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Bachelor's Thesis

MEASURING PURCHASING PROCESS IN CONSTRUCTION INDUSTRY:

CASE X OY

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1. INTRODUCTION

The understanding of purchasing management's importance to companies has increased in resent years. With the increasing understanding, the need for measuring the purchasing and its outcomes become one of the key factors in purchasing management.

The market situation in construction industry is constantly changing because of its sensitiveness to economic fluctuations. The industry is going through another change as well. Companies provide more and more overall services that combine materials and work. The customer value, cooperation with suppliers and quality has become important aspects in purchasing process. The competition in the markets is intensifying under tense market situation, which highlights the meaning of measuring as a vital tool in sustaining profitable. (Van Weele, 2005, 252)

Purchasing process is a significant part of construction company's success. The amount of purchasing in project's total costs has continually increased. Purchasing covers typically 60-80 % of the total costs of the construction projects. (Junnonen and Kankainen, 2012, 5)

Measuring and systems to measure the purchasing process are at the center of this thesis. The company's strategy and objectives will be linked to the process and measurements, for they should be closely tied to purchasing process and the measurements should be aligned with the strategy of the company and with the goals that are expected from the purchasing process. The measuring has not been studied very extensively in the field of purchasing research. There is a lot of data of measuring supply chain performance but in this thesis the most central theme is the connection between the operational process, measuring and measurements of the process and the strategy and goals. By identifying and understanding this connection companies could enhance the purchasing processes.

1.1. Research objectives

The objective of this thesis is to discover the current situation of measurement in construction business. The purpose is to find out how are the processes measured and how effective the measuring is. It is also relevant to examine what kind of attitudes exists in organization's different levels towards measurement. The aim is to collect information by using semi-structured questionnaire. The questionnaire will be presented to three persons in different positions at the company X to create a wide image of the current situation of measurement in the case company. These persons will represent financial, operational and strategic perspectives to measurement. This way it is possible to study how the measurement system is seen in the company.

The strategic point of view has increased in purchasing and procurement management, and for that reason the other goal is to search the possible connections between measurement and purchasing process to the strategy and objectives of a company. There are several measurements and even more metrics available for companies to measure purchasing and it is properly speaking a vital decision to choose the right measurements from the large scale of measurements available.

1.2 Research problems

In this thesis the measurement of purchasing process is studied through following research questions:

The research question:

- What kind of role measurement has in purchasing process?

The sub questions:

- How are the purchasing processes measured at the construction industry?
- How strategy and objectives are linked to measuring?

1.3 Research limitations

The research is limited in construction industry and the case company. Because of the large scale of the measurements, the thesis is going to focus only on a few of them. The purpose is to introduce and study only measurements that could be relevant for the case company, and those already used in the company's purchasing management.

The strategic point of view is highlighted and the measurement part of theory of the thesis is presented from strategic perspective, thus the goals and financial perspectives are also seen as relevant basis for the empirical study.

The approach is limited in organization's internal perspective. The supplier, subcontractor or customer perspectives are not discussed in the thesis, though they are important aspects in construction's purchasing management. The focus is on the measurement used and the methods used in the procurement organization.

1.4 Research methodology

The theoretical part of the thesis is based on studying existing literature and scientific journals published of purchasing and supply chain measurement. The collected theories differ from their perspectives concerning the measurement systems, but are still linked to each other. The strategic point of view is in focus of used theories. Because there is a small amount of literature and studies available from purchasing process measurement, studies and literature from supply chain measurements are exploited in this thesis. The aim is to critically evaluate the adequacy of used references to this thesis.

The research in empirical part is made by case study and using semi-structured questionnaire, which is one of the most common research methods in qualitative research methodology. The subject of the thesis could also be studied by using quantitative research method, but because the purpose of this thesis is to identify and analyse the role of the measurement in purchasing process, the qualitative research method is preferred to gather comprehensive results with the questionnaire. With qualitative research, rounded and contextual understanding can be created about the purchasing process measurement. (Mason, 2002, 3-4)

The empirical part of the thesis is a case study on company X operating in construction industry in order to enable making comparisons and building explanations in a distinctive way (Mason, 2002, 166).

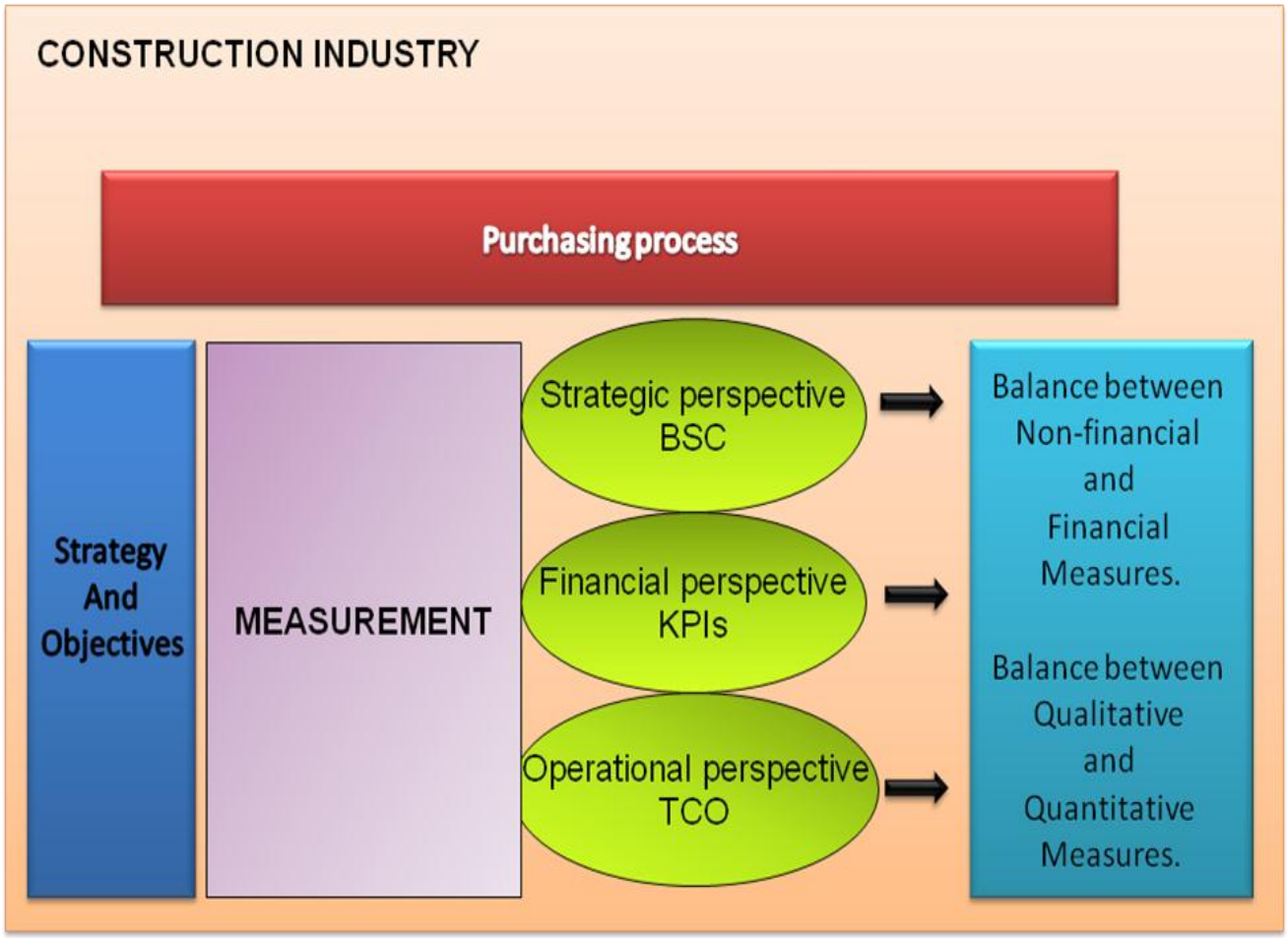
The survey is made with qualitative research approach using a semi-structure questionnaire as a research method. Interactional exchange of dialogue (e.g. one-to-one interactions or larger group interviews face to face or over the telephone or the Internet), conversational format of interviewing, fluid and flexible structure of the questionnaire, which allows researcher and interviewee to develop the interview are seen to be the core features of semi-structured questionnaire. (Mason, 2002, 62-63)

The questionnaire is made for three persons in company X. The persons are in different positions in company's procurement unit or closely operating with it. The questionnaire combines financial, strategic and operational approaches to measurements (Appendix 1). The purpose is to get an insight regarding measuring purchasing process in the construction industry throughout the case company. The results of the questionnaire are discussed and evaluated in conclusions of the study.

1.5 Theoretical framework and the structure of the thesis

The theoretical framework combines the operational and the strategic nature of purchasing process measurement system. The purchasing process is seen as operational activity, while setting objectives and the decision-making regarding the measurements are concerned to be strategic, long-term oriented procurement management. The strategy and objectives should be linked to measurement to get relevant and meaningful results with used measures.

It is important to look purchasing process measurement from different perspectives. In this thesis measurement is studied from financial, strategic and operational perspective. The importance of measurement and need for different kind of metrics in different management levels are represented. Balanced scorecard (hereafter BSC), key performance indicators (hereafter KPIs) and total cost of ownership (hereafter TCO) are measurements that will be presented as examples of these different perspectives to measurement. These concepts will be defined more accurately in the last part of the introductory part. Many researchers have adduced the importance of balance between financial and non-financial and on the other hand between qualitative and quantitative measures. By creating balance with these, companies can give more specific and comprehensive measurement results with higher quality.



Picture 1. Theoretical framework

The theoretical part starts by presenting the purchasing process specified to the construction industry and the case company. The first part of the theory introduces the general measurements used in purchasing and supply chain management. The phases of the process are presented and analyzed in the light of measuring in the first theory part. Features of a good measurement are analyzed based on available studies. The purpose is to create a comprehensive picture of measurements; the challenges involved in them, but also introduce benefits that companies can gain with measuring. Measurement is discussed through strategic, financial and operational management levels. After that the importance of strategy and objectives will be included in measuring. The focus of introduced measures will be on balanced scorecard by Kaplan and Norton

(1996), key performance indicators and total cost of ownership, which all take also account of a strategic perspective to measuring.

In the empirical part of measuring the purchasing process is done using a semi-structured questionnaire made for case company. The empirical part is constructed over the theories presented previously in the thesis. The used data is based on the answers of the questionnaire and observations of the writer. The research and its results are presented and discussed critically. By surveying the company's procurement personnel, it could be studied, how theories of measurements work in practice. The questionnaire presents also an insight on how are the measurements seen in different levels of procurement unit.

1.6 Literature review

Only in recent years, procurement management has been considered to be an important function in organizations. For that reason, there is not very accurate scientific information available concerning the measurement. The researches made usually represent general guidance for measurement systems, but still, many of those highlight the relevance of unique measures that are suitable just for a particular organization in particular industry (Sillanpää, 2010, 51). It is difficult to build standard measurements, because of the differences in industries and organization structures.

Purchasing process has been presented extensively in many studies and it is one of the baselines in procurement management. There are no major differences in the purchasing process definitions. Though there is some varying in the phases of the process depending on a research. One of the most used is Van Weele's (2005) purchasing process, where the process is described both in buyer's and seller's point of view. The process begins with defining specifications and ends with follow up and evaluation. Lysons and Farrington (2006, 76-77) also define purchasing process in their studies. The purchasing process begins with identification of a need for purchasing and creation of a procurement plan. The process, however, ends to concluding agreement.

The researches of purchasing measurement mainly focus on supply chain performance. Measurements are categorized in to two groups by Beamon (1998) –qualitative and quantitative in which customer satisfaction and responsiveness, flexibility, supplier performance and cost among other issues are discussed in supply chain modeling. Kaplan and Norton's (1996) Balanced Scorecard has been used in many industries for business process measurement. It integrates financial and non-financial metrics, and differs from traditional measurements in that it does not focus on the history data. Financial, non-financial, qualitative and quantitative measurements are discussed in many studies and articles published, but there is no specific definition for, what these metrics might be that would support these important perspectives in measurement.

As a continuation to the previous, many researchers have suggested different measurement systems using the metrics of performance from different aspects (Laura et al. 2007; Hughes et al, 1998). However, problems occur when searching a holistic and helpful approach, which can simply be implemented and compare different organizations' performance (Najmi and Makui, 2012).

Also, the total cost of ownership has become more common way of thinking when evaluating the costs and savings in purchasing. The total cost of ownership is used as a performance measurement model in many articles from many different industries. Total cost of ownership (TCO) highlights that price is only one cost factor in purchasing process. There are many other factors which must be considered when making a purchasing decision. (Dobler and Burt, 1996, 308)

Clear research gap exists in measuring purchasing process. As mentioned earlier, defining examples of good and balanced measures are not well introduced. The evaluation of indicators is often difficult and too easily companies use measurements that are irrelevant and difficult to understand. Companies may be using many indicators, but very often they lack connection to each other and do not therefore support the company's strategy and goals. As a result, measuring does not provide relevant data from the procurement process and misleads the company to make unprofitable decisions in the future. (Iloranta-Muhonen and Pajunen, 2008, 435)

1.7 Definition of key concepts

Purchasing and procurement are definitions for the buying processes. It is often assumed that these definitions are the same, still there is difference between them and it is important to identify the differences of their meanings. According to Waters (2009), when speaking about purchasing the focus is on the function that makes the actual buying, whereas procurement is seen in a wider prospect. Procurement consists of the related activities that get materials or services from supplier into the organization. It can include different types of acquisition, in which purchasing is included, and also the associated work of, for example, selecting suppliers and negotiating among other phases of the purchasing process. (Waters, 2009, 304)

Purchasing process defines all the operations included in the process of the purchase. The purchasing process starts with question of how to achieve purchase specification. The next step is to describe the main activities preceding the supplier selection. Then the purchasing contract is discussed with several terms and conditions included in the contract. In the final phase the process is evaluated. (Van Weele, 2005, 46)

As noted earlier **BSC** is a strategic measurement model that integrates financial and non-financial measurements. BSC is not focusing on historical data, but utilizes data frim the past to create information for the future. The past performance is complemented with their measures of the drivers of future performance (Bhagwat and Sharma, 2007). Kaplan and Norton (1992) have proposed the BSC tool for performance evaluation through four perspectives: financial, internal business process, customer, and learning and growth. With BSC, the mission and organization strategies can be translated and converted in to the goals and measures in the above four perspectives. The model can provide a base for companies' strategy management system.

Key performance indicators, KPIs can be defined as the performance indicators that have significant impact on the overall performance of an organization in the areas of strategic, tactical and operational planning and control (Gunasekaran et al. 2004)

Total cost of ownership (TCO) model describes the total purchasing and usage costs in procurement to the buying company. In the model price is only one component of TCO. Other components are costs related to transportation, storage and administration. TCO takes also the defective or deficient materials into a consideration as a cost factor. These kind of costs cause postmanufacturing costs, including rework, loss of productivity and warranty works, which should be included measuring the costs in processes. (Dobler and Burt, 1996, 308)

Effectiveness and efficiency are important to differentiate from each other. They indicate performance from different aspect and for that reason, it is important to identify the differences between these two definitions. Effectiveness is related to actual expected values, for example expected sales and savings. (Lysons and Farrington, 2006, 22)

Efficiency relates to how well the resources are used and produced output. Efficiency indicators include traditional financial ratios, but nowadays the meaning of non-financial efficiency measures is identified as a key factor, when tracking cause-effect of business decisions (work hours per unit produced for example). (Waters, 2009, 436; Lysons and Farrington, 2006, 22)

Performance measurement is also relevant to define in the concept of the thesis. It can be defined as the process of qualifying the efficiency and effectiveness of action. (Sillanpää, 2010, 50)

2. MEASURING THE PURCHASING PROCESS

“Measurements are the key. If you cannot measure it, you cannot control it. If you can not control it, you can not manage it. If you cannot manage it, you cannot improve it” (Harrington, 1991) Najmi and Makui (2009) used this reference in their studies of measuring supply chain performance. This indicates the importance of measuring aspect in purchasing. According to several studies companies have realized the importance of the balanced measurement system as an organization promoting tool (Najmi and Makui, 2009; Hughes et al, 1998; Van Weele, 2005).

In this section of the thesis, the purchasing process is presented in the light of measurement. After identifying the issues to be measured, background of measurement is represented, starting with its challenges and benefits. Possible perspective differences in operational, financial and strategic level are dealt and the major differences are highlighted from theoretic aspect. The meaning of strategy and objectives as a link to measurement has a major importance on purchasing and supply chain process. Companies are starting to realize the importance of this connection, but it appears to be one of the most difficult issues to implement in practise. The end of the theory part deals with features of good measurements and indicates to introduce relevant measurements in the context of the thesis’ subject.

2.1 The purchasing process

The research concerning purchasing has traditionally focused on the purchasing process for industrial goods. However, many industries, including construction industry, are moving towards service purchasing which is influencing and changing the purchasing process. According to van der Valk and Rozemeijer (2009) the evaluation of service purchasing is more complicated than purchasing of goods or materials, which increases the complexity of purchasing process measurement in construction industry. (Van der Valk and Rozemeijer, 2009)

The construction industry is very cyclical, which leads to that price is often a significant factor, when selecting suppliers and when concerning the whole purchasing process. In addition, delivery accuracy, quality, and delivery time are important factors of purchasing process performance, particularly in the construction industry. These factors are also brought up as TCO's cost factors (Ellram, 1993). Hapanova and Al-Jibouri (2009) have presented that, the pre-project stage, such as planning, has not always performed effectively in the construction industry, and as a result companies in the industry have suffered from poor performance due to weak project scope definition, resulting in cost overruns and time delays. Companies should pay more attention to these, pre-project stage issues before the purchasing process. (Hapanova and Al-Jibouri, 2009)

According to study of Trent and Monczka (1998), supplier selection should be identified with measurement systems. Supplier performance and possible improvement opportunities should be identified to select the best supplier in purchasing process. Requirements for supplier selection can include both routine and critical items. For critical items, buying organization can benefit more easily in long-term agreements. With long-term contracting organization can benefit from supplier knowledge and innovations and usually the prices decreases as quality increases, when the understanding of mutual targets is gained through long-term buyer-supplier relationship. (Trent and Monczka, 1998) However, in construction industry, the pressure on prices causes increase in the prices. Instead of gaining price decrease, construction companies can avoid price increase with long-term buyer-supplier relationship.

Once supplier is selected, responsibilities and obligations of the parties will be contracted. Purchasing can be done one-off in construction business, but on the other hand the suppliers may be contracted in long-term. Evaluation of the procurement and purchasing process can be complicated. The purchases are often project-based and the procurement in construction industry includes rental, investments and many other major purchases (e.g. machinery). The contracting is based on specifications introduced above and additionally on the content of desired service level agreement (SLA). Van der Valk and Rozemeijer (2009) state that the success of purchasing process is highly

dependent on the first stages of the process where the purchasing specifications are made and contents of desired SLA are defined. (Van der Valk and Rozemeijer, 2009)

Trent and Monczka (1998) outline, that certain performance measurement areas have gained importance as contribution to stressing strategic-oriented activities in purchasing. These are purchasing's support of consept-to-customer cycle time reduction for new products or services, purchasing's ability to introduce new technology from supplier, purchasing process cycle time measurement and total cost of ownership. Even if this study is published in 1998, it highlights issues that still nowadays are at the center of the purchasing management. (Trent and Monczka, 1998)

Gunasekaran (2004) presents some useful metrics for strategic planning, supplier, production and delivery performance evaluation. These are seen as very important phases of purchasing process. In strategic planning, the level of potential customers of product or service can play a very important role. When considering suppliers and supplier selection, an important metric is supplier delivery performance. At production level cost per working hour and capacity utilization are considered as the most important metrics. When evaluating delivery performance, quality of goods, on time delivery of goods and flexibility of service systems to meet customer needs represents metrics that are useful for measuring performance of delivery. (Gunasekaran, 2004)

It can be noticed based on what was introduced above, that the phases that should be measured in purchasing process are supplier selection, contracting time, purchasing cycle time and the total cost of the process.

2.2 Challenges and benefits in measuring

Most companies have large number of measurements in use, which are implemented based on the suggestions staff or consultants, but there is no understanding what the measurements are measuring. The connection to business strategy is concerned to be difficult to integrate in to company's measurement system. (Hughes et al., 1998, 184)

The problems in measurement can be related to the lack of definitions in purchasing. Lack of formal objectives and performance standards is another common problem in measuring. Van Weele (2005) has stated that there is not enough guidance in purchasing operations of well-defined performance standards. Problems occur also in the accurate measurement. The input-output relationships are very difficult to identify, which is limiting the possibility to measure and evaluate purchasing activities accurately and comprehensively. The scope of the purchasing may also differ across the organization. When the organization does not have converging scope for purchasing and measuring, it is difficult to create measurements, which are considered to be effective through the organization. This also influences on understanding the reason behind the measures that company uses when evaluating purchasing. It has major importance that also employees understand, why purchasing is measured and why certain measures are chosen. (Van Weele, 2005, 253)

It has been studied that many companies develop targets that are inadequately flexible to reflect changing circumstances. The targets are global and general rather than specific to the required business circumstances. Companies also favour the idea of pushing costs down at the expense on developing the bottom line to be more effective. (Hughes et al. 1998, 190) This can lead to making decisions with negative effects on purchasing performance and further purchasing strategy planning.

Though, the measurement may appear to be complicated and difficult, it is possible to gain great benefits with accurate and appropriate measurements. It can lead to better decision making by identifying variances from planned results. It gives vital answers to questions what to do in the future and what not. (Van Weele 2005, 253; Otto and Kotzab, 2003)

Van Weele (2005) points out, that measuring may also lead to better communication between different departments of organization. For example by analysing the number of invoices that cannot be matched with a purchasing order, the arrangements in payment procedures can be improved with mutual understanding between the procurement department and administration. He also notes that by improving the communication, measurement can make things more visible internally and externally. With visibility,

planned results enable buyer to verify whether the expectations have been realized. This can be seen as constructive feedback to supplier and also provide information to management about effectiveness in individual and group level and hence contributes recognition of procurement department. (Van Weele 2005, 253)

Accurate measuring may contribute to better motivation of the buying organization. It also specifies personal and motivational needs of the buyer. Goal setting and motivational and personal development programs in procurement can be based on results from measuring, which indicate the importance of measurement. The purchasing performance should result in a higher added value of procurement department to the organization. The added value can be seen as cost reductions in purchasing process and better purchasing decisions for example. (Van Weele 2005, 253)

2.3 Perspectives to measurement at different levels of management – strategic, operational and financial perspectives

Because purchasing process involves operators in many different levels of organization, the interest on measured issues varies according to one's position in organization (Gunasekaran, 2001). Top executives and general managers are more interested in measurement data that informs them of overall performance and its contribution to revenue growth. From perspective of chief executive, measurement is about calibrating effectively the net effect of the execution of inter-related activities, business strategies and operational initiatives throughout the organization. (Hughes et al, 1998, 184)

Otto and Kotzab (2003) have presented different perspectives to performance measurement in their studies. According to them, the financial perspective is concerning allocation of benefits and costs. The goals from financial perspective are related on benefits exceeding costs, naturally. It may not be an easy task to allocate and evaluate costs and benefits of the purchasing process. The goals of procurement unit or more precisely the goals of purchasing process should be specified. The aim of operational perspective presented is related to finding optimal solutions with given resources in

purchasing process. Operational perspective is concerned in optimizing the resources for creating cost reduction and increase in customer satisfaction. Strategic perspective is seen to be aiming to connect competencies and the ability to make profit in purchasing process. Strategic perspective includes long term perspective to success and project planning. In purchasing process this can be seen as a guideline for making decisions and setting process targets. (Otto and Kotzab, 2003)

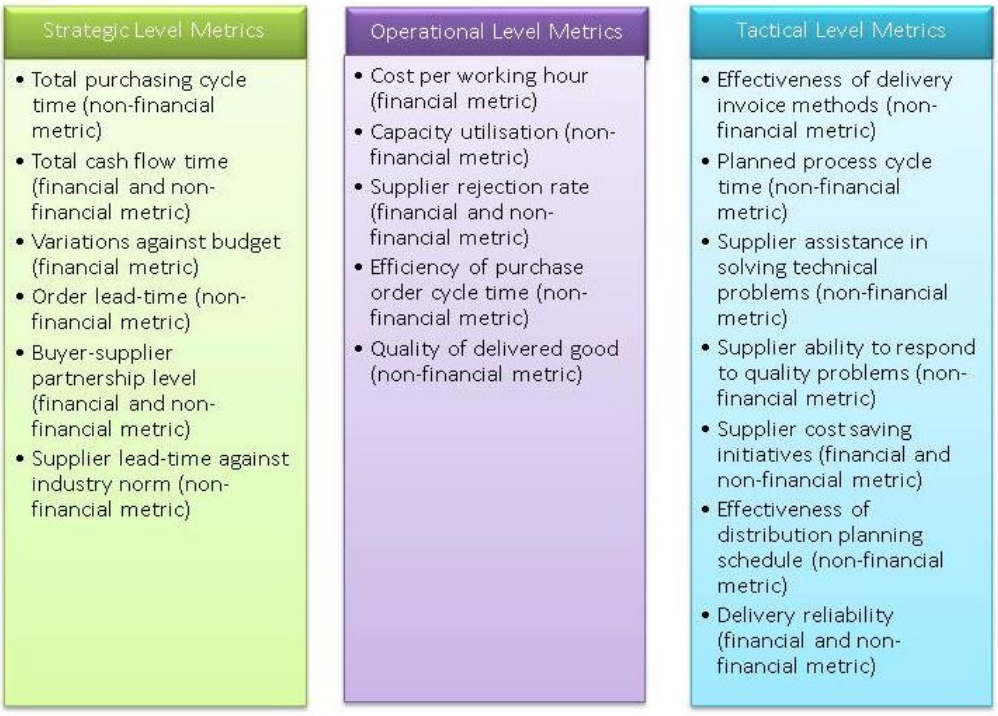
The measures that companies use should provide valuable, valid and timely information on the direction and relative strengths of value delivery that the business is providing to its stakeholders. Measurements should enable senior management and stakeholders to asses and review the process performance. Results of the process have to be evaluated against the previously set targets and new goals need to be discussed with regard to requirements for enhanced value delivery to customer. (Hughes et al, 1998, 184)

Gunasekaran (2004) presents that top level management needs strategic and financial measures for decision making, but lower management and employees need more operational measures for the actual business operations. Gunasekaran (2001) presents a framework for supply chain performance metrics. The framework combines strategic, operational and tactical management perspectives in supply chain. Gunasekaran et al. (2001) also stated that there should be measurements from several different perspectives.

The measurement system should have features from non-financial and financial measures as well as balanced approach through strategic, tactical and operational levels of measurement. As mentioned before, strategic level measures have influence to the decision making as well as long-term planning and strategies of top management. Strategic level is also often interested in policies affecting the purchasing process and level of adherence to organisational objectives. At the operational level the focus of measures is on time-related and non-financial metrics, though some financial measures are also used, for example cost per operational hours. The metrics should be relevant for day to day business and the measurement requires accurate data for decision making at the lower management level. The tactical level’s interest focuses mainly on non-financial measures such as purchasing order cycle time. The financial interest on

tactical level is on supplier cost savings initiatives and delivery reliability. Tactical level measures are useful for middle management and the measures in this level can be exploited when developing supply chain, or in this case purchasing process in long time perspective. This framework is a relevant for this section of this thesis, though it covers performance measurement of the whole supply chain. (Gunasekaran et al. 2001, Gunasekaran, 2004)

Gunasekaran (2004) has identified in his studies these management level metrics. The most relevant metrics for purchasing process are presented below to create an image of the different perspectives of the management levels' to measurement (Gunasekaran, 2004):



Picture 2. Metrics in strategic, operational and tactical level. (Gunasekaran, 2004)

Gunasekaran (2004) adduces also some core elements that are consisted to presented management levels according the metrics that are used in strategic, operational and tactical measurement levels.

Elements in different management level:

Picture 3. Elements of strategic, operational and tactical management level (Gunasekaran, 2004)

As it can be seen, the financial perspective is involved in all three levels. According to this framework, it can be noted that financial perspective is not seen as a separate perspective, like strategic and operational aspects. The financial perspective is highly implemented in strategic management level to support decision making as well as supporting the evaluation of purchasing process in operational level. It is important that management gets accurate numbers on for example cost reductions, to support further strategy planning. (Gunasekaran, 2004; Otto and Kotzab, 2003)

2.4 Strategy and objectives as a part of measuring

At the previous part of the thesis the measurement was brought up in the light of different management levels with strategic, operational and financial perspective for measurement. As introduced earlier, the measuring should be balanced and its metrics classified into three levels – strategic, tactical and operational and the measurements should be part of the supply chain, or in this case, purchasing process evaluation criteria (Bhagwat and Sharma, 2007; Gunasekaran, 2001; Gunasekaran, 2004). This observation includes the supply chain performance, but can be exploited in measuring the purchasing process as well.

According to Hervani (2005), the variety of performance measures depends greatly on the objective of the organization or the individual strategic business unit's characteristics. Companies have to consider existing financial measures such as return on investment, profitably, market share and for example revenue growth at more competitive and strategic point of view when measuring performance of purchasing process. The objectives should be better integrated to organization's business units and processes. (Hervani *et al.*, 2005)

Many researchers have noted that effectiveness is organization's ability to achieve their goals, which supports the importance of objectives as a part of measurement (Otto and Kotzab, 2003; Lysons and Farrington, 2006, 22). By setting specific objectives to varying stages in procurement, such as project or process planning and procurement management, may pursue a powerful performance measurement. However, Otto and Kotzab (2003) outlines that set objectives should not be too easy to achieve, because they easily lead good performance and for that reason the results might not be realistic. (Otto and Kotzab, 2003)

In addition to goals, companies should also implement their strategies to measurement. Van Weele (2005) states, that firms that consider purchasing as a strategic business area are frequently forced to do so by external factors. Nowadays external factors can have strong influence to the markets and organizations, such as strong pressure on

prices and margins, loss of market share, the need for strong cost reduction on incoming materials and fierce fluctuations in the supply market. As internal reasons can be seen for example the extent to which procurement management has been implemented within the company. When purchasing is understood to be a strategic business area, it is actively involved in deciding the company's competitive position. Suppliers are put out to tender internationally, so that the best suppliers will be chosen into purchasing process. Management is evaluating purchasing on a number of aspects including the number of changes in its supply base, the number of new suppliers being contracted and its contribution to the bottom line in terms of savings realized. (Van Weele, 2005, 252-253)

2.5 Features of measures to be considered in developing the measurement system

Measurement system may be unique management tool for each individual organization, reflecting its fundamental purpose and its business environment (Sillanpää, 2010, 51; Gunasekaran, 2004). It is clear, that companies need more than one measurement. As there are varying issues to be measured, the measures should also present different perspectives from one and other. Financial measurements are great for comparison, but do not offer information on how to enhance performance in business processes. For that reason it is important that companies understand the importance of non-financial measurement as well. (Waters, 2009, 438) Before making the decision of measurements to be used, a number of questions must be answered. Companies must carefully evaluate, what are the aspects of process they are trying to improve and how the process should be measured (Laura *et al*., 2007). It has to be decided, what are the issues that should be measured for increasing the effectiveness of purchasing process. In this section, the relation between financial and non-financial, and qualitative and quantitative measurements is introduced.

Qualitative performance measures are measures which are not directly numeric, but however can have quantitative aspects in some cases. Probably the most important of

these is the customer satisfaction. It can be applied to both internal and external customers measuring the degree of customer's satisfaction to the received product or service. According to Chan et al (2003) there are three different elements that can be identified in customer satisfaction, which are pre-transaction satisfaction of customer before the actual transaction, transaction satisfaction during the operation and post-transaction satisfaction. Flexibility to respond to possible fluctuations, information and material flow integration and supplier performance are other examples of qualitative measurements. (Chan et al., 2003)

Quantitative measurements are described numerically. The objectives of quantitative measures can be cost or profit, measures of customer responsiveness and productivity. Measures that are cost based are mainly related to cost minimization, sales and profit maximization. Maximizing the fraction of customer orders filled in time, minimizing the product lateness and customer responsive time are elements of customer responsiveness. Measures based on productivity concern capacity and resource utilization. (Chan et al, 2003)

Because of their easiness to handle and their descriptive nature, it has been stated that all the possible qualitative measures should turn into quantitative measures. (Chan et al. 2003) As a criticism to this statement, as noted earlier, Waters (2009, 438) has stated that quantitative measures do not offer information on how enhance performance in business processes, though they show that something is wrong.

According to article of Najmi and Makui (2012), selected measurements should reflect coordination between financial and non-financial measures and be capable of being strongly related to strategic, tactical and operational levels which. As presented earlier financial measures are popular as a performance measurement. And there is a reason for that – they are easy to find, they look and sound convincing. They give a view from situation of business processes and allow comparison very easily. However, there are some weaknesses as they are concentrating on past rather than the current performance. Consequently, financial measures are slow to react to changes. One of the main problems is that financial measures can point out that something is wrong, but they do not indicate what is wrong and how to make it better. For that reason,

companies need to consider the non-financial measures to be used also in their measurement system. (Waters, 2009, 438)

At the end of this section, some features of good measurement system are introduced by Hervani (2005).

- Measures should be dynamic and present at multiple levels of organization.
- Systems and measures are best developed with a team approach with derivation from and links to organization's strategy.
- Systems must have effective internal and external communications.
- Results have to be accountable and must be understood.
- Measurement systems should provide intelligence for decision makers and not solely collect data.
- System should be capable of linking compensation, rewards and recognition to measurement.

Hervani (2005) states that performance measurement must improve performance management and the organization should develop appropriate organizational structure and ability to use measurement results in order to actually create change in the organization. Measurement should be useful in determination of the efficiency and effectiveness of an existing measurement system or to comparing competing alternatives. (Hervani *et al*., 2005)

2.6 Measurements for purchasing process

Measures that are introduced next are considered to reflect strategic, operational and financial perspectives for measurement. They bring different point of views for purchasing process measurement and are relevant examples of measurement models, which all underline the strategic perspective for measurement, though they can be seen to represent a differing perspective to measurement. Balanced scorecard is seen as a strategic measurement model, which outlines balance between financial and non-financial metrics, and long term and short term objectives (Armatunga, Baldry and Sarshar, 2009). The KPIs can be seen representing the financial perspective, because the data developed with KPIs are mainly numeric indicators. When they are used properly, they can produce accurate knowledge of the effectiveness of purchasing process (Bongsug, 2009). TCO is directly interested in the costs of business processes, which makes the measure easily represent the operational perspective in measurement (Ellram, 1993).

2.6.1 BSC – Balanced Scorecard as a strategic measurement

The non-financial aspect had been highlighted in the article of Armatunga, Baldry and Sarshar (2001). In the article BSC is seen as a process measurement framework, which is balancing the measurements that companies use in their measuring system. In this section we are going to discuss, how companies can increase their effectiveness and efficiency in purchasing process through BSC. (Armatunga, Baldry and Sarshar, 2009)

The name of the concept comes from of a set of items that maintain balance between short term and long term objectives, between financial and non-financial measures and indicators, and between internal and external performance perspectives. According to Armatunga, Baldry and Sarshar (2009) BSC's two main approaches are financial and customer perspectives. Customer perspective is a value-adding view and financial is focusing on shareholders' view. The mission of customer perspective is to achieve

vision by delivering value to customers, it can be also seen as an internal perspectives and its aim is to promote efficiency and effectiveness in business processes. (Armatunga, Baldry and Sarshar, 2009)

Mission of financial perspectives is to gain financial success, by delivering value to the shareholders and achieving the vision, by sustaining innovation and change capabilities through continuous improvement and preparation in the future challenges (Armatunga, Baldry and Sarshar, 2009). The financial perspective also has learning and growth approach in future view. Financial performance measures the company's financial results: profitably growth in sales turnover and maximizing wealth of shareholders are also BSC's financial metrics. Evaluating customer perspective approach is to find out how customers see the business. Measures also include metrics such as lead-time, quality of products or services, company's performance service and cost effectiveness. Internal business measures business processes, factors in the process that impact on customers' satisfaction most, Innovation and learning perspectives can increase efficiency of companies' operative business in the future. (Bhagwat and Sharma, 2007; Kaplan and Norton, 1992)

With BSC framework can be created balanced measuring system, and in many cases BSC creates a framework for developing KPIs, which are discussed in the following section.

2.6.2 Key Performance Indicators

As defined earlier, key performance indicators are performance indicators, or in other words metrics, that have significant impact on the overall performance of an organization in the areas of strategic, tactical and operational planning and control (Gunasekaran et al. 2004). According to Bongsug (2009) companies use certain number of KPIs, mostly assessing performance, but in supply chain management KPIs have not been extensively yet adopted, partly because they do not have required knowledge related to the indicators and how to develop those. They can offer overall visibility to

purchasing process and help evaluate the accuracy of supply/demand plan and execution performance, in other words how the actual meets the forecasted plan. Hence, KPIs can reveal the gap between plan and execution and additionally offer opportunities to identify and correct potential problems. The feedback that is gained through KPIs is necessary for processes and their development to be more effective and efficient. (Bongsug, 2009)

A construction project involves different stages that represent different processes involving different parties. In each stage process control is essential. The process control is aiming at monitoring and controlling process performance to achieve end-project goals. According to Hapanova and Al-Jibouri (2009), the very early stages in the project development such as the pre-project stage are crucial to its success. This can be seen as a baseline for using KPIs in purchasing process in construction industry. (Hapanova and Al-Jibouri, 2009)

Hapanova and Al-Jibouri (2009) have studied relevant KPIs for process performance measurement in companies operating in construction industry. They identified eight relevant KPI: 1) management of client requirements, 2) plan development, 3) whole life cycle cost model, 4) risk management, 5) value management, 6) management of project scope, 7) stakeholder's involvement and communication, and 8) alignment to project goals.

From these key performance indicators can be identified the most important elements in process measurement. This study verifies the importance of meeting customer's requirements. Also the value creation was highlighted in findings of the study. Management of project scope can be measured through possible changes from original requirements of processes. (Hapanova and Al-Jibouri, 2009)

2.6.3 TCO – Total Cost of Ownership

According to Ellram (1993) total cost of ownership can be defined as a concept which strives to analyze and understand the true costs of business processes. TCO involves identifying the major cost elements associated with purchases. TCO aims to understand the total cost of a purchase from a particular supplier in the purchasing process. (Ellram, 1993) By using TCO in supplier evaluation companies can gain more valuable data from the efficiency of the suppliers.

Ellram (1993) divides total costs into three categories, based on when the costs are emerged. Pretransaction costs may include costs associated with investigation, qualifying sources, or the costs from adding new suppliers to company's purchasing system. Transaction costs cover the purchasing price, deliveries, inspections and many other costs included in the actual business process. Posttransaction costs of a purchase include line fallouts, reworks of finished service or goods, costs of returns, warranty works and other costs associated with purchase. (Ellram, 1993)

Like all of the measurements, there are some difficulties in the use of TCO as a purchasing process measurement. Ellram (1993) found that the greatest obstacles for using TCO were lack of data resources, training and education and corporate culture. As a concept, TCO is quite easy to understand, but in practice the complexity of gathering data for TCO may limit its adaptation. The resource allocation is considered to be the biggest problem in the implementation of TCO. The study of Ellram (1993) highlights the importance of computer systems and information to support TCO efforts. However, it can be assumed, that companies could have the resources needed for using TCO because of the major development of IT-support function and computer systems

Though there are problems in implementation of TCO, potential benefits of TCO have been identified. With TCO companies can improve supplier performance measurement. TCO can be seen as a logical approach that allows companies to develop comprehensive understanding of suppliers' performance. It has been studied that it helps to allocate purchase volume among suppliers. The model supports and can improve decision making and internal and external communication. The decision making

improvement relates to the rational approach that looks other cost factors among price. TCO helps to clarify the expectations of both supplier and buying company. The understanding of costs and suppliers improves. With identifying and determining what costs should be included in TCO model can increase the understanding of purchases and their cost structures. This understanding and information is useful in negotiations and can also help to increase the awareness of non-price factors which affect the companies' purchasing. TCO also supports companies' continuous improvement efforts. (Ellram, 1993)

3. CASE COMPANY X

Company X is a large construction company operating internationally in construction industry. The case company understands the importance of procurement management, which can be seen from its strategies and objectives. The purchasing process is measured, but need for improvement could be identified.

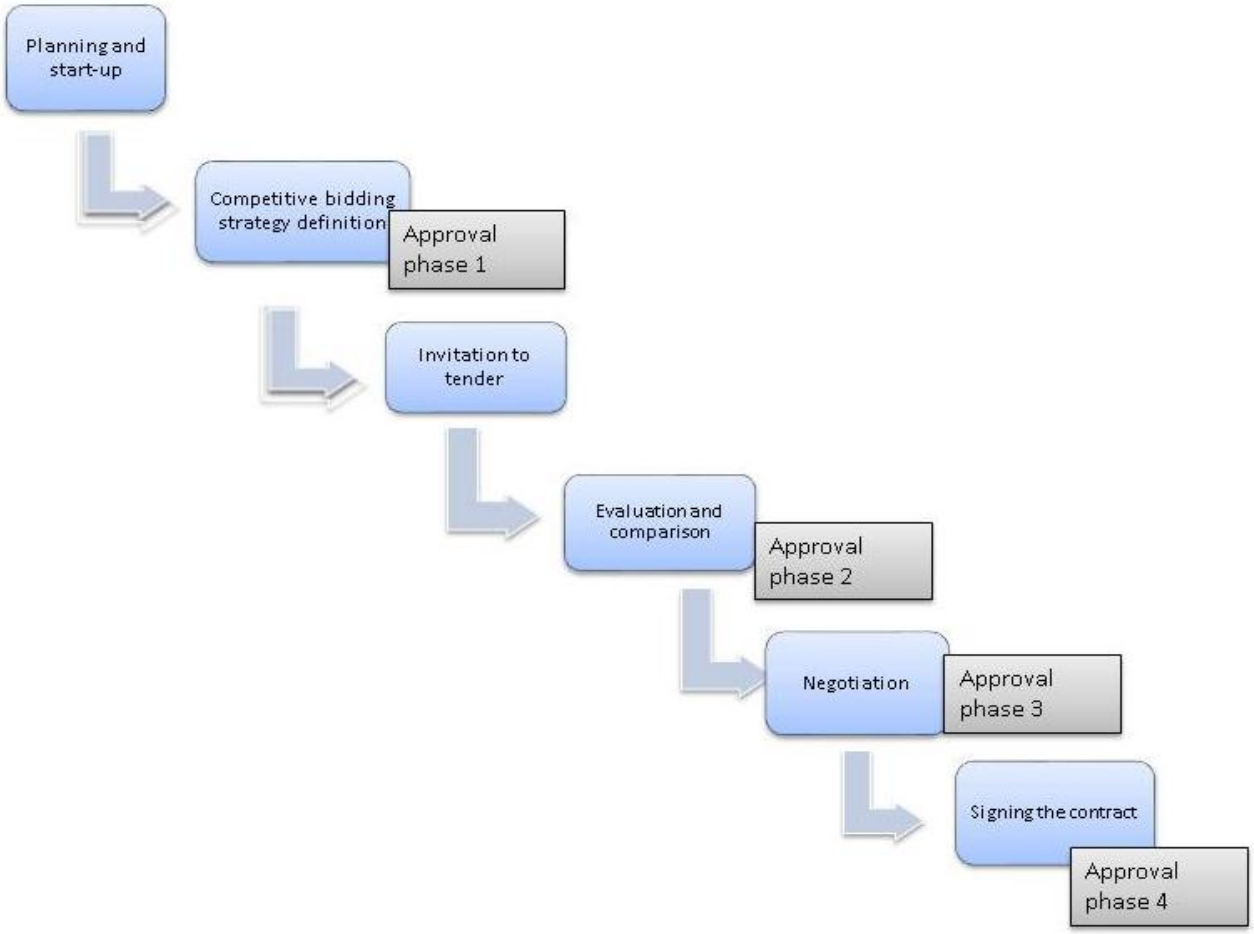
This part of the thesis is based on data from case company X and the observation of the writer, which have gained through two summer trainee periods. The information is collected through semi-structured questionnaire. Case study as a research method was discovered to be the best way to execute this thesis. With case study, measurement of purchasing process could be studied more profoundly, than just with theoretical study. With case study relevant information can be gained on today's situation in construction industry.

The case company's corporate level strategies are focusing on occupational safety, ethics, human resources development, eco-efficiency and risk management. The strategic areas of procurement support the corporate level strategies. The strategy areas specified for the procurement are people, project cooperation, professional procurement and logistics and suppliers. With these strategic focus areas, the case company operates to achieve its goals to have professional procurement people to gain the needed competence level to develop procurement maturity level. This is made by securing the systematical individual and organizational competence management. The importance of procurement department is understood and highlighted in company's targets. Investing time in communications, training and change management by both the line and procurement is understood to play a vital role in today's changing business environment and in intense competition that emerges in markets. By sharing knowledge, increasing involvement in bidding and estimation and by improving selling company's procurement services, the company is pursuing towards optimized processes for strategic and operational procurement. The last target area is improving the supplier

base of the case company. The objectives are to increase potential supplier markets by finding new suppliers in from international markets.

3.1 Purchasing process

In this section the purchasing process of the case company is introduced. The theory presented earlier in the thesis will be the baseline for company X's purchasing process. The information for the presented process is collected from the case company X. The purchasing process consists of six stages, starting with designing and start-up. The process includes four different approval phases where the issues involved in the specific stage are discussed and decided. The process chart is presented in the picture (Picture 4.) below. The phases of the process are defined more specific after the picture.



Picture 4. Purchasing process of company X

As it can be seen, the process ends with signing the contract and approval phase 4 where the process is evaluated. The process is tightly related in supplier selection. From this it can be noted, that suppliers are highly weighted in company's purchasing strategy.

3.1.1 Planning and start-up

In the first stage of the purchasing process the plans are made for the following phases. The objects what will be purchased are identified and the needed information

concerning the purchase is collected, for example historical data about suppliers for the second stage, where the competitive bidding strategy will be decided.

As brought up earlier, the pre-stage, such as planning phase of the purchasing process, is concerned to be important phase to be evaluated with measurement. The TCO model and KPI's highlights the pre-project stage, when planning and evaluating the cost structure, and effectiveness and efficiency of purchasing process (Ellram, 1993; Hapanova and Al-Jibouri, 2009) The definition for services differs from purchasing of goods or materials and for that reason the planning and start-up phase has a major importance for effectiveness of purchasing process (Van der Valk and Rozemeijer, 2009). Case company's purchases include both material and service, which should be taken into a consideration in purchasing process evaluation.

3.1.2 Competitive bidding strategy definition precedes invitation to tender

In the second stage the strategy for competitive bidding is defined. For that, the historical data regarding the suppliers is vital for inviting the best suppliers to tender. After the strategy definition comes the first approval phase: In addition to the competitive bidding strategy, the recipients and contents of the invitation of tender are determined and approved. This phase can be seen as one of the most important phase of the purchasing process. It has a major influence for the later process when the supplier selection is based on the determined strategy. Trent and Monczka (1998) noted that supplier performance and possible improvement opportunities can be helpful information in this phase of purchasing process. The requirements for wanted supplier should be determined to support the competitive strategy determination. (Trent and Monczka, 1998)

After determining competitive bidding strategy, the invitations to tender are send to the potential suppliers. The importance of previous phase highlighted, because the strategy determined is defining the suppliers will be selected to the invitation to tender phase.

3.1.3 Evaluation and comparison

The suppliers are evaluated and compared according to offers. The suppliers with best offers are selected and invited to negotiation stage. In the second approval phase, the negotiation mandates are finished. With TCO model companies can increase their knowledge of costs, also costs other than price. This knowledge is valuable for company, especially in negotiation situations, where the price has usually been the main factor. (Ellram, 1993)

3.1.4 Negotiations

The selected supplier should be capable to integrate its operations to the strategy and objectives set by the buying company. Additionally, value delivering to the end-customer and increasing effectiveness and efficiency in purchasing process should be required from the supplier. (Armatunga, Baldry and Sarshar, 2009) After negotiations, the best supplier will be selected based on the previous phases of the process. The supplier selection is the third approval phase. The terms, responsibilities and the contents of the contracts will discussed and determined before signing the contract between suppliers.

3.1.5 Signing the contract

The contract is signed in the last stage of purchasing process. In approval phase four the final results and the process evaluation are made. This phase defines the further decision making for purchasing process and competitive bidding strategies. TCO model provides also in this phase an important aspect to evaluation. Ellram (1993) outlines that the total costs of process can be discovered after the end product or service is successfully transferred to the end customer. There can always be some rework to be done or warranties that must be taken into consider. Contracting can be evaluated with contracting compliance which is already utilized in the case company. (Ellram, 1993)

3.2 Measuring purchasing process at present

The measurement of purchasing process of the case company is done by using KPIs. The KPIs used are:

- share of centralized procurement
- customer satisfaction
- international procurement,
- annual rebates, and
- buyer-supplier partnership level

From the metrics introduced above, can be identified financial and non-financial features, though there might be something to do for improving the connection of these metrics. It can also be seen that these metrics do not have clear connection to each other, and more importantly they are not describing the effectiveness of the purchasing process: the metrics are measuring only the output of procurement – not the effectiveness of it, because the input is not taken into account in these indicators. Like Van Weele (2005) brought up, the input-output relationships are very difficult to identify, which is limiting the possibility to measure and evaluate purchasing activities accurately and comprehensively. The results obtained are compared to target figures, but do not tell, why targets were not reached. If the metrics would have the balance between input-output aspects, the metrics would give much more accurate results of the purchasing process and its effectiveness. However, strategy and objectives introduced earlier can be identified in these metrics, which is important to measurement for gaining relevant and useful information for decision making of strategic level, though the accuracy of the measures is not at ideal level.

Internally, company X evaluates performance through two measures. First one is cost reduction and the other is contract compliance, which simply measures the utilization

rate of the contract. It appears that quality aspect is not at the consensus of purchasing process measurement, though it should be an important factor in measurement.

4. ANALYSIS

The purpose of the questionnaire was to collect information of the attitudes towards the measurement at present. The questionnaire is presented in appendix 1. The purpose of the questionnaire was to gain information about the measures that are used for measuring the purchasing process and how are the strategy and objectives linked to measurement. It is also important to identify the role of measurement in procurement management and more precisely in purchasing process.

The analysis is based on answers of company X's procurement unit's controller, category manager and the head of the procurement unit. Controller's answers are considered to represent the financial aspect of the thesis as the answers of category manager's is representing the operational and the answers of the head of procurement unit represent the strategic point of view. Hereafter the respondents are referred according the following:

Head of Procurement unit	Strategic perspective	Respondent A
Controller	Financial perspective	Respondent B
Category Manager	Operational perspective	Respondent C

Table1. Respondents from company X

The answers of respondent A do not give answers to questions that are dealing the measurement identification. For that reason the strategic perspective rises at the end of the analysis.

Respondent B identifies five different measures that are used in purchasing process measurement. These are share of centralized procurement, year end bonus, customer satisfaction, international procurement and the level of buyer-supplier partnership. At the financial perspective 4/5 of the measures are considered to be easy to understand.

Share of centralized procurement measures the volume handled by company X's procurement department. Year end bonus measures simply the amount of year-end bonuses earned through framework agreements (the difference between market price and the price that is paid).

At operational level three measures were identified. Share of centralized procurement and year-end bonus were identified like at the financial perspective. The third one, however, differs from the answers of respondent B: it is FWA's (framework agreement) share of centralized procurement which measures the amount of framework agreements managed by procurement department. This emphasizes that the transparency of measurements is not as good as it should be. However, the respondent C responded that the ability to understand the measurements is still perceived to be good.

Measures should be clearly identified in all levels of procurement department. Hervani et al. (2005) presented features of good measures. When comparing the features of metrics used in the company to these theoretical guidelines, there can be seen problems with providing knowledge for decision making. It appears that the metrics solely collect data from processes, but the usability of collected data might not be as good as it should be. Metrics should be useful in determination of the efficiency and effectiveness of an existing measurement system or to comparing competing alternatives. (Hervani *et al*., 2005) Other issue that rises from the answers is the need of different kind of measures in different levels of management (Gunasekaran, 2004; Gunasekaran, 2001; Otto and Kotzab, 2003).

According to respondents B and C the measures are implemented on strategy and goals of the organization. Respondent B and C considered that the intended results can be achieved with current measures. This can be seen as a result from a successful implementation of strategy and goals on measurement. From this it can be also assumed that the strategy and objectives are convergent through the organization. Company could increase its effectiveness by evaluating the quality of the process and suppliers that are chosen based on the process. As Otto and Kotzab (2003) outlined the objectives should be well specified and defined. If the goals are set too low, it is too easy

for the company to achieve its goals and this can mislead to good performance results, which might not be realistic.

When asked what good or poor features are in present measurement, respondent B pointed out the following issues from financial perspective:

> *"Due to poor data availability/quality, most of the measurements are not precise enough. Current measurements are mainly quantitative measurements, and don't take the quality (/value added) into account well enough. "*

In the financial perspective lack of accurate data and interest in quality were the main deficiencies in current measures. At strategic perspective the problems associates with separateness of measures in different business units. According to respondent A KPIs would increase the effectiveness and efficiency if they were converged through business units. Respondent outlines, that massive re-planning of KPIs is needed to enhance their efficiency. As a result, the objectives and strategy should be in line also through all business units, not just lined with business unit's internal objectives and strategy. This is seen necessary for producing information accurate enough for improving effectiveness of the whole procurement department. Developing KPIs requires accurate knowledge of developing indicators, which is identified to be one main problem related to KPIs (Bongsug, 2009).

Respondent C also pointed out that KPIs used, do not emphasize the quality of the purchasing process, which should be an important issue, especially when concerning customer satisfaction. Based on this, it can be stated that the measurement should move towards quality and value thinking instead of preferring only quantitative measures. In addition, respondent C noted that the KPIs are not accurate enough leaving too much space to speculation and for that reason; the results can be misunderstood and are not accurate enough.

As Hapanova and Al-Jibouri (2009) studied, important KPIs for process measures related to quality and value perspective are management of client requirements and

value management. Plan development can also be seen as an important metric. When measuring the plan development, it is possible to react to value adding and customer satisfaction at the pre-stage of the process. (Hapanova and Al-Jibouri (2009) Customer perspective of BSC aims to deliver value to customers. It represents organization's internal perspectives and promotes efficiency and effectiveness in business processes (Armatunga, Baldry and Sarshar, 2009).

As it was found, need for improvement was identified in KPI's metrics from strategic, financial and operational perspective. Based on what presented earlier, the idea of using KPIs as purchasing process measure is considered to be useful, but the indicators used should be modified to be more suitable for measurement. Need for improvement from financial and strategic perspective was identified target integration:

> *"Even more focus should be on integrating procurement targets to support business unit's overall targets, to assure that we are heading towards common goals." (Respondent B)*

This answer confirms a need for considering existing measures at more competitive and strategic point of view when measuring performance of purchasing process. The objectives should be better integrated in organization's business units and processes. By setting specific objectives to varying stages in procurement, such as project or process planning and procurement management, it may pursue a powerful performance measurement. (Hervani *et al.*, 2005)

5. RESULTS AND CONCLUSIONS

In this thesis the purchasing process measurement is discussed from strategic, financial and operational perspectives. It has been found that with accurate measurement companies can improve their purchasing process effectiveness and efficiency. The attitudes against measurement and measures can vary in different management levels and these differences should be identified.

From the purchasing process was identified some phases that should be more accurately measured. More emphasis should be placed in pre-stages of the process, which includes planning and start-up, strategy definition and partly invitations to tender. By measuring supplier performance and by exploiting TCO model in the evaluation, company could increase its knowledge of potential suppliers and possible costs, which can not be directly identified and evaluated (Ellram, 1993). The metrics identified by Haponava and Al-Jibouri (2009) could be useful also for the case company. Especially, management of client requirements that emphasizes the customer satisfaction and value creation for the client could be utilized in the case company.

Based on the interviews, the case company X emphasizes strategy and objectives in their business processes through different departments and organizational levels, but there is still a need for improving in the integration of strategy and objectives of procurement towards the business unit's strategy and objectives. The measurement system of company X is based on use of KPIs. Currently the metrics are measuring only the output of the procurement. For getting more accurate information of the effectiveness of purchasing process, the input aspect must be added in the metrics (Van Weele, 2005). All of the respondents aligned need for rethinking of the KPIs.

BSC, TCO and KPIs were presented in the light of the three different perspectives. The models are presented as a separate measurement systems, but based on the analysis, it can be stated, that they can support each other and by utilizing features from each of them, it is possible, that the company can have more comprehensive and more accurate data from measurement. As it has been studied, different metrics of performance from

different aspects can increase the effectiveness of measurement (Laura et al. 2007; Hughes et al, 1998). Based on the case study and the theory, problems occur when implementing and comparing different organizations' performance (Najmi and Makui, 2012). To support the statement, there can be identified connection between these three measures. With BSC the company can identify areas, which could be measured for increasing the knowledge of its purchasing process. After identifying these issues, it is much easier to develop proper KPIs for accurate measurement to support decision making and strategy planning in business unit, internally and externally. As discussed earlier one of the main problems, that identified also in case company was the lack of precise data for measurement. TCO could be seen as model to collect data from purchasing process for measurement. Though, there are some difficulties in practical terms, but the necessary resources are available, it can produce information that can increase the competitive advantage of the company. As the financial perspective can be seen as a link between strategic and operational perspective, KPIs can be seen in similar way. In other words from the operational perspective the question could be what is measured, at strategic level what should be measured and from the financial perspective how are issues measured.

In conclusion and for further studying, based on the theories and the case study there is much to do to make purchasing process measurement more effective and efficiency. The problems presented in theory are faced by companies in many industries. It is evident, that the study of purchasing process measurement is still nowadays narrow, which is also detected in practice. Theories do not explain, what could be the operations for improving process measurement in a way that visibly would improve procurement management. It would also be interesting to study how to develop more effective and efficient measurement system for company operating in construction industry. The thesis is written from company's internal perspective and it could be relevant to study this subject from client's or supplier's point of view. Also it could be interesting to study what is the role of measuring the purchasing process in other industries. The company could gain very valuable information from these external sources.

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APPENDIX

THE QUESTONNAIRE TO THE SURVEY:
HOW IS THE PURCHSING PROCESS MEASURED IN COMPANY X IN CONSTRUCTION INDUSTRY Title of the respondent:
1. What are the measurements used in measuring the purchasing process?
2. Are the used measurements easy to understand?
3. Do you understand the meaning of used measurements?
4. Are the measurements implemented on strategy and goals?
5. Do you get the intended results with current measurement?
6. What good/ bad is in the current measurement systems?
7. How would you improve the systems?