the biggest challenges and development issues in the future.

Concerning the current measures in PSM context, it was found that defining and measuring purchasing performance is extremely complicated task. More advanced IT-systems and methods are needed as the measurement develops towards more strategic areas of purchasing. Furthermore, it was found that supplier related ratios, sustainability, risks, human capability, and ratios related to internal and external collaboration have an increasingly important role together with more traditional areas such as savings.

Results from the analysis proved also that behavioral issues through performance measures are needed to make purchasing practices such as supplier selection more understandable and visible. This also allows to develop purchasing decisions from the price to more qualitative areas. However, the major problem in the case company's context relates to the implementation of more long-term activities as the success of company is evaluated on the basis of its financial performance, not on the basis of the purchasing measures. Thus, activities which aim to create the basis for sustainable competitive advantage should be made committed better to actual targets of business units.

Research findings demonstrated that learning and improvement areas are important part of purchasing. More specifically, there can be identified two perspectives: internal perspective focused on developing the purchasing organization, whereas the external perspective aimed at improving company's competitive supply base. Thus, in order to

boost the development in both areas - desired capabilities of purchasing people must be identified more objectively and supplier performance measurement must cover larger share of case company's supply base in terms of amount and quality of supplier evaluations. Furthermore, supplier evaluations are ultimate prerequisites behind other measures, core part of supplier development and have influence on purchasing decisions. Thus, a recommendable solution is to follow up evaluations through well-defined measure.

Finally, a central part of any measurement system is communicating the results. Especially in purchasing context, internal and external communication are vital to integrate purchasing with internal functions and suppliers - leading to more cooperative relationships. These are increasingly important factors in the future and usually neglected in the construction industry. However, this demand permanent lines of communication through functional units and that measures are defined by top level.

5.4.2 Suggestions for the Case Company

To provide solutions for the case company and ensure long-term orientation, a planning and implementation model was drafted. Figure 17. below presents the necessary steps.

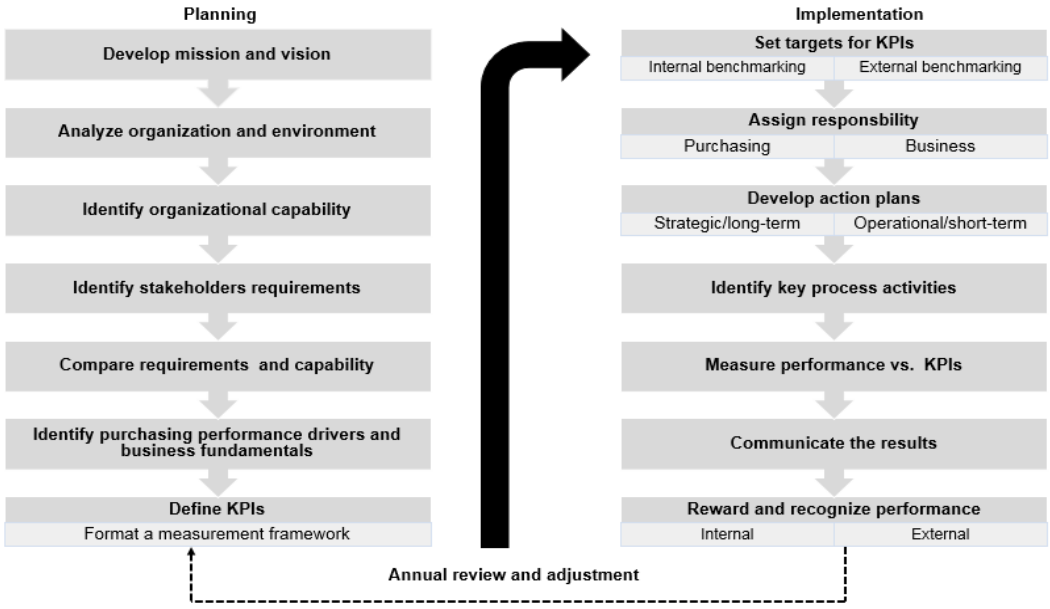

***Figure 17**. Prerequisites for developing and implementing purchasing performance measures (modified from Gunasekaran et. al., 2001)*

A first step of any purchasing performance measurement initiative is built on the basis of purchasing strategy. To ensure continuous fit through measures, purchasing strategy must be transformed to actual activities that are consistent with the overall company objectives. Subsequently, an analysis of the actual organization and environment situation is to be made. This ensures the identification of which perspectives are implemented in existing system and which are still lack of focus such as environmental and collaboration issues. Aside from organizational capability, stakeholders' requirements in form of internal and external are to be included to support internal customers' and external stakeholders' expectations and their future needs. This allows to understand both internal capabilities and relative positioning in the supply chain as the case company's objective is to be most preferred customer in the industry. In the next step, before defining actual measures, existing business fundamentals and following purchasing performance drivers must be identified. Particularly, care is to be taken of a long-term orientation to ensure long-term capabilities to operate. Following that, KPIs are to be defined and this could be done on the basis of some measurement framework such as purchasing balance scorecard to be able format a balanced view of performance. Furthermore, measurement system must cover the whole purchasing process. In this respect measures should be divided into financial, process, supplier, employee and internal customer perspective. Consequently, the information systems architecture should include the strategic objectives of purchasing.

However, planning the performance measurement is only half of the process – the measurements must be also implemented to the whole company level. The first step is the target setting, where both internal and external benchmarking should be utilized to draw challenging, but meaningful purchasing performance targets. This ensures continuous improvement. In the following step, the responsibility must be assigned. In the multifunctional context of the case company, shared responsibility and assignment with other business units is a crucial part. Without mutual commitment, measurement will not ever reach the full potential, which limits purchasing's possibilities to contribute firm's competitive advantage. Consequently, action plans must be developed and this process includes both long-term and short-term activities that are basis for identifying

key process activities. In the next step, performance is measured against targets. Thus, to maximize the impact of measuring, the performance results should be communicated and used as a management tool to impact on behavior and increase the visibility.

In this respect, information technology, through its capability to provide timely, reliable and accurate information has a major role in integrating and communicating results both internally and to supply chain partners. In the last step, rewarding mechanisms have a central role by motivating to use appropriate purchasing methods. In addition, measurement results should be communicated externally to develop and control them. Finally, the performance measurement system should be reviewed annually in order to keep it flexible and to be able to react to possible changes in corporate objectives, supply market and make appropriate adjustments. Taking all this perspectives into account, performance measurement can have a positive long term impact on purchasing performance in the case company.

6 2nd EMPIRICAL STUDY – Testing the Impact of Purchasing Performance through Statistical Tests

The case company's purchasing performance measurement practices were presented in the previous chapter. Based on theoretical background and identified practices, a linear regression model was used to compare Yellow LTD's purchasing practices against the financial performance of Yellow LTD's projects. The aim was to statistically investigate the relationship between purchasing variables and profit margin of a project. In addition, supplier performance evaluations from the project sites are included in the quantitative analysis. Thus, the testing model is two-sided: firstly, it investigates how the purchasing performance contributes to financial performance, and secondly how these variables contribute on the supplier performance evaluations of the project. Figure 15. below illustrates the testing model of the variables applied in this study. The chosen ratios can be divided into two different groups: pre-purchasing performance ratios and supplier performance ratios. Pre-purchasing performance ratios are based on actual purchasing practices, whereas supplier performance ratios illustrate the performance of suppliers at the project site. Applied success factor is the profit margin of the project. Project size is used as a control variable because it might have an impact on the project margin.

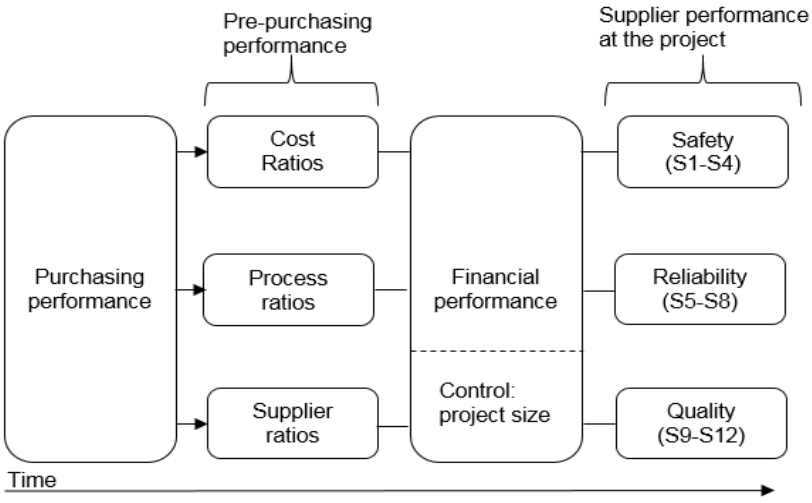

***Figure 18**. Formation of test variables used to investigate purchasing performance through statistical tests*

The pre-purchasing performance ratios were calculated for each project as a percentage of the total spend. These are presented below in table 6. However, all the applied performance measures of the case company were not able to include in statistical tests as they remain qualitative or case company's IT-system is not capable to handle those into desired level. In addition, couple of available interesting areas were included to tests. However before drawing extensive conclusions, it must be noted that all the selected variables may not have a direct financial impact, but as they are nominated KPIs they should have critical effect to success or failure in terms of financial, risk or other value creation. Finally, there is also several external variables that effect on the financial performance even though the purchasing capitalizes almost 80 % of the total turnover of the projects.

***Table 7**. Applied pre-purchasing performance variables*

Variable	Scale
Cost ratios	
International procurement [H1]	%
Process ratios	
Supplier prequalification [H2]	%
E-procurement usage [H3]	%
Contract coverage [H4	%
Managed spend [H5]	%
Internal project spend [H6]	%
Supplier ratios	
A-supplier spend [H7]	%
C-supplier spend [H8]	%
Credit rating C spend [H9]	%

Similarly, the post-purchasing performance ratios were calculated for each project and this data varies among Likert scale of 1-5 for each dimension. This data is based on supplier performance evaluations in company's project specific purchasing system, where the total sample amount is over 5000 invidual supplier evaluations. Supplier evaluations are made by the responsible person in the project site. This allowed to add softer measures into the statistical analysis. Applied post-purchasing performance variables are below in table 8.

Table 8. *Applied supplier performance variables*

Variable	Scale
Safety	
Attitude towards safety [S1]	1-5
Cleanliness, order & environmental consideration [S2]	1-5
Compliance with safety instructions [S3]	1-5
Reliability	
Representatives availability & expertise [S5]	1-5
Compliance with agreed timetables [S6]	1-5
Unfounded demands related to the contract [S7]	1-5
Billing & payment terms [S8]	1-5
Quality	
Contract compliance [S9]	1-5
Quality of the products / performance [S10]	1-5
Development activity [S11]	1-5
Reactions and corrective actions towards claims [S12]	1-5

To minimize the effect of external variables (e.g. market conditions, competition, legislation) and ensure the data quality, the statistical tests were executed by utilizing the data of the case company's projects that were completed in 2016 or in the beginning of 2017. Having gathered and standardized the data from different sources (see chapter 5.3) into one database the data were purified to ensure the quality, consistency and reliability by removing significant outliers from the data. A total of 73 projects were eligible to include in statistical tests.

To investigate the relationship between applied variables, a linear regression model was utilized. The regression analysis was done for each variable independently. In the analysis, $p < 0{,}01$ and $p < 0{,}05$ were utilized as a confirmatory margin for analyzing statistical significance. T-value was used to examine the level of the correlation between variables, whereas R-squared values were utilized to investigate the level of variability in data i.e. how close the variables are to the fitted regression line. Before testing the relationship between the variables by simple and multiple regression analysis, the preliminary analyses were conducted to ensure that there was no problems with normality, multicollinearity or heteroscedasticity. The normality of the variables was ensured by graphically investigating the linear relationships through scatterplots, and they were normally distributed. Multicollinearity was examined

through variable inflation factor (VIF) values and all of the variables were under the maximum value of 10 (Cohen et. al., 2003). Finally, the heteroscedasticity was examined through residual values and scatterplots. As no violations were not observed in preliminary analysis, all the tests can be conducted in trustful manner.

6.1 Hypotheses

Based on theoretical background and briefly illustration of Yellow LTDs performance measurement practices, several hypotheses are formed to test relationship among variables. As variables H1-H9 are largely identified Yellow LTD's purchasing performance drivers and based on its strategy, we propose the following hypothesis:

H1. *All the independent variables H1-H8 influence positively on financial performance of the project.*

Furthermore, if purchases are made by following the case company's purchasing policies and identified performance drivers, it should have positive effect on supplier performance. Thus, we propose the second hypothesis:

H2. *All the independent variables H1-H8 influence positively on different areas of supplier performance of the project.*

6.2 Pre-purchasing Performance Results

The results of the regression analysis regarding pre-purchasing performance variables are shown in table 9. The analysis presents that six of nine variables are statistically significant at 99 percent or 95 percent confidence level. Three out of nine variables (*H1, H3, H5*) show no statistically significant values and we are able to confirm the rejection of the hypothesis 1 with these variables.

Table 9. *Pre-purchasing performance results*

Variable	T-value	P-value	R-Squared	Hypothesis supported?
Cost ratios				
International procurement [H1]	-0,21	0,831	0,06 %	No
Process ratios				
Supplier prequalification [H2]	**2,12**	**0,038****	**6,55 %**	Yes
E-procurement usage [H3]	-0,49	0,626	0,38 %	No
Contract coverage [H4]	**2,19**	**0,032****	**7,78 %**	Yes
Managed spend [H5]	-1,50	0,137	3,13 %	No
Internal project spend [H6]	**-2,15**	**0,035****	**7,27 %**	No
Supplier ratios				
A-supplier spend [H7]	**3,06**	**0,003***	**12,11 %**	Yes
C-supplier spend [H8]	**-2,65**	**0,01***	**9,76 %**	No
Credit rating C spend [H9]	**2,06**	**0,044****	**7,40 %**	Yes

* = statistically significant at 99% confidence level

** = statistically significant at 95% confidence level

Based on the results, a variable *H3* (e-procurement usage) does not statistically significant affect the financial performance of the project. Even though, some authors like Davila et. al. (2003) have found that a capable purchasing system may bring several advantages in terms of purchasing efficiency such as transaction costs, supply base reduction and decreased prices. This finding looks reasonable, if we understand the small role of e-usage in terms of monetary contribution. However, there exists huge differences between the projects in the usage of e-procurement systems. Thus, it remains questionable whether case company should invest for more efficient purchasing systems in order to be able mitigate risks and increase the purchasing efficiency and contract loyalty. Furthermore, it would provide visibility of purchasing processes and increase the transparency of supply base, which in turn provides valuable knowledge to company. In fact, it constitutes the basis to be able follow other metrics. Similarly, results indicated that the level of international procurement (*H1*) do not affect on financial performance. This finding may result from relatively limited usage of international suppliers in Yellow LTD in terms of monetary value and number of the projects. Finally, managed spend (*H5*) that is measured to follow-up purchasers are made by competent people do not indicate any statistically significant values, even

several authors have argued (e.g.) that purchasing people and their capabilities are essential factors leading to purchasing performance. However, PSM people and their competence remains quite subjective area to be exactly defined and measured, which may explain the results. Therefore, we should not draw any extensive conclusions based on the results, but better process to evaluate purchasing people's maturity would be one target for development in Yellow LTD to be able evaluate purchasing personnel's capability more objectively and specify where improvement areas exist.

Based on the regression results, a statistically significant value was found six out of nine variables (*H2, H4, H6, H7, H8, H9*). A positive and statistically significant relationship was found for variables H2, H4, H7, and H9. Firstly, results reveal that projects which have utilized more *prequalified suppliers* (H2) show higher level of the financial performance. In Yellow LTD, supplier prequalification is a pre-requisite and base to ensure that the company only work with legal and financially stable suppliers. In practice, suppliers are expected to fill Yellow LTDs preliminary form and based on the results suppliers are classified as a prequalified or non-accepted. This not only ensure an efficient and reliable network of subcontractors, but also helps to recognize those key suppliers and competent partners from a large supply base. Preceding findings indicate that the company's long-term work with prequalifying suppliers do not only create the basis to operate in sustainable way, but also impacts on company's bottom line.

Secondly, the results for the regression analysis reveal that there is a positive relationship (t-value= 2,19) between the financial performance of the project and the amount of contract purchases (H4). Thus, the bigger is the monetary value of Yellow LTD's contract suppliers of total purchases, the greater is the profit margin of the project. This finding here is line with Narasimhan et. al. (2002) and van Poucke et. al., (2000). A higher contract coverage rate is related to better purchasing conditions such as payment terms, deliveries, quantity discounts, risk mitigation and more collaborative relationships. Based on the results, these are evident areas in Yellow LTD as well.

Thirdly, supplier classification variable *A-supplier spend* (H7) seem to have the strongest positive influence (t-value= 3,06) on the financial performance. In Yellow LTD, suppliers are classified into A, B, C, D, where supplier classification group A is the highest. Supplier classification is a central tool to mitigate risks and the highest status A is a result of filling the prequalification and legal requirements, having strong financial performance and proved track record in terms of amount and quality of supplier feedback from the previous projects. Subsequently, this finding demonstrates that an effective supply management suppliers and their competitiveness builds the basis of case company's competitive advantage.

Finally, the results from the regression analysis reveal that there is a positive relationship (t-value= 2,09) between the financial performance of the project and the amount of purchases from the lowest credit graded suppliers (H9). Lower grades are intended to represent an implicit forecast of the higher probability of financial problems in the future. Suppliers' credit ratings are monitored as the suppliers with a low level of financial performance carry at a significant level of risk. While bankruptcies are the most visible examples, a weak financial situation often reveal weak quality or poor payment rehearses and other mismanaged obligations. Thus, it is a top determinant in a supplier selection process and followed by the case company. Therefore, results are somewhat surprising to conclude that projects which have selected more financially weak suppliers have a relatively higher financial performance. Perhaps the financial performance is made possible at the expense of other performance areas, which is investigated in the next section.

Alternatively, a negative and significant value were found two out of nine variables – H6 and H8. Similarly, variable H8 (*C-supplier spend*) is based on the case company's supplier classification and it seem to have the strongest negative influence (t-value= -2,65) on the financial performance. Typically, lower classified suppliers have a weak financial situation, are not prequalified or have other durations in societal and legal requirements. Thus, it can be concluded that by investing in supplier management and prohibiting procurement from poorly classified suppliers could result into higher financial performance. Furthermore, it may have other benefits in terms of quality,

reliability and safety. Finally, findings reveal that variable H6 (*Internal project spend*) has a negative influence on the financial performance. This finding is supported by a negative t-value of -2,15. This variable is strongly linked to make-or-buy decisions that relates to the selection of whether to carry out a particular activity within a company or to purchase it in from an external supplier. Based on the results, projects that are awarded by a higher share of internal purchases have relative lower financial performance. However, authors like Nikolarakos & Georgopoulos (2001) and Welch and Nayak (1992) have argued that the make-or-buy decision is one of the most challenging problems in the business or sourcing strategy, because the amount of financial and non-financial areas to be taken into consideration when evaluating whether to outsource or not. Therefore, we should not draw any extensive conclusions as other important factors are not part of this quantitative analysis. To compare costs and benefits accurately, all aspects influencing the make-buy decisions such quality control, capacity, reliability and the strategic importance of specific service or product should be considered. Furthermore, working as a joint venture with internal services can be a critical factor in winning more large and complex properties.

6.3 Supplier Performance Results

Even though the financial performance of the project is important, it does not cover other aspects of the performance that play crucial role in terms of safety, reliability and quality. Hence, in order to investigate supplier performance at the applied projects and go beyond the price, the advantage were taken of having the access to case company's supplier evaluation database. The amount of individual supplier evaluations of the studied projects accounted total of 1169 evaluations. Mean and standard deviation was utilized to simultaneously measure the hypothesized relationships between previously presented category constructs and supplier performance. The same measurements were used to calculate average of all evaluations in the database to have a baseline. Total of 5432 invidual supplier evaluations were included into baseline. The results are shown below in table 10.

***Table 10**. Supplier performance results*

	International procurement [H1]		Supplier Pre-qualification [H2]		Contract coverage [H4]		Managed Spend [H5]		Internal Project Spend [H6]		A-Supplier Spend [H7]		C-supplier Spend [H8]		Credit Rating C Spend [H9]		Average of total	
Variable	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Safety																		
Attitude towards safety [S1]	3,53	0,80	3,93	0,77	4,05	0,77	3,94	0,79	3,94	0,90	4,15	0,69	3,75	0,72	3,06	1,14	3,79	0,78
Cleanliness, order & environmental consideration [S2]	3,83	0,79	3,89	0,74	4,05	0,72	3,88	0,76	3,75	0,93	4,12	0,68	3,64	0,71	3,12	0,70	3,75	0,75
Compliance with safety instructions [S3]	3,41	0,87	3,96	0,77	4,10	0,73	3,96	0,79	4,13	0,62	4,20	0,69	3,73	0,70	3,18	1,01	3,82	0,78
Development activity with safety [S4]	3,13	0,81	3,48	0,89	3,73	0,90	3,48	0,90	3,35	1,00	3,73	0,85	3,27	0,77	2,82	0,88	3,39	0,89
Reliability																		
Representatives availability & expertise [S5]	3,79	0,92	3,99	0,82	4,08	0,77	3,98	0,85	3,67	0,62	4,17	0,66	3,86	0,96	3,12	1,36	3,90	0,84
Compliance with agreed timetables [S6]	4,00	1,03	3,98	0,93	4,08	0,89	3,99	0,96	3,53	1,12	4,24	0,77	3,71	1,09	3,12	1,45	3,90	0,96
Unfounded demands related to the contract [S7]	4,17	1,10	4,38	0,79	4,50	0,73	4,37	0,80	3,57	0,94	4,54	0,68	4,24	0,98	3,76	1,48	4,22	0,81
Billing & payment terms [S8]	4,05	1,05	4,37	0,71	4,42	0,68	4,38	0,68	3,76	1,25	4,47	0,68	4,10	0,89	3,41	0,80	4,22	0,72
Quality																		
Contract compliance [S9]	4,05	0,71	4,19	0,73	4,33	0,66	4,20	0,74	3,71	1,05	4,38	0,62	3,93	0,87	3,35	1,17	4,11	0,75
Quality of the products / performance [S10]	4,05	0,60	3,93	0,82	3,98	0,85	3,93	0,86	3,71	0,92	4,13	0,75	3,74	0,86	3,06	1,25	3,92	0,84
Development activity [S11]	3,53	0,62	3,65	0,87	3,78	0,84	3,65	0,90	3,24	1,15	3,85	0,81	3,45	0,96	2,71	1,21	3,66	0,89
Reactions and corrective actions towards claims [S12]	4,00	0,91	4,14	0,89	4,27	0,82	4,13	0,90	3,65	0,86	4,38	0,73	3,78	1,02	2,88	1,20	4,09	0,90
N= 1169 invidual supplier evaluations																	N= 5432	

It was hypothesized that all variables positively influences the supplier's performance (hypothesis 2). The analysis shows that hypothesis was not supported clearly for three out of eight variables: H6, H8 and H9. Alternatively, the data indicates that there is neutral or positive support for other variables.

The results from the regression analysis reported earlier that supplier prequalification, contract purchases and A-supplier spend has a statistically significant positive impact on the financial performance. Similarly, as table 10. presents, these variables are awarded with the higher level of supplier performance in terms of safety, reliability and quality. Particularly the results demonstrate that A-suppliers have the highest average and the lowest deviation in each section. Similarly, framework agreement suppliers (H4) and prequalified suppliers (H2) are awarded with the higher supplier performance. In addition, standard deviations are relatively low that indicates of stable operational performance without having huge deviations through different projects. Thus, we can conclude that Yellow LTD's long-term supplier management activities have a positive impact for both financial performance and more operational performance at the project site. In perspective of total cost of ownership, costs related to total life cycle as warranty costs should be also lower as there are no identified problems in terms of quality.

Based on the results from the regression analysis, no statistically significant results was found variables international procurement (H1) and managed spend (H5). However, compared to the average of all evaluations, results demonstrate that purchases made on behalf of the identified competent people are awarded with the higher level of supplier performance, particularly in terms of reliability and quality. Results regarding international procurement are substantially neutral with the exception of safety, which are under the average.

Furthermore, when comparing the average values to the results from Internal project spend (H6), C-supplier spend (H8) and Credit rating C spend (H9), variables react more negatively to the purchases categorized under these constructs. As presented before, the results from the regression analysis for the variables H6 and H8 demonstrated a negative relationship with financial performance of the projects and variables. Similarly,

average values of purchases from Yellow LTDs subsidiaries have lower mean in the each area with the exception of safety. These results are more or less surprising and interesting. Thus, it remains questionable that how the case company may require superior performance from the external suppliers if the operational performance of internal suppliers are below the average. To fully improve the performance of the internal suppliers, one development area concerns of targeting supplier development initiatives towards Yellow LTD's own subsidiaries. The results in table 10. show that suppliers classified into C are awarded with the lower average values in each category construct. Together with the opposite finding regarding A suppliers – we can conclude that Yellow LTD's supplier management and classification tools are not only capable in the monetary context, but also in operational performance context. Thus, it can be concluded that by investing in supplier management and developing both internal and external suppliers' performance could result into higher operational capability, which seems to go hand in hand with financial performance.

Subsequently, suppliers that have the lowest credit rating show the weakest average values in each section. Results are more or less interesting, because the regression analysis demonstrated positive relationship between utilization of C-graded suppliers and financial performance. Thus, it seems that the financial performance is made possible at the expense of other performance areas. This finding here is in the line with Nollet et. al. (2008). If the emphasis is definitely on price and savings that usually decrease over time, it might be impossible to get affordable prices – unless purchasers feel justified to accept lower performance in terms of safety, reliability and quality. To overcome the problem, supplier selection and processes related to performance measurement such as rewarding should not only be built on the basis of savings.

6.4 Synthesis of the Findings

The previous sections of the study presented the statistical approach to investigate purchasing performance and its impact on firm's performance. Furthermore, supplier performance was included to complement analysis and cover softer, but strategically important areas of purchasing. It was shown that both internal and external measures

of PSM are precarious to understand the whole performance of purchasing. Moreover, purchasing measurement is not only useful in developing purchasing, but the whole supply chain. As purchasing and supply chain develops towards more strategical and complex areas – more tailored and sophisticated ways of measuring purchasing performance must be designed and implemented. It was demonstrated that a comprehensive measurement design must include metrics in the beginning of the supply chain in form of supplier selection, and continue to the final stage of purchasing process in terms of supplier performance, which, on the other hand, is a pre-requisite to create more strategic metrics.

Based on the findings of the statistical tests, the following summary of the case company's purchasing variables and their contribution to financial and supplier performance was made. As table 11. summarizes, in most cases the financial performance and supplier performance go together.

Table 11. *Summary of statistical findings*

	Hypothesis supported:		
Variable	**Impact on Financial performance**	**Impact on Supplier performance**	**Key findings**
International procurement [H1]	No	No	No demonstrable impact on either areas.
Supplier prequalification [H2]	Yes	Yes	Positive impact on both areas.
Contract coverage [H4]	Yes	Yes	Positive impact on financial performance, strongly positive impact on supplier performance
Managed spend [H5]	No	Yes	No demonstrable impact on financial performance. Positive impact on supplier performance
Internal project spend [H6]	No	No	Negative impact on both areas.
A-supplier spend [H7]	Yes	Yes	Strongly positive impact on both areas.
C-supplier spend [H8]	No	No	Strongly negative impact on financial performance, negative impact on supplier performance.
Credit rating C spend [H9]	Yes	No	Positive impact on financial performance, strongly negative impact on supplier performance.

7 CONCLUSIONS

The objective of this study was to investigate purchasing performance measurement practices and expand the understanding of critical pre-requisites and factors behind strategically aligned measurement system. In first empirical research, multiple qualitative studies were utilized to format a holistic understanding of the areas linked to actual purchasing performance measurement practices in the case company. In the second empirical study, the relationship between purchasing performance and firm's performance was researched through quantitative analysis. This combination allowed to build a framework of the related factors that effect on PSM performance. The following final chapter summarizes the main ideas of the study by answering defined research questions, conducts the main findings from empirical studies and assesses the main research limitations and implications of this study which lines further research areas.

7.1 Summary of Results

The findings from the literature emphasized that purchasing is not anymore a clerical reactive function that should only be measured by operational performance such as savings delivered. Vice versa, purchasing has developed towards strategic orientation and has become a strategic reactive asset. Together with its multidimensional nature, PSM can impact on competitive advantage and other outcomes by contributing to quality, costs, innovation and sustainability. Specifically, it should be measured on value created. However, the contribution to competitive advantage can be provided only if the purchasing function is understood and operates at a strategical level in the organization. Consequently, the capability to operate at the strategical level and absorb more developed practices is strongly related to purchasing maturity. All of this has an impact on measurement of purchasing performance. Therefore, a comprehensive measurement in PSM context must include operational and strategic measures, be multidimensional, balance with financial and non-financial measures, include leading and lagging measures, have an internal and external view, and have stretch and

standard targets. Finally, arguably as most important – the measurement results should be used in the management to determine desired actions. This demand that responsibility is shared also with business units. Next, the key findings of the empirical studies are summarized. Below figure 18. summarizes the empirical findings.

In the first empirical study, the aim was to analyze actual purchasing performance practices of the case company and find the crucial prerequisites that effect on PSM performance measurement. Analysis was made by interviewing the case company's purchasing stakeholders and analyzing multiple internal materials. More specifically, the framework by Franco-Santos et. al., (2007) was utilized to draft systematic overview of the current challenges in order to create a basis for re-engineering the measurement practices and leverage the full potential of performance measurement in the case company.

Following the authors Carr and Smeltzer (1997) and Keough (1988), major findings for purchasing to operate at the strategic level and contribute performance were related to its strategic status and integrity within the company. Furthermore, the basis of any measurement lies on the corporate overall strategy, but there exists a challenge in identifying the most crucial performance drivers and capability to measure them. Hence, the processes must be built on the basis to be able identify, implement and manage the key strategic objectives that drive performance with internal stakeholders and supply chain partners. Therefore, this study supports the findings by Pohl & Förstl (2011) and Carter & Narasimhan (1996) – purchasing targets should be aligned with other business units, but also the responsibility must be shared. Such prerequisites constitutes the crucial basis to leverage the full potential of PSM. Concerning actual measures in PSM context, the findings are in line with Hartmann et. al., (2012) and Paulraj et. al., (2004), PSM developing into more strategic role, performance measures must increasingly cover other purchasing outcomes such quality, sustainability, supplier performance and internal collaboration – thus having an external and more strategic focus. In addition, lot of focus should be given for supplier development, where the ultimate prerequisite is to collect supplier performance data. Finally, the importance of information technology must be understand. Particularly, in perplexing industries

such as construction industry, IT-systems do not only allow to collect and draft strategically aligned metrics, but also shift the focus from reactive management to advanced proactive decision making. Only if, PSM excels in all the previous perspectives, the benefits of measurement can be maximized.

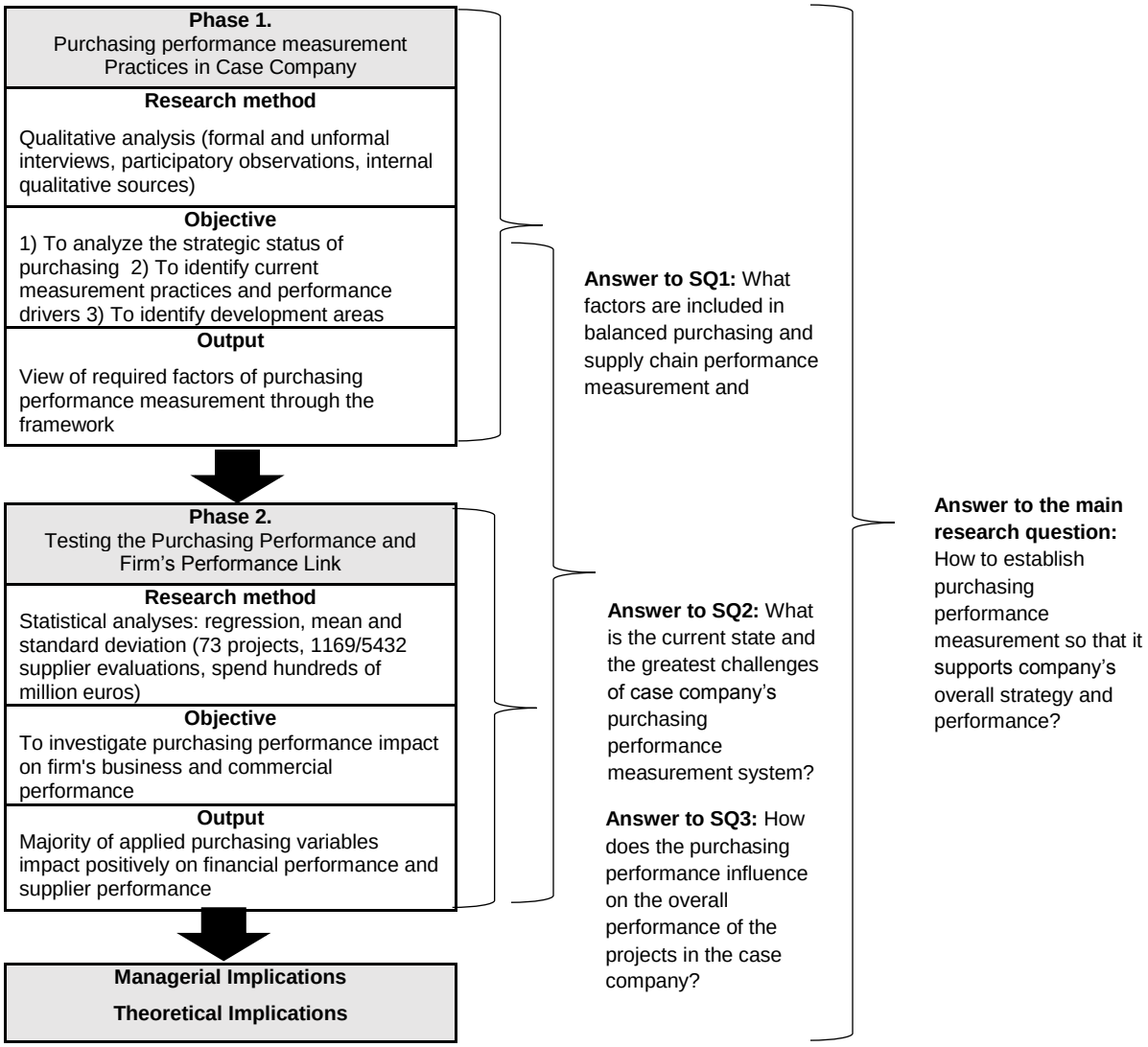

***Figure 19**. Summary of the empirical research*

In the second empirical study, the purpose was to provide understanding of how purchasing performance variables relate to financial performance of the projects and suppliers' performance through statistical tests. Thus, the testing model was two-sided: firstly, it was investigated how the purchasing performance contributes to financial performance, and secondly how these variables contributed on the supplier

performance of the project. Contrary to previous studies (e.g. David et. al., 2002; Carr & Pearson, 1999; Ellram et. al., 2002) this study utilized more objective success variable – profit margin of the project, instead of focusing to investigate the link between PSM activities and corporate success through generic high-level measures such as return on investment.

The results from the regression analysis and other statistical tests were somewhat interesting and extremely valuable for the case company. In the regression analysis, six out of nine variables presented statistically significant values, and four of the variables had positive values. Alternatively, it was found that two of the variables has a negative impact on the financial performance. Variables related to supplier management such as supplier classification, supplier prequalification and contract purchases showed to impact positively. As a reverse, somewhat surprising was that purchases from the most poorly classified suppliers impacted positively. However, the findings from the second stage of the quantitative analysis prevailed that short-term financial performance is made possible at the expense of suppliers' performance such as quality, safety and reliability. Furthermore, purchases from internal suppliers and poorly classified suppliers showed to impact negatively on the financial performance. In general, the major findings from the second stage of the quantitative analysis demonstrated that financial performance and supplier performance are strongly related to each other. Hence, this study established an understanding that in order to measure and manage purchasing performance, companies are in need to develop metrics that cover both internal and external areas. Especially, ratios related to supplier management are crucial prerequisites for purchasing to contribute competitive advantage in terms of financial and operational performance. In a sum, the study prevailed that case company's measurement practices do not only create the basis to operate in sustainable and efficient way, but also impacts on company's bottom line. These findings have both managerial and theoretical value.

In summary, the results are valuable for the purchasing decisions makers to help designing, implementing and drafting measures in a balanced manner. Particularly, for the actors operating in construction or similar industry, where the amount of suppliers

and their contribution to overall performance is huge, decision-making is largely disseminated, aim to operationalize purchasing performance through more substantial factors and understand purchasing performance more than operational benefits delivered. Hence, the ultimate prerequisite to leverage the potential of measurement is that purchasing transforms the strategy into measurable and manageable actions, and the whole company is committed to mutual targets, not just decision makers in purchasing function. This ensures the maximal contribution to company's success that was demonstrated in this study.

7.2 Limitations and Further Research

The findings of this study has significant contribution from both a managerial and academic perspective, particularly for the decision makers in the case company. However, as contingency theory assumes: maximum performance results from the selection of the most appropriate structure, which fits in its contingencies. Therefore, there are certain limitations regarding the results which build the basis for further research. First, findings of the study could not be simply generalized as hypothesized relationships have only been examined in a specific industry context. A second study with other industry would complement the results as several factors could raise from purchased items, supply base and other supply market conditions. Furthermore, applied empirical studies focuses deeply on the specific purchasing environment of a single company. With the respect of findings, qualitative studies should be repeated with other stakeholders of the case company to have an internal view of how purchasing performance is regarded in top management or more operational level.

Second limitation concerns applied variables in quantitative analysis. In this study, purchasing performance is conceptualized and measured through very specific performance measures. Although the validity and reliability of utilized approaches have been proven, we have only focused on certain areas of purchasing performance. In further research, there is need to include other purchasing outcomes such as internal customer satisfaction, contribution to innovation and relationship issues with suppliers. In addition, including purchasing maturity in the empirical analysis should complement

the study and offer valuable tool to understand varying results as results vary largely in different units. Finally, complementing quantitative analysis with other costs from the total life cycle of the construction project such as warranty costs resulting from poor quality would be valuable.

Third and final limitation concerns the applied sample population and time frame. This limits the explorative power and reliability of the research results. Thus, a more longitudinal study would be an interesting extension of the current research method. By increasing the amount of the studied projects, we would be able to have more significant findings leading to more comprehensive results of the studied research object. However, varying market conditions (e.g. legislation, economic situation) and other developments in supply market characteristics would increase the amount of non-accountable factors effecting negatively in the reliability.

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APPENDICES

APPENDIX 1. Summary of previous studies according to purchasing performance and financial performance of company.

Authors	Constructed area	Applied success variable.	Methodology
Carr & Smeltzer (2001)	Technical skills	ROI, market share, profits as % of sales, net income before taxes	Survey, quantitative analysis
Carr & Pearson (1999)	Strategic purchasing, buyer-supplier relationships	ROI, market share, profits as % of sales, net income before taxes	Survey, quantitative analysis
Carr & Smeltzer (1999)	Strategic purchasing, benchmarking	ROI, market share, profits as % of sales, net income before taxes	Survey, quantitative analysis
Gonzalez-Benito (2007)	Strategic purchasing, purchasing capablities	8 subjective performance measures	Survey, quantitative analysis
Cousins (2005)	Strategic purchasing and alignment	3 subjective performance measures	Survey, quantitative analysis
Ellram, Zsidisin, Siferd & Stanly (2002)	Strategic purchasing, purchasing practices	Total shareholder return	Survey, quantitative analysis (descrptive)
Narasimhan & Carter (1998)	Purchasing practices and sourcing strategies	Not applied	Survey, quantitative analysis
Sanchez-Rodriguez, Martinez-Lorente & Clavel (2003)	Benchmarking, purchasing performance practices	Return on assets, gross margin, market share, 5 subjective performance indicators	Survey, quantitative analysis
Schiele (2007)	Purchasing maturity profiles	Financial performance (savings potential)	Company maturity audit & workshop
Das & Narasimhan (2000)	Purchasing competence and purchasing practices	Not applied	Survey, quantitative analysis (explorative)
Chen, Paulraj & Lado (2004)	Strategic purchasing and alignment, performance measure practices	ROI, market share, profits as % of sales, net income before taxes	Survey
David et. Al. (2000)	Organization design practices (structure, e-usage, coordination)	Return on assets	CAPS survey database, quantitative analysis (explorative)

APPENDIX 2. The list of core questions of the semi-structured interview

A. Role of purchasing function

1. What is the role and function of the purchasing department in the company? How has purchasing developed in the company?
2. Please describe purchasing strategy and strategic goals (i.e. critical success factors). How do these relate to overall corporate goals?
3. How is purchasing perceived in comparison with other functions?
4. How is purchasing involved in the internal planning process and strategy development?
5. How does purchasing work together with other departments?
6. Are training initiatives and tools used for purchasing employees? How do these relate to purchasing strategy?

B. Performance measurement practices

1. Please describe the role and function of the performance measurement system used to purchasing.
2. What measures are used in the system and why. Please describe in detail the measurement procedures.
    a. Who does choose such a measures and how management effect on selection?
3. Please describe the connection between performance measurement and purchasing strategy? How does strategy relate to measurement?
4. How do you communicate performance measurement results?
5. Who acts based on the measurement results? What actions are taken?
6. What role does internal and external communication (measurement results) play for purchasing?
7. How is the system used in performance evaluation of employees?
8. Does a bonus system of any kind exist based on performance measurement?

APPENDIX 3. Analyzed dataset presented in the project level. Includes project details, purchasing performance statistics and the financial performance of the project.