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UNDERSTANDING THE PROCUREMENT PROCESS AND ITS CRITICAL SUCCESS FACTORS

A Case Study of Woima Corporation in Global Project Deliveries

Master`s Thesis in

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ABBREVIATIONS

CSF's	Critical Success Factors
KPI's	Key Performance Indicators
RFQ	Request for Quotations
LPC	Lowest Price Conforming
PR	Purchase Requisition
PO	Purchase Order
OC	Order Confirmation
RFQ	Request for Qualification
SLA's	Service Level Agreements
AP	Accounts Payable
DSM	Dependency Structure Matrix
IRN	Inspection Release Note
TBE	Technical Bid Evaluation
CBE	Commercial Bid Evaluation
PSR	Procurement Status Report
MSR	Material Status Report
RDF	Refuse-Derive Fuel
SRF	Solid Recover Fuel
EPC	Engineering Procurement and Construction
AI	Artificial Intelligence
AR	Augmented Reality
AHP	Analytical Hierarchical Process
ANP	Analytic Network Process
MAUT	Multiple Attribute Utility Theory
TCO	Total Cost of Ownership

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ABSTRACT

This research provides an insight of how the procurement process can be organized in a better way. Since, companies are now trying to outsource parts and material from external suppliers in order to focus on their core competences. Therefore, critical success factors are also identified to successfully manage the procurement process. The understanding and identification of critical success factors in the procurement process enables the organization to improve the efficiency of the procurement process and successfully manage the whole project. A lot of risk and pressure is involved in the case of outsourced engineering and manufacturing projects therefore, it is necessary to carefully handle the procurement activities to ensure the best outcome.

The aim of this study is to characterize the phases of procurement process and its critical success factors in the procurement activities to ensure the effectiveness and operational excellence of the procurement process as a whole. This study is based on data triangulation in which facts and evidences are gathered from various sources. The information is collected from company's archival record, literature and open-ended interviews/discussions from the benchmark companies to analyze and understand the procurement process.

This study contributes to the businesses associated with engineering and manufacturing solutions in which there are crucial components that are considered critical for the functioning of large power plant solutions therefore, comprehensive planning is necessary. The results are generated by considering As-Is of the case company and outcomes from this research to formulate the To-Be process by incorporating the essential CSFs. *Quality gates, parts approval process* and *logistic control* tools and approaches are considered vital for the whole process. However, *effective communication, top management support* and *collaborative partnership* are also closely linked with the success of the whole procurement process. Professionals working in the field of procurement can use the outcome of this research for the better understanding and successful completion of the project that lies the way procurement activities are performed.

KEY WORDS: Critical Success Factors, Procurement Process, Outsourced Engineering and Manufacturing, Project Success

1. INTRODUCTION

1.1. Background

The success of projects which involve engineering and manufacturing consists of many different perspectives that are dependent on the purpose and context. These projects may start from buying/purchasing the components of that project. This process is known as procurement which involves activities related to identification of requirements, locating the manufacturers, buying the inputs for the project and installation of the final project at the customer's site. Thus, the aim of this research is to identify and understand those factors that can influence the procurement activities in order to achieve project success for the case study of the company Woima.

Achieving success in a project is indicated by several studies explaining about the criteria and key success factors (Pinto & Slevin 1989; Atkinson 1999; Lim & Mohamed 1999). Organizations typically purchase goods, services, materials, add value by transforming and finally sell them therefore, it is important for the organizations to effectively manage their sourcing/buying process such as their operating and selling processes (Leenders & Fearon 1997; Dobler & Burt 1996). However, criticism regarding project success has evolved like a rising wave along with the general assumption about the possibility of applying universal theory in many kinds of projects (Diallo & Thuillier 2004; Khang & Moe 2008).

Global projects consisting of engineering and manufacturing projects are influenced by many distinctive factors that varies from project to project. Thus, answering about achieving success in different projects is sometimes challenging. Achieving success in in such project requires, project management, team selection, flexible planning, compliance with procedures & rules as well as the implementation approach (especially when dealing in sourcing) are considered as success factors in this phase (Ika et al. 2009; Khang & Moe 2008). The terminologies including procurement, sourcing, organizational buying, strategic sourcing and commissioning are used to express the functions and

responsibilities for supplies, procurement of material and services (Roots 2009; Lindgreen et al. 2009; Driedonks et al. 2014).

Woima Corporation provides modularized waste-to-energy solutions to the developing countries. The main solution is waste-to-energy power plant which can be supplemented according to the customer needs with waste pre-sorting facility. The company emphases on energy solutions which utilize industrial, agricultural, wastewater sludge, commercial and municipal solid waste as well as processed waste i.e. Refuse-Derived Fuel (RDF) and Solid Recovered Fuel (SRF) fuels. Project deliveries are mainly managed as Engineering Procurement and Construction EPC projects.

One early written book has addressed the concept of purchasing with the title "The Handling of Railway Supplies-Their Purchase and Disposition", by M. Kirkman in the year, 1887. The author proposed the idea of purchasing like an expert discipline (Kirkman 1887). The procurement profession in the past 20 years has developed largely from as an administrative focus (Sagev & Gebauer 2001) towards the one who perceived to be more critical to business, forward thinking, vital for success and strategic organizations (Pressey et al. 2007; Gadd & Hakanssonioppoip 2004). It has been observed that in an organization, 70 percent of the total manufacturing expenses or sales revenues is consumed by sourcing, raw materials, their components, finished products or services (Tayles & Drury 2001; Presutti 2003; Chan & Chin 2007). However, the profitability of an institution can significantly be improved if sourcing expenses are minimized (Leenders & Fearon 1997; Dobler & Burt 1996).

The role of procurement has grown with the passage of time and shifted towards a broader scope of activity. However, it has been observed that many organizations and firms still perceive procurement to be an administrative activity mostly associated with buying of goods and services. (Joesbury 2016). Furthermore, purchasing can be included in the design and development of product to increase the product quality allowing the possibility to reduce manufacturing cost and rapidly bringing new products to the market. This is only possible if key suppliers are involved into the design and development of a product at an early stage of purchasing process. (Joyce 2006). He further said that, it is the responsibility of the purchaser to manage suppliers, making contracts, form alliances and

play a liaison's role between the suppliers and several other international departments (Joyce 2006).

According to Aberdeen Group (2013), organizations buy and convert the entity by adding some value before selling it therefore, the buying activity is surely a key factor towards success. Moreover, strategic sourcing is taken as a process of organized and broad approach that helps the company in realizing its long-term goals and objectives by adding value and incorporating it into business procedures (Smeltzer et al. 2003). Researcher Matthews (2005), supports this strategic procurement to be more critical for a business and listed some differences between Strategic (leading) & tactical (historic) tasks associated with the evolution of procurement/purchasing showing in the table 1 below.

Table 1. Strategic (leading) and tactical (historic) evolution of procurement/purchasing

Historic (Tactical)	**Leading (Strategic)**
Vender File Management	Cost Management
Order tracking	Life Cycle Estimation
Local Venders	Spend Management
PO Insurance	Supplier Alliances
Excess Inventory	Global Sourcing
Unit Cost Aim	Procurement planning

1.2. Aim and Motivation

A lot of engineering and manufacturing works are involved in the prefabrication of modularized waste-to-energy power plants powerplants. Most of the components are outsourced from the external suppliers so that Woima can focus on their own core competence. Rising cost and competition have led companies to focus on their competences and skills. Thus, there is a rise in outsourcing in which external suppliers are involved to buy required products and services (Iloranta & Pajunen-Muhonen 2008: 48-49). Consequently, the increasing economic value and importance of managing supply chain and procurement activities has made them important business drivers of the company. Moreover, company should leave the traditional way of managing supply chain

and procurement due to their changed role and concentrate on handling the process carefully (van Weele 2010: 18). According to KPMG (2012), most of the companies have opted centralized model of procurement processes but there are still several who are facing some challenges in transforming it into strategic Importance for their business growth. Moreover, they proposed that in order to minimize operating cost and increase efficiency in their delivery process, supply chain managements and CPO's will have to re-evaluate their existing operating activities and reduce higher values from them. Thus, the motivation of this study is to develop the procurement process for the company where the deliverables are procurement process and critical success factors.

1.2.1. Research Objectives and Questions

The objective of this study is to map highly effective procurement process and identify critical success factors to achieve success in the project. The engineering and manufacturing process are outsourced under the management of case company Woima where the internal resources of case company focus on sales, product development, project and site execution and supply management capabilities. This requires the development of an effective procurement management in order to operate supply chain according to the project, business and customer needs. The aim of case company is to form a collaborative partnership with major and important suppliers by meaningful contract agreements and collaboration tool to create constructive transparency that emphasize to achieve common goal for both the participants. Therefore, there is a need develop effective system of managing procurement activities for the business, project and customer needs. The objectives of the research work are classified as follows:

- To map highly effective procurement process for the case company Woima
- Identification of the critical success factors

The questions constructed for this study are as follows.

I. What is the procurement process for Woima corporation?
II. What are the critical success factors that can influence the procurement process of Woima in achieving success in their global project deliveries?

1.3. The Scope

Procurement is considered a very important part of the project success and customer satisfaction is one of the objectives for the companies now a days. Therefore, there is a need to understand the process and factors that can assist in achieving that success in the process. To map the process for the case company, both literature, archival record and primary data were brought into study. The information source for this study was rich literature, interviews and case company provided data i.e. tables, flowcharts, reports etc. This study is based on exploratory research carried out by conducting interviews of various companies related to engineering and manufacturing involved in the global projects. Therefore, the study delivers more general outcome and conclusion related to the important phases of procurement process and its critical success factors. The phases of procurement are based on initial/start-up procurement purpose. The scope is limited to the identification of CSFs and not to measure the influence of these factors on the project success.

The study consists of 5 Chapters i.e. introduction, literature, methodology, results and conclusion. Prior research work regarding the phases of procurement, its relationship, different levels of procurement, success criteria and success factors are presented in Chapter 2. The method adopted to deliver an effective procurement process and CSFs to the case company is presented in Chapter 3. Analysis and results are generated in the form of proposed procurement process design after understanding how the procurement process is organized and success factors are associated in the benchmark companies, presented in Chapter 4. The discussion regarding the outcome of the findings are also given in Chapter 4. Finally, conclusion, managerial implication and future possible suggestions are given in Chapter 5. The structure of study is illustrated in figure 1.

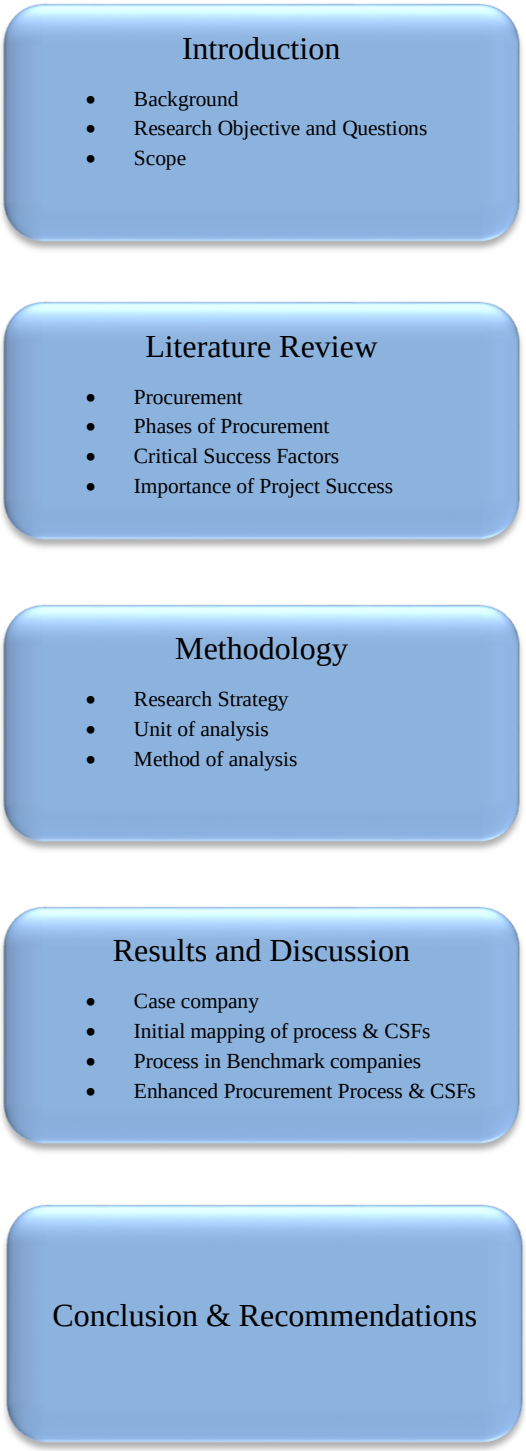


Figure 1. Structure of the thesis

2. LITERATURE REVIEW

2.1. Procurement

In this thesis, the notion of procurement is involved to refer the professionalism of procurement capabilities. This includes various activities circulating around purchase-oriented activities and undertakings involved in the before and after getting the invoice. However, it can be related to the context of a company that will determine, to what extent procurement capabilities are participating with the activities they performed. This study refers to the procurement and its process within the company.

2.1.1. Definition of Procurement in Literatures

Generally, the language used within the literature domain has some difference in the definition of procurement. For instance, procurement and purchasing is frequently used interchangeably, whereas supply management is used as a synonym of procurement and purchasing as well as a broader term for organizational process (Holm 2012). The discussion about procurement or purchasing dates back to the researcher (Lews 1946), who has indicated general ambiguousness about what it should be called in this regard. Contemporary textbooks took direct perspective of the matter for instance, (Cousins et al. 2008) defines it historically from *"buying" to "purchasing"* and then *"procurement"*, this is called supply management in contemporary. The tendency of using such new words to describe the subject matter seems to indicate it like strategic orientated and more sophisticated. Furthermore, (Axelsson et al. 2005) used the word sourcing and defined it simply as it involves all those activities by which invoices are generated. They also indicated that sourcing includes strategic aspects of acquiring the resources at a cost of focusing on the operational matters together with after invoice activities.

Cousins et al (2008) claimed that the survived word that has minimum connotations is *"supply management"*. It is a good term to explain what is happening in buying, that is spending money to acquire an item. Monczka et al. (2010) maintained that the difference between supply management and purchasing (They interchange the words

"procurement" and *"purchasing"*) needs to be recognized. According to them, procurement is a functional activity as well as group that performs various activities in order to ensure certain value for the organization like identification and selection of supplier, buying, negotiating and contracting with them, supply market analysis, measurement and improvement of supplier and development of purchasing system. Furthermore, Monczka et al. (2010) stressed on *"supply management"* to be a comprehensive and strategic concept when comparing with the procurement/buying process. Therefore, supply management consists of four elements when planning and acquiring for the organization's current and future needs: *"strategic orientation, cross-functional group, supply base management, lastly process-driven approach"*. Moreover, strategic sourcing is also included in the supply management, a cross-functional concept having a broader scope for the organization including engineering, manufacturing, strategic planning, design, quality and accounting etc. (Monczka et al. 2010).

2.1.2. Procurement and its Relationship with Sourcing and Purchasing

As explained earlier in the definition of procurement in literature, there are numerous concepts and terms used both in practice and as well as in literature. However, there is no clear consensus about how to relate these different terms. Thus, purchasing, procurement, buying and sourcing seems to be used interchangeably. According to Iloranta & Pajunen-Muhonen (2015: 50), **"*Procurement*"** contains all the necessary transactions for the purpose of transferring material or related service to the last destination, provided by the supplier. Furthermore, procurement involves store, transportation and traffic, quality assurance, inspection of incoming and control related activities (Van Weele, 2010: 8-10).

The term **"*Purchasing*"** comprises of commercial entries associated with the buying of product and service facilities (Pajunen-Muhonen & Iloranta 2015: 49). Such transactions consist of RFQ (request for quotations), ordering, selection of supplier, expediting and lastly, transactions of payment (van Weele 2010: 29). Thus, "*Buying"* is only a single portion of the aforesaid purchasing process. However, buying process is different from purchasing process because determining the specifications and supplier selection may not be the responsibility in the buying activity (Pajunen-Muhonen & Iloranta 2015: 49-50; Van Weele 2010: 10). According to van Weele (2010: 10) & Baily et al. (2008: 198),

"*sourcing*" is concerned with finding, then selecting, then contracting and lastly, managing supply related sources rightly. Hence, persistence in deliveries, availability and accessibility of goods and services and identification of alternative supply sources are ensured by mapping the potential and key supply sources (Pajunen-Muhonen & Iloranta 2015: 51). Researcher Baily et al. (2008) stated that, it could be a very important decision in procurement to select the appropriate supply related sources because right decision ensures that organization receives their desired materials and services when required. Model of purchasing process and its relationship with the stated 4 concepts is shown in the figure 2 below. Chapter 2.1.4 contains the detailed explanation of this process model.

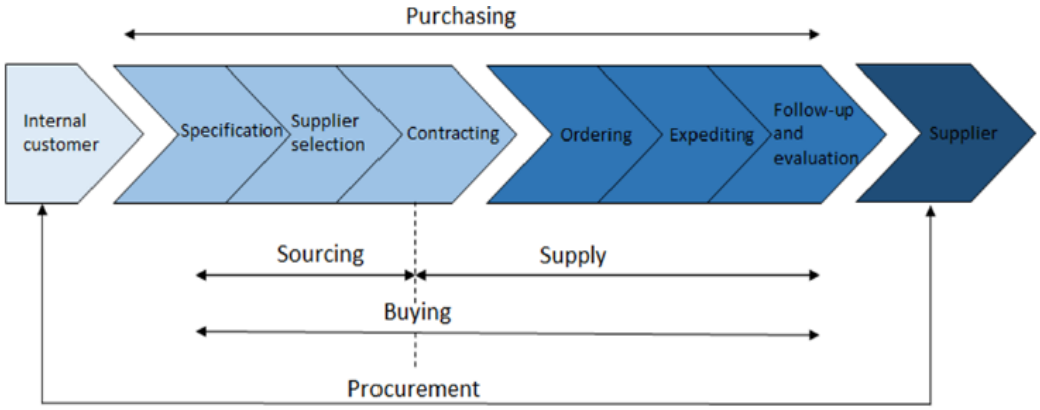


Figure 2. Process model of purchasing and relationship with each other (van Weele 2010: 9).

2.1.3. The Importance of Procurement

Cox (1997) proposed that initially, the function procurement becomes more critical when the business shift towards the procurement. He further said that business success continuously requires 2 and sometimes 3 important competences, "capacity to procure resources", "marketing" and "transforming inputs". Traditionally, organizations and institutions have focused on their operations (transforming inputs) and marketing, however, the strategic importance of purchasing process has increased recently (Pressey et al. 2007; Gadd & Hakansson 2004). Moreover, it is going to be a brand-new source of attaining competitive edge for an organization (Axelsson & Wynstra 2002). Cox (1999) illustrates by stressing on customer satisfaction that the success of a business will be

determined from businesses trying to improve their whole performance concerning supply chain activities, it enables them to provide improved value to their clients. As a result of this, businesses are trying to create reactive and competent supply chains because there is no longer business competing with another business instead, competing against their supply chains (Cox 1999).

Researcher Svahn (2009) stated that competitive edge is not dependent only on the competence of an organization in delivering variety of competitive things but also on the ability of that organization in creating superior strategies for purchasing/buying. This is due to the change happening in traditional economic activities, as academics and business practitioners equally are being motivated and encouraged to adopt the new context of multi-firm network (Achrol 1997; Axelsson & Easton 1992). He also commented that companies are unable to develop leading products and innovative services on their own because specializations for the organization is handling the distribution of knowledge and technological resources. Moreover, the increasing need for achieving effectiveness in the operations of a company has forced them to pay more attention to their core competences. This requires externalization of activities with the supply partners therefore, relying on other's capabilities and resources has increased. (Barney 1986; Hamel & Prahalad 1991; Grant 1996).

Competition between the businesses is increasing day by day therefore, the importance of managing the supply chain and procurement is widely recognized by the top managers to create value chain for the company and its processes (van Weele 2010: 3). Companies are forced to concentrate on their core competences because of the increasingly intense competition. Also, core competences have a direct influence on the cost structure of an organization. Moreover, the economic significance of purchasing and procurement increases when the proportion of services and parts purchased increases. (Iloranta & Pajunen-Muhonen 2008: 48-49; Baily et al. 2008: 10).

Procurement was introduced by Van Weele (2010: 5) as a supporting function to create value chain for an organization. The initial concept of value chain was introduced in (Porter 1985), which comprises of margin and value activities as (illustrated in figure 3).

These value activities are further divided into primary and support activities. In primary activities, logistics, sales and marketing, operations and services are involved to provide value to the customers of an organization Whereas, support activities empower and facilitates the primary activities with some supporting elements. The purpose of procurement is to provide a supporting activity for the value chain by acquiring inputs that are used. It can provide assistance in both ways for instance, either one or all primary activities together. (van Weele 2010: 5-6; Porter 1985: 36-41).

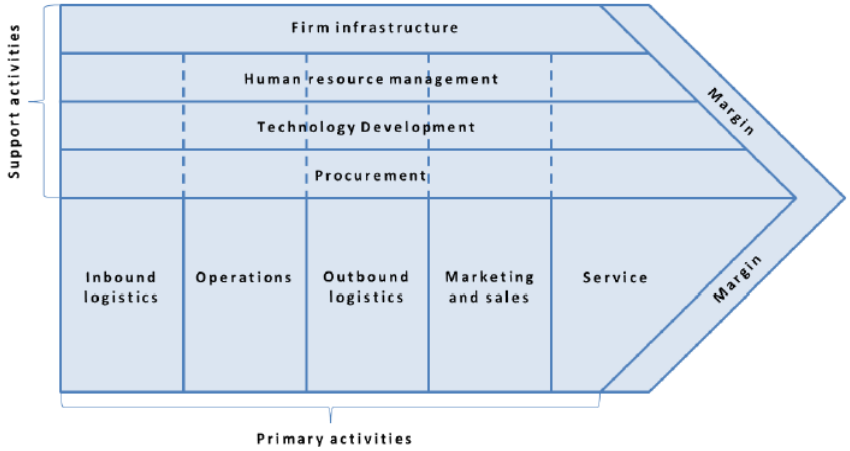


Figure 3. Value chain and its contribution in procurement (Porter 1985: 37)

2.1.4. Procurement Process

Procurement process consists of sub-processes and chain of activities which is activated by the internal customer's need, followed by acquiring supplies and ended up payment given to the seller (Lysons & Harrington 2006: 4). Researcher Novack & Simco (1991) stressed on the significance of procurement and indicated that it starts with the organization's quality process. Moreover, if company needs good quality outputs, they first have to qualify their inputs with better quality. To attain input with good quality and increase in supply chain efficiency, company needs to understand, describe and manage the overall sourcing process (Novack & Simco 1991). Important characteristics for the purchasing model are listed in the table 2 given below.

Table 2. Some important aspects involved in the purchasing procedure (van Weele 2010: 28-30).

Aspect	Description
Steering business needs	The requirements of internal customer are the inputs that activates the procurement process.
Defining interface	All the phases along with their outcomes should be clearly outlined to ensure systematic & synchronized purchasing.
Linking various kinds of skills, expertise & knowledge	Cross-functional collaboration helps to identify the best solution that represents all aspects (administrative, commercial, logistic and technical).
Determining responsibilities	Acquiring is a cross-functional assignment. Responsibilities, tasks & authority of every single department in that phase should be defined.
Process approach	Steps of the purchasing process are very much connected. Therefore, complications and defects in one step can create problems in the coming phases.

Basic model of purchasing process introduced by Van Weele, (2010: 28-29), that has been utilized and cited widely in the procurement literature. The table 2 encapsulates some essential aspects of purchasing/procurement process. The purchasing pattern stated in van Weele, (2010: 28-31) consists of six phases as illustrated in figure 2: defining the specification, selecting the supplier, contract settlement, placing order, expediting lastly, the evaluation. However, due to the difference in mindset of the author and characteristics of a company, there may have a lot of difference in the phases of purchasing process. Furthermore, P2P (purchase to pay) and some other interrelated concepts are directly associated with the purchasing method. While, word P2P stresses on the procedure that consists of all activities associated with procurement and payment for the entire material and services that are purchased (Okren & Vokurka 2004).

According to Novack & Simco (1991), there are three types of purchases depending on the complexity in buying and the amount of time required: routine purchase or straight rebuy, new-task activity and modified rebuy. The term "*straight rebuy"* is considered as a very common situation in which both the supplier and product can be identified therefore, there is low uncertainty. In contrast, the state of "*new-task situation"* occurs when there is an unknown supplier and the required product is also completely new. The third "*modified rebuy"* situation occurs when either the purchased product or the supplier

is totally new and fresh. Thus, the scenario in which all the steps in purchasing procedure must be followed is the new-task scenario. Nevertheless, each step in the process is not compulsory to follow when the purchase process is less complex. (van Weele 2010: 31).

The modified model of purchasing process to support P2P process is illustrated in Figure 4 which is the combination of "*purchase process"* model (van Weele 2010) and "*supply process"* model (Johnson et al. 2011: 80). However, it is important to know that there is no need to always pass through each of these steps and phases (van Weele 2010: 28-31).

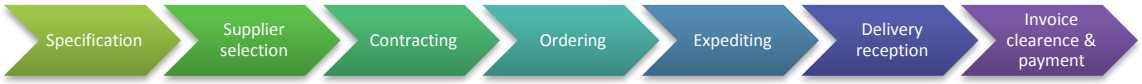


Figure 4. Model of purchasing process (Johnson et al. 2011: 80 & van Weele 2010: 9)

Specification

It has been described earlier that the initial step of purchasing process is triggered by the prerequisites and desires of an internal client, often known as the input of this activity. Therefore, purchasing process starts by a system generated purchase requisition (PR) or internal customer defining the specification of the required components or service offered (van Weele 2010: 28-33). At this stage, internal customers convey their requirements to the procurement department with some agreed accounting controls through PRs (Johnson et al. 2011: 81). It is the responsibility of internal client to create purchase order specification (PO). Likewise, it is the responsibility of buyer to ensure the neutrality of supplier and objectiveness of these specifications. At this level, co-operation between the internal customer and buyer aims to formulate complete, persistent and unambiguous description of desired products and services are very important (Bensch & Schrödl 2011).

Specifications are generally differentiated into two types: technical and functional specifications. Technical specification consists of necessary technical properties, supplier activities and product characteristics whereas, functional requirement indicates the range of capabilities of the needed product and components. (van Weele 2010: 32-33). Technical & functional, both specifications are a part of broader concept known as PO

requirement. There are also some other required specifications included in PO specification like logistics specifications, quality specifications target budget, maintenance specifications, requirement related to legal and environment. Changes related to technical specifications must be agreed by both buyer and supplier during the purchasing phase however, writing is preferred. (van Weele 2010: 32-33).

Selecting the Supplier

Supplier selection is the next stage of purchasing process. Johnson et al. (2011: 340) stated that, an extremely critical decision during the purchasing process for the procurement employees is the selection of supplier. They further said, organization can use three potential supply options to fulfil their internal requirements and needs. Firstly, there is a need to decide on make-or-buy the desired material and offered service. Furthermore, if the organization has decided to buy then there is a possibility to fulfil the demand either by approaching an existing seller or seeking for a new seller. (Johnson et al. 2011: 316-317).

Supplier selection phase is further divided into four individual steps in (Van Weele 2010: 34-37): identifying subcontracting methods, preliminary supplier qualification, RFQs preparation and analysing the received quotation. Thus, list of prospective suppliers can be prepared on the bases of contracting method and required specifications. The appropriate way is to choose 3 to 5 suppliers from the one who have sent request for quotation (van Weele 2010: 36). Firstly, there is a need to analyze, if the bids are comparable and the received bids are in compliance with the stated requirements (Benton 2010: 403). Thus, there is a possibility to negotiate and inquire descriptive questions from the suppliers prior to the selection. Finally, the selection is done by emphasizing on total cost ownership (TCO) and taking into consideration all the associated aspects (quality, legal, logistics, technical and financial). (Van Weele 2010: 36-37).

Contracting

Contracting is a written agreement in which parties are legally bond and it is considered to be the next step after the supplier is selected (van Weele 2010: 37). Also, first important

thing to be incorporated in any contract agreement is the detailed specification of required material or service (Baily et al. 2008). Moreover, this specification may also include documents related to contract, illustrating the scope of agreement between the participants and comprehensive description of requirements (Benton 2010: 527). According to Chopra & Meindl (2007: 436), purchaser's perspective is an idle contract that increases the profit of an organization, contain such incentives that compel the seller to enhance its performance and discourage misinterpretation of the information.

Contracts usually have warranty conditions and penalty clauses to ensure that goods or services delivered by the suppliers are according to the agreement. Objective behind warranty conditions and penalty clauses is to outline the amount of charges and provide corrective actions to the suppliers if there exists a deviation in the delivery. (van Weele 2010: 39). According to Baily et al. (2008: 215), seller and buyer agree on the pricing mechanism, price, delivery terms and terms of payment in a contract. Furthermore, the term delivery indicates that the risk and possession is shifted from seller to the customer (Baily et al. 2008: 215).

Ordering

Ordering process starts when the agreed terms and conditions are fairly recorded. In this process, purchaser places a purchase order (PO) on the bases of formerly agreed terms and conditions. The purchase order (PO) is known as a legally binding document containing all the essential information like: PO number, unit price, product and service description, quantity required, invoicing and delivery address and expected delivery date. (van Weele et al. 2010: 42, 30). Therefore, it is not required to buy materials or services without having PO document in electronic or written form. There should be a legitimate PO contract form to ensure proper documentation and to prevent legal complications. Similarly, urgent orders placed via telephone are also included under this guideline and should be pursued by sending confirmation in electronic and written form. (Johnson et al. 2011: 85).

Supplier should confirm the production order (PO) by sending an (OC) order confirmation in respond. This document contains an agreement by supplier to perform

according to the terms and conditions stated in purchase order (PO). Validity of the contract sustains even if neither the client has agreed with the purchase terms as whole, nor rejected them directly in the OC. (van Weele et al. 2010: 408, 40-42).

Expediting

The term expediting is a delivery follow-up, performed by the purchaser to provide a post-purchase feedback. Expediting is performed to ensure that goods and services supplied by the seller is in accordance with the PO confirmation document. (van Weele 2010: 42). Follow-up may not be performed for the purchases having lower value, but it can be supported electronically through systems to inform the purchasers for some exceptions. Responsibility of service deliveries follow-up could be handed over to the internal client who is having a decent experience of previous deadlines and promises. (Johnson et al. 2011: 88).

Three different forms of expediting are identified in (Van Weele, 2010: 43): filed, exception and preventative expediting. The "*exception expediting"* is performed only when any exception is happened. Such as, internal client may send information to the purchaser in case of goods not yet delivered. However, it is recommended not to use exception expediting because damage may realize earlier. Whereas, "*preventative expedition"* has a regular status check system to avoid such exceptions. For instance, purchaser may contact the seller prior to the actual delivery date in order to prevent from undesirable incident. Finally, "*field expediting"* consists of purchaser-seller's regular contact asking about the progress of their delivery and schedule. Therefore, it is considered as a time-taking method which has to be limited to some critical suppliers and purchased parts. (van Weele 2010: 42-43). According to Johnson et al. (2011: 89), root cause analysis should be conducted in the organizations to prevent from excessive costs and enable themselves to reduce time consumed in follow-up and expediting.

Delivery reception

Objective of delivery reception is to ensure that the required product or service is supplied in good condition and in right quantity. Moreover, the receipt has been properly recorded

and registered in the system and shipment is despatched to the internal destination. (Johnson et al. 2011: 90). It has been observed that the world of business is not perfect therefore, different kind of problems may occur during the purchasing process. Thus, organizations should possess reporting systems to manage problems related to the invoice, quality and delivery. Furthermore, to prevent from problems related to the suppliers and their activities should be communicated immediately to them in order to prevent from the same issues happening again and again. (van Weele 2010: 43).

Clearing the Invoice and payment

Duty of clearing the bill could be allocated to accounts payable and the department of procurement. This department places the original order therefore, it would be a prompt action if they are responsible for clearing the invoice. Nevertheless, accounting department should take the responsibility of invoice clearance to ensure if the internal control and check and balance principle are properly followed. (Johnson et al. 2011: 91). Invoice received from supplier is then processed by accounts payable in three-way matching. Thus, data in the invoice is matched with the data in receiving report and PO. The invoice is transferred for payment process if the terms, price and other associated features are matched. If there is a difference between the invoice and PO, the invoice needs to be sent to the procurement department for approval. If the information in the invoice is missing or incorrect, then it is returned to the seller. (Johnson et al. 2011: 91).

2.1.5. Performance Indicators of Procurement (KPIs)

There are some performance indicators in the procurement activities and table 3 summarizes some KPIs of procurement that are stated in literature.

Table 3. KPIs in procurement (Illikainen 2017)

KPI	Description	Reference
Contract compliancy	Share of spend that is covered by existing contracts.	(USAID 2012)
Automatization	The rate of automatic PO releases.	(Chae 2009)
Procurement cycle time	Average length of procurement cycle. Percentage of purchases that are completed within procurement cycle time guideline.	(Gunasekaran et al. 2004; van Weele 2010)
Savings	Savings that procurement department has gathered during selected time period.	(Gunasekaran et al. 2004; van Weele 2010)
Delivery accuracy	Percentage of orders delivered on time.	(Gunasekaran et al. 2004; Chae 2009)
Supplier claims	Number of claims sent to suppliers.	(van Weele 2010)
Number of requisitions	Number of requisitions processed during selected time period.	(van Weele 2010)
Number of orders	Number of orders issued during selected time period.	(van Weele 2010)
Number of non-matching invoices	Number of invoices that do not match the PO document and receiving report. Need to proceed with invoice error handling.	(Gunasekaran et al. 2004; van Weele 2010)
Procurement cost	Ratio of annual procurement unit cost-to-value of annual purchases. Average purchase process cost per transaction.	(USAID 2012)
Transparent tendering	Total value of purchases through tendering divided with total value of all purchases.	(USAID 2012)
Procurement managed spend	The share of company's total spending that is directly managed by procurement department. On contrary, procurement by-pass including the share of spend that is not managed through procurement processes.	(Easton et al. 2002; Pohl & Förstl 2011)

2.1.6. Procurement Levels and Responsibilities

There are three different levels of procurement with regards to responsibilities, authority and tasks: strategic, tactical and operational level of procurement. Firstly, "*Strategic level"* deals in managing the function of procurement, planning and development. According to the researcher van Weele (2010: 282) & Iloranta & Pajunen-Muhonen (2008: 90), making strategic and long-term decisions which have an impact on firm's competitive position are the responsibility of strategic procurement. "*Tactical level"* involves tasks and obligations influencing the product, its process and the selection of supplier. Thus, results at this stage usually brings a medium-term effect. Lastly, the "*operational level"* consists of daily routine performances concerning monitoring the supplies and placing order for the material and required services (van Weele 2010: 282). The figure 5 below shows how obligations, power and tasks are distributed into the different levels of procurement.

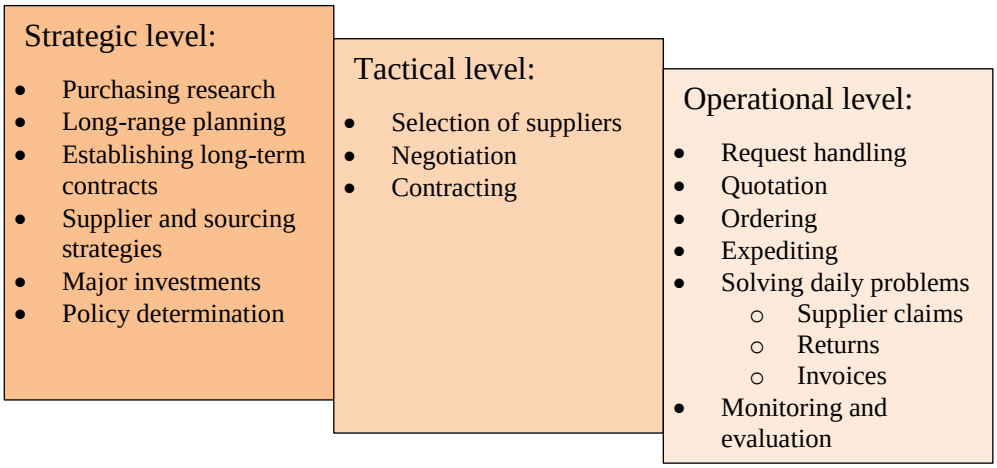


Figure 5. Responsibilities, authority and tasks at different procurement levels. (van Weele 2010: 282-283; Iloranta & Pajunen-Muhonen 2008: 90; Baily et al. 2008: 36).

2.1.7. Effectiveness v/s Efficiency of Procurement

Effective means *"capable of producing the result or something productive"* whereas, effectiveness means *"the extent to which something goes successful in generating a desired output"*. Efficiency is *"producing or functioning effectively with minimum waste and effort"*. (Collins Dictionary 1995). Efficiency often means to achieve effectiveness which is considered as result-driven (Gibbs 1998).

The purpose of undertaking the literature review is to get access and map the prevailing intellectual domain, to identify and elaborate the research question in order to establish the pool of prior information (Tranfield et al. 2003). Thus, the literature review for this research has been carried out to elaborate the information either related to the procurement and its effectiveness as a whole, or some particular factors and elements considered to be important for improving the performance of procurement. However, the success of procurement could be different for different departments. The procurement deemed to be successful inside the procurement division because cost may have been decreased. However, same initiative could be considered unsuccessful for manufacturing division because of the quality damage and they have concluded that production performance is negatively affected by that initiative (Joesbury 2016).

Gibbs (1998) mentions that, effectiveness is assumed to be result focused whereas efficiency means succeeding effectiveness in the task. Dumond (1991) indicated the difference between effectiveness and efficiency by saying that effectiveness related practise is supportive towards the efforts made to integrate sourcing with the operation of an organization whereas, efficiency stresses on the operational productivity of the department and the cost of sourcing/purchasing. Svahn (2009) comments that, there are 2 key buyers related functions in the purchasing process, one is "operational efficiency" and the other one is "business strategy". Thus, the key difference between them is that the efficiency is related with cost-reduction, good price and buying strategies to build better relationships in supply, whereas effectiveness is associated with value-orientation and improvement (Axelsson & Wynstra 2002).

Gershon (2004) described efficiency to be the best utilization of funds and available resources for public service provision. Furthermore, he defined efficiencies to be those reforms to the resource utilization (including personnel) and delivery processes that attains less amount of inputs (e.g. assets or people) with sustaining the same level for providing service. Yet another interpretation could be that lower prices of needed resources to deliver public services and even enhanced quality services for the same input level (Gershon 2004). Therefore, pursuing effectiveness by supplier relationships give customers the opportunities for activity development and rationalisation (Gadd & Hakansson 2004).

2.1.8. Factors Associating with Procurement Effectiveness

Smith & Conway (1993) stated 7 important success factors that indicate procurement and its effectiveness:

- Effective control and information management system
- A visible procurement strategy
- Expertise development
- A proactive and entrepreneurial approach
- Role and responsibility in corporate management
- Focus efforts
- Co-ordination.

Trent & Monczka (1994) proposed some critical factors for sourcing team: involvement and participation of selected suppliers, availability of significant organizational resources, effective team leadership, higher level external and internal decision-making authority and implementing efforts at higher levels for the given team projects.

2.2. Outsourced Engineering and Manufacturing

Engineering & Manufacturing projects are affected by many factors that changes from project to project. Thus, answering about achieving success in different projects is sometimes difficult. Achieving success in Engineering and Manufacturing project including project management, team selection, flexible planning, compliance with procedures & rules, implementation approach especially when dealing in sourcing, are considered success factors in this phase (Ika et al. 2009; Khang & Moe 2008). Procurement, sourcing, organizational buying, strategic sourcing, lately in public sector as *"commissioning"* and purchasing, all these stated terms are used to express the functions and responsibilities for supplies, procurement of material and services (Roots 2009; Lindgreen et al. 2009; Driedonks et al. 2014).

2.3. Importance of Project Success

According to Ika et al. (2009: 71), *"Success of a project stays an unclear, broad, and multidimensional notion therefore, its measurement and description are bound by a specific framework".* Identification of critical areas and measures are based on the criteria and factors to reflect those critical areas. However, criteria and factors are often mistaken as synonym of each other, which makes it very important to clear the difference. According to Lim & Mohamed (1999) and Ika et al. (2009), factors are any facts or influences and circumstances that should be given continual and special attention to achieve the result. Similarly, criteria is a standard or principle to judge anything. The criteria and factors of attaining success in a project are broadly described by the researcher (Muller & jugdev 2012: 758).

"Project success factors are such elements of a project which increase the probability of success when influenced; these are considered independent variables that have an impact in achieving success more likely".

"Project success criteria, consists of some measures used to judge the failure or success of a project; these are considered dependent variables to measure success."

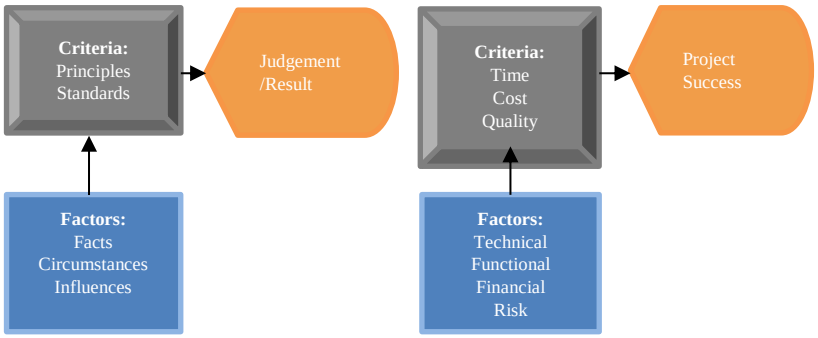


Figure 6. Factors and criteria for success (Lim & Mohamed 1999)

To ensure the accomplishment of required objectives and succeed in the project, stakeholders must understand the influence of critical factors on different phases of a project. Moreover, it helps in forecasting the status of a project for future, identifying the problems that could occur and then direct the attention towards those factors that are contributing to attain the objectives of a project (Khang & Moe 2008).

2.3.1. Criteria of Achieving Success in Projects

Achieving success in a project is indicated by several studies explaining about the criteria and key success factors (Pinto & Slevin 1989; Atkinson 1999; Lim & Mohamed 1999). However, most of these researchers have considered cost, quality and time as approaches that are easy and unambiguous to apply. The measurement of achieving project success is mostly linked with the schedule, budget and attaining performance at a certain acceptable level (Dvir, Raz & Shenhar 2001). Projects are considered failure even performed within stated time at certain cost and quality. Similarly, some projects are considered successful while exceeding time & cost limitations (Ika L. A. 2009). Project success involves the realization of objectives made by client organization who has

initiated that project, satisfaction of key stakeholders and users (Ika 2009; Khang & Moe 2008).

A well-known logical framework approach is the one that can expand "time, cost, quality" approach. According to Baccarini (1999), project management and product success are the two important components for the success of a project. Moreover, the focus of *successful project management* should be on the achievement of certain quality, time, cost and project success. It is associated with the inputs as well as the outputs of a project with the addition of how the overall procedure was conducted. Thus, the aim for *product success* should be the purpose, project goals and the criteria that influence the final product of that project. Also, he claimed that measurement criteria for a successful project needs to be defined at the start to encourage the team having the common aim for certain objectives. Baccarini (1999) stated that, "*Project stakeholders are the individuals and organizations and actively involved in the project, or whose interests may be negatively or positively affected as a result of successful project completion and execution*". Baccarini (1999) considered the satisfaction of stakeholders as crucial and proposed that project management and product success should identify the needs of stakeholders and then concentrate on their expectations to assure successful project deliveries.

Criticism regarding project success has evolved like a rising wave along with the general assumption about the possibility of applying universal theory in many kinds of projects (Diallo & Thuillier 2004; Khang & Moe 2008). Literature in the earlier studies indicates that numerous authors have identified and established critical success factors but without considering the development and manufacturing concept (Khang & Moe 2008). Engineering & manufacturing projects are affected by many factors (environment, ethics & culture) that changes from project to project. Therefore, answering about achieving success in different projects is sometimes difficult.

2.3.2. Success Factors Criteria in Development/Manufacturing Projects

According to Nilsen (2015), first empirical research on the success factors and its criteria in the international development and manufacturing projects was performed by (Diallo & Thuilier 2004). According to them, the communication between different parties involved

in a project is always challenging, due to the fact that it happens across large distances and stakeholders belongs to different culture. They found two most important criteria that assists in development projects to be successful. First, they have considered management performance in *time*, *cost* and *quality* to be an important criteria. Second criteria is the *reputation* and *visibility*, described as a project's profile earned by the project (Diallo & Thuilier 2004).

Researchers Kang and Moe (2008) conducted research by applying logical framework method to find out the factors and fact-based success criteria exists in global development projects. Moreover, they have presented a conceptual model to identify which factors and success criteria should be considered for the different phases of a project life cycle. At implementation level especially in the procurement/buying process, flexible planning, selection of a team, project management structure, compliance with certain procedures and rules are considered some critical factors (Khan et al. 2000; Ika et al. 2009; Khang & Moe 2008). The purpose behind this is to support key stakeholders and project management team members to prioritize their scarce resources and attention to ensure the project success (Khang & Moe 2008).

The procurement process is considered critical for the success of a project as the implementation and completion of a project relies on the goods procured and, this process has a high contribution to the total expenditures (Agaba & Shipman 2006; Basheka 2009). Therefore, many factors are to be considered in this process. Furthermore, Webster & Wind (1972) stated the significance of social, physiological, environmental and organizational factors involved in a buying process. Moreover, they have considered the buying behaviour of an organization to be influenced by individual members, personal characteristics, goal, structure of a group, leadership among the formed group, environmental factors and task performed (Webster & Wind 1972). The variable will influence and the extent of how much that will influence the process will vary according to the purpose, context of procurement and the members working with it. Therefore, in developing countries, it is very important to consider these variables due to the challenges regarding economical and ethical environment and complex geo-political situations (Basheka 2009).

2.4. Critical Success Factors

Critical success factors are those few elements that needs to work well in order to ensure success in an organization or for a manager. They exhibit those enterprise and managerial areas that should be given continuous special attention to achieve higher performance. CSFs consist on issues critical to the firm's current operating activities and for the prosperity of its future. (Boynton & Zmud 1984). Identified factors by various researchers over the period of time is listed in table 4.

Table 4. Critical success factors identified by various researchers

Critical success factors	Reference	Critical success factors	Reference
Top management support Project collaboration	(Dinter 2012)	Process management Supplier relationship Information technology	(Lin et al. 2013)
Performance elements in procurement method	(Rajesh et al. 2011)	Performance management	(Tummala et al. 2006)
Continuous improvement Information sharing Inter-firm collaboration Skilled employees Market competence	(Hidalgo & López 2009)	Effective communication Mutual commitment Mutual fairness and trust Supply source management Understanding business needs	(Tate 1996)
Resource management Strategic planning	(Pettit & Beresford 2009)	Collaborative project management	(Chen, Fang et al. 2003)
Resource management	(Power, Sohal et al. 2001)	Supply chain visibility	(Gunasekaran & Ngai, 2004)
Quality management capability Technological capability	(Wu & Weng 2010)	Training and education Top management support/commitment	(Ngai et.al. 2004)
Change management Supplier performance evaluation Contract management/compliance	(KPMG 2016)	Procurement performance management Material requirement planning	(KPMG 2016)
Long-term strategic goal	(Faes et al. 2000)	Effective partnership	(Thakkar et. al. 2013)
Clear goals	(Hwang & Lu 2013)	Customer focus	(Razzaque & Sheng 1998)

Ika et al. (2009) stated that, identification of critical areas and measures are based on the criteria and factors to reflect those critical areas. However, criteria and factors are often

mistaken as synonym of each other, which makes it very important to clear the difference. According to Lim & Mohamed (1999) and Ika et al. (2009), factors are any facts or influences and circumstances that should be given continual and special attention to achieve the result. Similarly, criteria is a standard or principle to judge anything (Muller & jugdev 2012). To get the understanding and comprehensive view of factors and criteria, some relevant ones are shown in table 5.

Table 5. An overview of criteria and success factors from the literature of project management (Nilsen 2015)

Success factor	**Success criteria**	**Research method**	**Researcher**	**year**
Communication between Stakeholders Cooperation between Stakeholders Thrust between stakeholder Visibility and reputation earned by project	Time Cost Quality	Empirical Statistical questionnaire	Diallo and Thuillier	2004
	Time Cost Quality Stakeholder's Satisfaction User's Satisfaction	Conceptual model	Baccarini	1999
Visible impact on the Beneficiaries Ownership of the project Good reputation Individual skills Training Commitment to project goal Communication between Stakeholders Thrust Support from stakeholders Support from management Adequate resources Compatible rules	Time Cost Quality Satisfaction of Stakeholders Satisfaction of users	Empirical statistical questionnaire	Khang & Moe	2008
Technical Risk Commercial Finance Human Environmental	Time Cost Quality Performance Safety	Unstructured interviews	Lim and Mohamed	1999

2.5. Influencers in The Decision-Making Process

Influencers are those individuals and different groups who have a hand in the decision-making process of the procurement activities, known as decision-making unit or buying centre (Webster & Wind 1972; Weele 2014). The important thing is to define and comprehend the structure of authority, composition and responsibility inside that buying centre in order to win over the buying process. The contributors with having shared goals are associated with the whole organization therefore, their behaviour and activities will influence organizational communication, technology adopted, buying activities carried out during the process and the other associated members of the organization (Webster & Wind 1972). Some roles stated by Webster and Wind's (1972) are users, influencers, buyers, deciders and gatekeepers.

2.6. Tools and Techniques Applied in Procurement

Procurement managers of modern days should familiarize easily with the rising product diversity, changing technology, worldwide coemption, issues related to environment and growing importance of quality. Various tools, approaches and techniques are indicated in literature that can be adopted by the procurement department to fulfil their goals and targets. Hugo et al. (2002: 227) stated some tools like supplier selection, negotiations, evaluation analysis, electronic information and material budgets.

According to Dreyer (2007), terms and conditions, contingency funds, warranties, negotiation techniques and insurance are some tools listed by White (2002: l) that can be applied to procurement. Techniques that can be applied by procurement were also recognized by Schorr (2000: 25) in his research by quoting *"buyers should be removed from non-productive tasks and time should be given to the buyers to do negotiations, analysis for value added and cost reduction"*. Thus, some tools, approaches and techniques are also applied in procurement to achieve such objectives (Clifford et al. 2003: 6). Some of the tools are explained briefly in the following paragraphs.

2.6.1. Process Handling Tools

Various tool, techniques and methods are available to successfully manage the procurement activities. Some tool and approaches are discussed below.

Work Breakdown Structure (WBS)

WBS is a very important tool for the identification and detailed assessment of the project components. It consists of different elements related to the deliverables which is presented in the form of structure for the whole project. Every descending stage shows more detailed information about the upcoming tasks and components in the project. Thus, by using WBS, all the essential functions of a project can be viewed, and all the members can understand at the whole process at the same time. (Koppleman 1996).

Change Management

According to Senge (1990: 30), "There comes challenges in every organization with the change movement intended to keep changes in the ongoing procedures and systems along with the attitude and performance of personnel". Therefore, deployment of an effective change needs vigilant planning, consent management and tight monitoring. Moreover, the activities that need to be incorporated must be, joining & contracting, planning & executing change, diagnosing and evaluation the change. (Cummings & Worley :29).

Data Envelopment Analysis (DEA)

It represents a system in which suppliers are evaluated by their inputs and performances by dividing them into 2 groups: incompetent or competent. The suppliers are considered to have certain qualified competence of 100%. This may include, if the outputs manufactured by the specific supplier is not manufactured by the competitive suppliers under given input conditions. (Weber et al. 1991)

Multiple Attribute Utility Theory (MAUT)

Min (1994) proposed this technique, also called linear technique for weighting. The advantage of this technique is that it allows the purchasing experts to design a feasible strategy of sourcing that is competent enough to handle conflicting elements. Nevertheless, this approach is useful for the selection of international manufacturer, where a lot of risk and complications are associated with the environment.

Analytical Hierarchical Process (AHP)

AHP is a method for decision-making in which criteria for prioritizing between the alternatives enable the procurement personnel to formulate complex issues in the hierarchical form containing three distinctive levels. These levels are based on alternatives, standards and goals. The weights of alternatives show the significance of standards in reaching the objectives. (Saaty 1999).

Analytic Network Process (ANP)

This approach is based on AHP, works as a preliminary step of this broad decision-making process. The ANP method combines the relationship and feedback between different the alternatives and their decision aspects. It consists of 2 parts: network of measures or control hierarchy and the second one is network of effects between the components. (Saaty 1999).

Liquidity Damage Clause (LDC)

It is a contract-oriented provision that outline in advance the terms when the party violates the contract. The justification of using LDC is its perceived effectiveness and freedom of agreement. Moreover, it allows the parties to get a grip on risk, enhance the predictability and establish a remedy consist of the information related to the contract and participants. (Pressman 2013).

Parts Approval Process (PAP)

It is a very handy tool to establish confidence within the supplier's component and production procedure. Many organizations are outsourcing most of their inputs, which often have bigger orders and lengthy lead time. Therefore, this is vital tool that can arrange quality parts and fulfil the requirements of a customer. It is capable to continuously make and deliver the products with all the stated requirements. (Quality-One 2019).

Quality Assurance Plan (QAP)

It is a project-oriented plan derived from (ISO 8402) which is prepared for the activities, quality procedures and resources linked with the contract between the parties (Fox 2013: 34-35). A Clear understanding about the responsibility of quality assurance must be developed by the contractor/buyer with the seller on the daily bases. Moreover, purchaser can trust the system of quality assurance at the supplier's end. However, a formal system of assuring the quality is postulated by the buyer. After receiving the goods, it is vital to maintain the quality records in order to guarantee the accessibility of potential suppliers in future for their quality performances. (Fox 2013: 50-52).

Logistic Control

Logistic control covers many important themes that consist of *"material requirement planning"* (MRP), in which volume requirements and the timing for the materials are calculated based on the required timetable of the final deliverable. The MPR is considered as a "push" practice which includes the stock from WIP to smooth the progress of the process. (Richard 2010).

2.6.2. Process Mapping Tools

Process mapping comprises of methods and tools needed to understand the organization and its processes. These tools enable us to analyse, document, streamline, improve and redesign the processes of business in order to identify organizational efficiencies. It is the

visual representation of work processes to show how tasks and inputs are connected and helps in constantly producing a desired out by highlighting the required essential steps. It encourages how and where the work has been done, who performs the work activities, what problems can occur frequently and what is the best way to solve them. Process maps and models can also be used to recognise team members for suitable quality improvement, establish critical control points and key areas for monitoring, clarifying who provides resources and inputs to whom and determine areas for improvement. (Halseth n.d. & Babok 2009). However, the formation of such tools is not a solution itself, but it gives a compact image to facilitate continuous process improvement (Kelada 2001).

As-Is To-be Process Mapping

This map is a very useful starting point to identify current process and its deficiencies. The "As Is" map formulates a benchmark for improvement and compare it against future achievement. To initiate this mapping process, team should collect data about how the process "actually" works. General information gathering techniques are tracking people during their job, employee interviews and discussion. Furthermore, the common approach used to achieve great success is to have meetings with all the key personnel associated with the process to formulate a preliminary As Is process visual map. (Kelada 2001). According to Kelada (2001), formation of visual As Is process is not a solution in itself, but it is the initial step towards the effort. Thus, the next step is to identify areas of improvement which can be seen in a process map as opportunities. Changes achieved by consensus is considered critical and important. Some common elements and areas to look for the improvement are: "*Simplify process, eliminating duplicate process and activities, eliminate work movement, reorganize worker teams, eliminate inspections, simplify processes, performing parallel activities and outsource unproductive processes".*

Kelada (2001) states that after the identification of some process improvements and changes, there is a need to map "To be" process. It is an ideal state to examine the process. Graphic representation of changes is beneficial especially when:

- Several changes have occurred and patching is insufficient for As Is system.
- Radical different process is required in new document.

- Management/team would rather direct their energy to create new process instead of repairing something old.

This task requires out of the box thinking when proposing new process and changes that is why it is considered a difficult task. (Kelada 2001).

Swim Lane or Cross-Functional Diagram

A swim lane diagram is a horizontal bands visual representation that shows set of interrelated activities and inputs that follows different direction to create value for the customers by transforming inputs/resources into outputs. It is also called cross-functional process which shows workflow of end-to-end process as a whole that crosses several functions in the organization. A noticeable point is the rectangle shape in a relationship map that represents "parts" of an organization become "swim lane" or horizontal bands in the cross-functional diagram. (Damelio 2011).

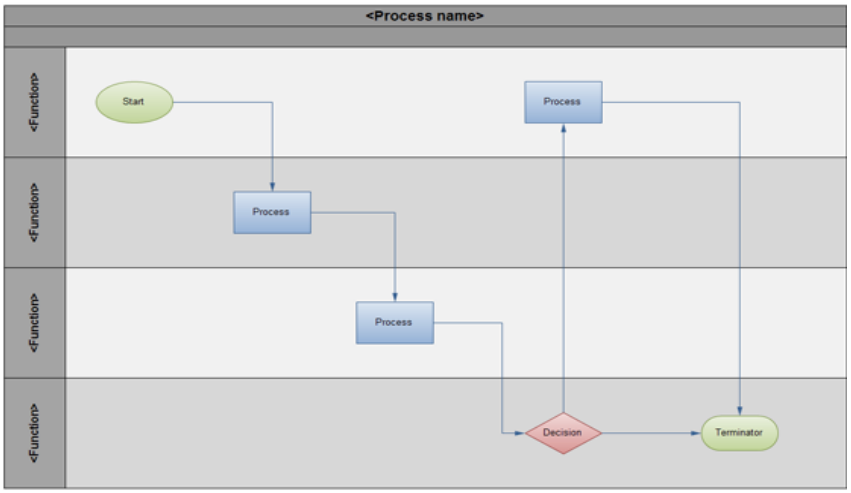


Figure 7. General swim lane or cross-functional process map (Damelio 2011).

2.7. Analyzing the Prior Research work

This research is conducted to provide an efficient procurement process with the important success factors that can support the case company Woima to perform its procurement activities. The literature reviewed is based on the area of procurement in which many

researchers have presented their valuable information. The procurement is a broader term which comprises of buying/purchasing. The purchasing process is further divided into 2 parts i.e. *sourcing* and *supply* that are collectively called *buying*.

Generally, *procurement* consists of some phases through which all the necessary business dealings are performed i.e. acquiring of components or materials, till the commissioning/installation of the project. *Purchasing* is the part of procurement in which all the buying activities are involved i.e. making RFQ, ordering, manufacturer selection, expediting and lastly making payments. *Sourcing* is the part of purchasing in which supply related tasks concerning locating, choosing and making contract with the required suppliers are performed. *Supply* is also a part of purchasing but it is more related to the activities performed after making the agreement with the sellers.

The procurement is divided into 3 levels in terms of its responsibilities. Tasks are different at each level to distinguish between the responsibilities. These levels are *strategic*, *tactical* and *operational*. It is essential to have collective performance in between all these levels to accomplish the project and satisfy the customer. Moreover, there are some *performance indicators* for the success of the procurement and the whole project. These indicators can evaluate the performance and identify the lacking areas where improvements are required.

Now a days, engineering, service and manufacturing companies are willing to receive the components of final project from the suppliers who are very good at manufacturing them. This leads to outsource few or sometime many of the parts from the external suppliers. The objective is to focus on their own core capabilities and install/deliver the final product to the ultimate customers. The success of the project is very much important because there is a lot of competition and companies are trying to satisfy the customers.

Efficiency and achievement in the procurement activities are influenced by many factors that are highlighted by various researchers in the literature. However, researchers have also mentioned some tool and methods to be applied and used in the procurement activities and achieve efficiency and success in the process. This valuable information has become the base to explore further by getting insights from companies and to observe how the procurement is organized and performed in these selected global companies.

3. METHODOLOGY

The attempts in this research is made to study the procurement process and how to make it more efficient. Therefore, the aim is to understand and analyze the critical success factors to enable operational excellence and high-performance procurement activities. For this reason, the research method is developed comprising the research strategy, data collection and analysis method and then implementing the results of this study on the case company Woima.

3.1. Research Strategy

For the purpose of formulating the research strategy, different aspects of knowledge development is utilized. The **"*unit of analysis*"** for this study is the procurement process of a company and the deliverables of this research are procurement process and critical success factors. To map the process for the case company, both literature, archival record and primary data were brought into study. The information source for this study was rich literature, interviews and case company provided data i.e. tables, flowcharts, reports and etc. There are many companies operating globally and the **"*targeted area*"** was global engineering and manufacturing companies who have been involved in big projects. For the purpose of **"*selecting sample*"** out of the targeted area, procurement professionals of global engineering and manufacturing companies were approached. Purposive sampling is used in which extreme case sampling is adopted. Furthermore, **"*method to analyze*"** the collected information is benchmarking process analysis for the procurement process to explore the activities and CSFs involved in a procurement process. Upcoming part of this chapter will study stepwise journey of this research that will describe how the study is performed, why the author has used methods and how the results are generated.

3.1.1. Data Collection Methods

This study is based on data triangulation which means various sources of information and evidence has been used as illustrated below in figure 8.

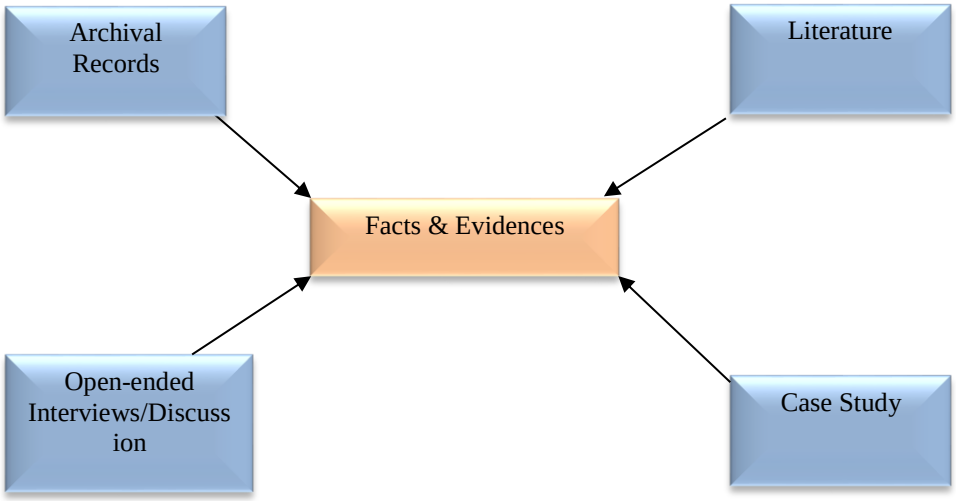


Figure 8. Multiple sources of data gathering.

Open-ended Interviews

Semi-structured open-ended interviews are conducted to receive practical insights from the respondents. Semi-structured interviews provide a chance to have a natural and more open discussion with the respondents and ensure to collect detailed information about the subject matter. Therefore, author has contacted professionals from companies who have been associated with purchasing or procurement process. For this case, open ended questions were asked where respondents have expressed their views and information concerning the subject matter.

Primary data was collected for this research by conducting semi-structured and open-ended interviews from the selected benchmark companies with the aim of understanding the procurement process and its critical success factors. Moreover, the motive behind arranging qualitative interviews was to understand the practical aspects of managing the procurement process and success criteria. Due to the experiences, opinion, values and beliefs of the respondents about certain situation, it is essential for the interviewer to structure and conduct interviews in such a way that the information needed is accurate and relevant (Easterby-Smith et al. 2002).

The Structure and Process of Interviews

The process of preparing and conducting interviews is discussed in this section. Firstly, the design of interview questions was divided into two sections: first section consists of interview questions related to the procurement process, its importance, base standards and their way of sourcing etc. The next section contains questions to deeply understand the critical success factors in procurement process to enable high-performance procurement activities. Thus, semi-structured method was adopted by the researcher in order to develop that particular framework. Moreover, such interview method can prevent rigorous questions and helps to explore practical and new dimensions during the interview. The structure of interview questionnaire is attached in the (Appendix 2).

Interview questions should not comprise of several theoretical concepts because the interviewer and interviewee may have different concepts and understanding for such terms (Saunders et al. 2007: 324). Thus, terminologies and questions used during the interview were simple and easy to understand. During the interview, it was insured that the respondent and researcher is holding clear and common understanding about the stated issues and concepts. Furthermore, questions in the interview were formed open-ended to be able to receive extensive answers from the respondents.

The next step was to physically search and contact the respondents for the required research. Potential participants were contacted via email and phone calls form the selected samples of the targeted area who were directly involved dealing with procurement activities and were experts of their field. An invitation letter was formed to inform interviewees about their role, research topic, estimated time and confidentiality which is attached in the (Appendix 1).

During the interview, the anonymity of the interviewee was guaranteed, interviews were audio-taped with their permission and the time frame for the interview was approximately one hour. Language used during the interview was English and no linguistic problem occurred between both participants. Moreover, all important terms listed in the questions were briefly explained by the researcher so that the interviewee can understand the aim

of the research. The communication medium used to contact the interviewees were physical and skype.

Literature

The Research work also uses the existing available data that has been collected for problems that needed a solution. Literature also served as an important source of information in this research in which case company provided information, several academic literatures, online articles, web pages and lectures from university of Vaasa were studied.

Archival record

Procurement process model of the case company Woima served as a source of information. Various flow charts and models were reviewed for the purpose of mapping an effective and efficient procurement process and its critical success factors. Furthermore, such valuable information source is essential to understand the phases and scope of a project. However, only archival record is not enough to generate valuable results. Instead, they serve as a support for the above-mentioned sources of information and considered valuable for the research.

Case Study

The aim of this study is to map and identify procurement process and its critical success factors. Generally, the framework of case study consists of many sources of evidences like interviews, observations, artefacts, documents and sources available in the form of study or research already done on the related topic. Many forms of evidences are studied to better understand the phenomenon of procurement and its success factors. Sources include interview and observation, semi-structured open-ended interviews from smart and well performing global companies, research work academia available in the form of articles, books, papers, documents, process models from the company and its department and other company archives.

This study focuses on in depth analysis of procurement process and its associated success factors. The aim is to map a highly efficient procurement process and identify critical success factors for procurement related activities enabling efficient and successful Woima project deliveries. Therefore, the case study for Woima is done by first gathering the data as discussed earlier and then analysing it using benchmarking approach, which will be discussed later in Section 3.2. According to Yin (1994), case study approach is beneficial to find the answer of how, what and when questions related to contemporary events outside the influence of a researcher. Case study can be a remarkable handy approach for the in-depth examination to understand the overall phenomenon (Patton 1987).

3.2. Data Analysis

After the data has been collected, the next phase was to transform, interpret and understand the data in the best possible way so that the desired objectives of the research can be achieved. The data collected after conducting interviews is formulated in such a way that the data is comprehendible, logical and prudent to be successfully utilized for the case company Woima. There are several data analysis techniques and approaches available. This research is primarily based on qualitative data therefore, the ***benchmarking analysis technique*** suits best for this study.

3.2.1. Benchmarking Approach

The approach adopted for this research is *inductive* which utilizes more general approach in the start to analyze the gathered data, find a relationship and a pattern and then finally develop theory and conclusion. The choice was made because its nature and dynamics require open ended and exploratory study. The method generally selected to gain understanding and in-depth knowledge of the particular issue is the qualitative method (Denzin & Lincoln 2008). The aim in this research is to explore the procurement process and success factors by using diverse sources on specific area of procurement process, models, efficiency and success factors. In the end, practical findings are obtained on the bases of chosen method which is supported by analysing the findings that will lead to the conclusion.

In this research, benchmarking method is adopted to explore the activities involved in a procurement process and its critical success factors. This benchmarking method is used by companies to identify the "best" within that industry to adopt their processes and practices. It helps the organizations to find out key things that they could imitate or improve. Therefore, benchmarking opens several ideas, concerns and approaches for the organization, which makes it valuable for them (Sánchez-Rodríguez et al. 2003).

Since, the aim of this study is to understand the procurement process and its critical success factors enabling high performing procurement activities for outsourced engineering and manufacturing. Therefore, to comprehend critical success factors and procurement activities, there is a need to study what and how to achieve effectiveness in procurement. Nevertheless, benchmarking is an effective tool but it also has some limitations. According to Dean & Yunus (1997), data focus is the main issue in this process rather than the procedures used for data collection. Thus, guidance should have to be the main aim of benchmarking and not the precision of statistics. The process model required to plan this analysis is illustrated below in figure 9.

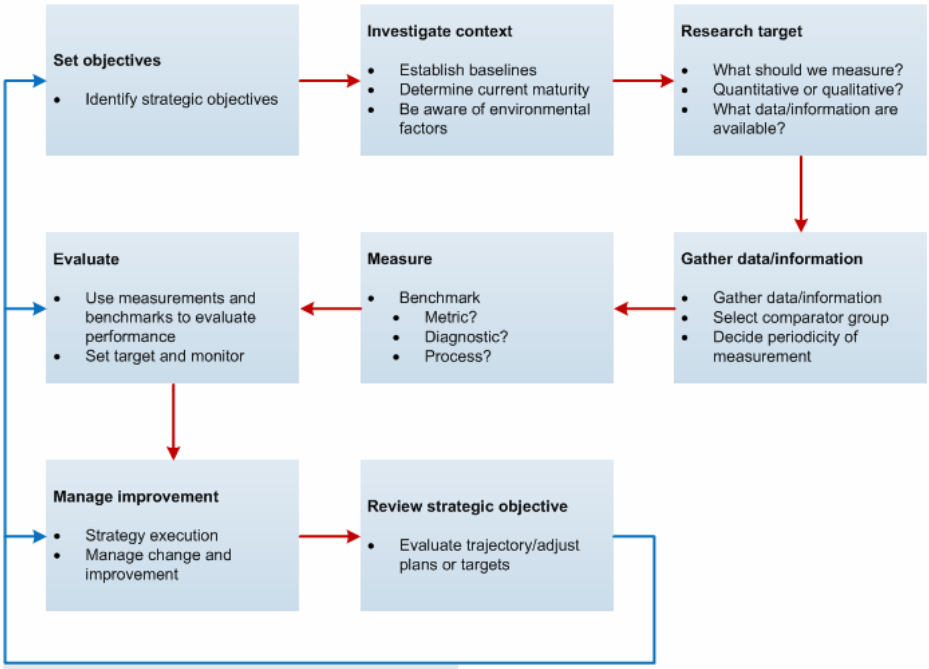


Figure 9. Generic process model adopted from (Giles 2012).

Unit of Analysis

This study is based on single unit of analysis which is the *procurement process of company*. The purpose is to map the procurement process and its critical success factors to achieve operational excellence and project success. Focus of the study is the phases of purchasing/procurement and how to make it more efficient by identifying critical success factors. The above-mentioned sources of information and benchmarking approach were used to identify and analyze the procurement process and critical success factors.

Target Group and Sampling

There are many companies operating globally and the ***targeted area*** was global engineering and manufacturing companies who have been involved in big projects. For this purpose, 8 companies were contacted via email and phone calls and finally 3 of them were benchmarked with the aim of understanding their procurement process. One procurement professional from each benchmark company was approached for the purpose of ***selecting sample*** out of the targeted area. Purposive sampling is used in which extreme case sampling is adopted. First, the participants should be associated with the purchasing and procurement process. Whereas, the participant can be the manager or professional in the subject matter. Second, the interviewee is linked with the purchasing and procurement activities for not less than 2 years. Moreover, the selected member is working in the organization dealing with the procurement activities.

Sampling method used to select the participants is ***purposive sampling***, focuses on *extreme case* and deviant sampling by contacting companies (i.e. Wärtsilä, Valmet and one anonymous company). It is considered as non-probability sampling technique. Moreover, non-probability sampling might be the most realistic option when the research projects are at their exploratory stage. The author presents that non-probability and non-random approach provides many different techniques of selecting samples with the help of personal judgements. Thus, this method is appropriate when resources are limited, and the study emphasises on getting deep understanding about the problem in the research area. (Saunders et al. 2007: 226-233).

3.3. Ethical Considerations

There were some important steps taken into account to maintain ethical consideration. Firstly, the participants were given guarantee for the confidentiality of information that the author has received. For purpose of confidentiality of the information, interviewees were briefly explained in advance through the invitation letter. In addition, interviewees were fully authorized to withdraw from the interview process whenever they want and their voluntary participation for the interview was also assured.

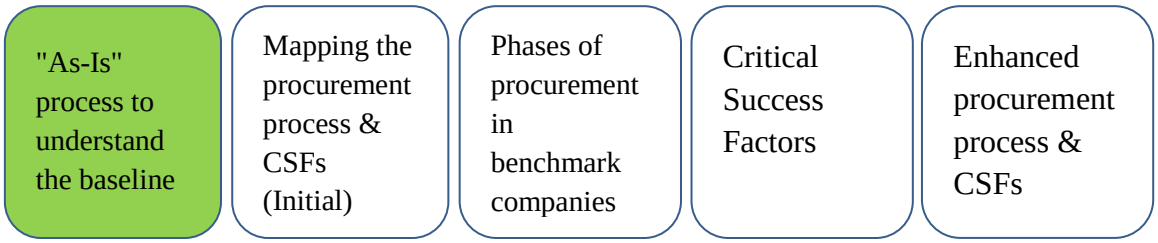
The timing for the interview was agreed with full support and convenience of the respondents and required attention was given to the participants to avoid discomfort and stress. Researcher should not put pressure for the response that researcher is expecting during interview and also prevent from asking obstructive questions from the interviewees (Sekaran 2003). Thus, such things were carefully handled and avoided to get the potential information from the participants and there was no gender or race discrimination during the interview process for data collection.

Protection of collected data is also very important and therefore, proper security procedures were taken into consideration to manage the data in order to avoid unauthorized access, accidental loss and mistreatment with the collected data. The responsible authority for providing regulation for personal data protection within European Union (Data Protection Directive 1995) was replaced by EU (General Data Protection Regulation 2016). It is very important for the laws regarding human rights and privacy. According to the directive, *"personal data is any information concerning natural person which is identifiable"* whereas, the word processing represents "*the operation or set of processes upon personal data regarding collection, organizing, recording, storage retrieval, consultation, alteration or adoption, disclosure via transmission, using, making it accessible or spreading, blocking, destruction, arrangement and combination"*. Thus, the data gathered through interviews has been kept confidential and used only for the analysis purpose and it has not been reported in this study to kept privacy.

4. ANALYSIS, RESULTS AND DISCUSSION

This chapter contains the findings from the chosen methods of data collection. Procurement process is mapped by taking all the necessary steps and important tasks required to perform in that procurement phase or activity. Furthermore, several success factors found in the procurement activities along with the tools and approaches to prevent and handle the problem. For instance, if the required equipment is missing during the project installation, the project will be delayed and handover time will be disturbed. Later in this chapter, findings are analysed in conformity with the theory described in chapter 3.

Engineering and manufacturing projects are complex and crucial upon which there is an influence of several diverse factors (i.e. work ethics, culture, internal and external environment etc.) that varies from project to project. Also, it is difficult to prepare an accurate process to accomplish the project with certain influencing factors. Therefore, an efficient procurement process with some critical success factors are identified to enable high performing procurement activities. The layout of this chapter is presented below.



4.1. Introduction of The Case Company

Woima Corporation provides modularized waste-to-energy solutions to the developing countries. Woima is a global born start-up company which was founded in 2017. The focus of this company is to mitigate social, environmental and health problems and to increase wellbeing for the developing countries by providing state of the art circular economy solutions. The main solution is waste-to-energy power plant which has three main configurations. First option is to generate primarily electricity to the local area, second option is to produce steam and the last option is to set-up the plant as Combined

Heat and Power (CHP) which generates electricity and thermal energy. Additionally, the solution is scalable by adding incineration lines, increasing the output of the plant respectively. Product portfolio is to be standardized however, certain engineering is always expected to be included in each sales and delivery project. Site activities are to certain extent always unique. (The Woima website).

The design principal of the modular power plant consists of containers having size of 20' and 40' that are in secure enclosures, easily transportable, installation of technical solutions platform and protective housing at location. The design of the plant focuses on ensuring robust and simple structure, long lifespan, relocation option, high efficiency rate, low operating as well as maintenance cost, strict emission control, great pre-fabrication rate and good tolerance for diverse kind of fuels. (Woima).

Engineering and manufacturing are *outsourced* under the management of Woima. Internal resources of the case company will focus on the sales, product development, project and site execution, and supply management capabilities. Thus, effective procurement management is to be developed in order to operate supply chain according to the project, business and customer needs. The aim is to form a collaborative partnership with major and important suppliers by creating meaningful and constructive transparency that emphasize common goal for both the participants. (Woima).

4.1.1. As-Is Process of The Company

The flow chart of the case company contains procurement activities and tasks performed by the company from specification to the hand-over of the final prefabricated modular to the customer. Procurement flow chart of the case company is illustrated in the figure 10. Phases of procurement are illustrated above it to match the model and better express the structure of procurement activates. WOIMA has focused on establishing the supply chain cost structure and collaboration set up with preferred suppliers for which the pre-assessment and selection of partners receives careful attention in the procurement activities. In order to build collaboration setup, WOIMA considers that larger mutual understanding is to be pursued including shared and aligned vision and strategy ensuring motivation and comprehension of total cost of ownership with preferred partners.

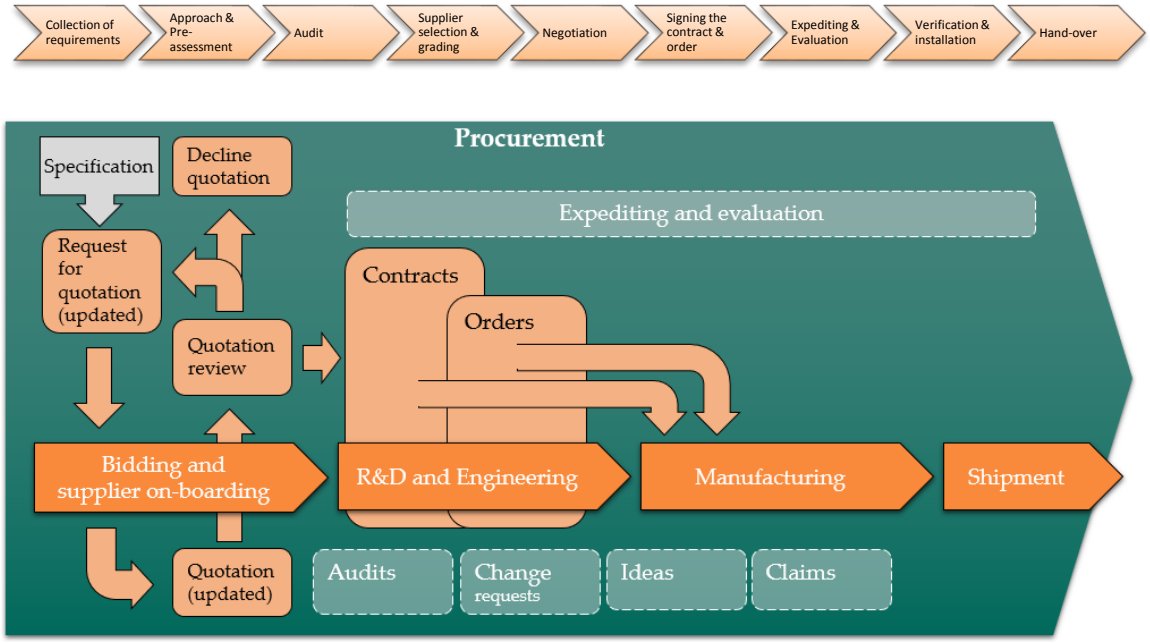


Figure 10. Procurement process flow chart (Woima).

Procurement process of the case company starts with "*need identification"* and collection of requirements for design and pre-fabrication and ends at installation of modularized waste-to-energy power and hand-over. The collection of requirements in this company is done by defining specification of requirements needed for particular scope which can be iterated as better understanding of the capabilities of a supplier is determined. Moreover, product WBS method is used to identify specification limits. At this stage, collaboration tools and guidelines express the way of working and questionnaire are designed to determine the capabilities of preferred supplier. Developed questionnaire can be informal which is not submitted to supplier, but rather acts as a checklist for internal purposes.

The next step is approaching and "*pre-assessment of supplier"* by arranging meetings in which Woima introduces the power plant and its design and prefabrication needs. Pre-assessment is done on the bases of received feedback to the listed questions together with the budgetary offer from the suppliers. Moreover, supplier terms and conditions are also discussed at this stage to to pave the way to contractual negotiations.

The next stage is conducting audit to "*evaluate the supplier"*. The content for an audit is determined on the bases and scope of particular preferred supplier. The case company

verifies the supplier capabilities and development needs based on the audit while simultaneously agreeing on the collaboration way of work.

"Selection of suppliers" are done by grading the suppliers on the bases of set standards. Moreover, technical specifications of the received quotations and its commercial terms are clarified. Most ideal partner and supplier are then selected by the company to proceed with "*final negotiations*".

Quotation is finalized based on the final negotiations which forms the foundations for establishing the performance criteria with the selected supplier or partner. The partner is thus finally selected, and deal is finalized after which company initiates the execution of agreed scope. The case company does the expediting from early on to make sure the deliveries will reach on time and in accordance with the PO requirement.

Eventually, shipment is made after the manufactured components and parts are validated and ready. Commissioning and installation work are initiated at the site to finalize the project and satisfy the customer.

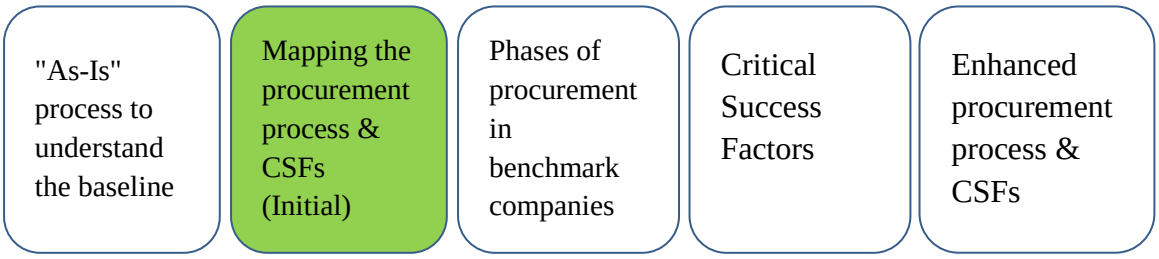
4.1.2. Comparison of Procurement Process

The process adopted by the case company is compared with the phases described in literature to identify the required steps for the case company. This practice is helpful in understanding the existing and required procurement process that can be adopted by the company. Moreover, this initial model became a base for further analysis with the benchmark companies. It can be seen from the table 6 that most phases of procurement process taken from the As-Is process of case company is same as described in (van Weele 2010 & Johnson et al. 2011).

Table 6. Comparison of case company process with the process in theory

Case Company	Combined from literature-van (Weele 2010 & Johnson et al. 2011)	Initial proposed model for case company based on literature & company archives
Collection of requirements	Specification	Identification of needs
		Specification of needs and funds approval
Approach and pre-assessment	Supplier selection	Determining procurement method
		Bidding process
Audit		Evaluation of bids
Supplier selection & grading		Supplier selection
Negotiation	Contracting	Negotiation with the supplier
Signing the contract and ordering	Ordering	Signing the contract and ordering
Expediting and evaluation	Expediting	Expediting the order and evaluation
Verification and installation	Delivery reception	Verification, pay and installation
Hand-over	Invoice clearance and payment	Closing and after sale services
	Follow-up	

4.2. Mapping of Procurement Process



After the detailed study of several academic literatures, online articles, web pages, theories, procurement process of some successful companies and the As-Is process of the case company Woima, the initial procurement process is mapped. The proposed procurement process illustrated in figure 11 contain phases, critical success factors and approaches are also identified to make successful procurement activities. Identified factors by various researchers over the period of time is listed in chapter 2, table 4.

4.2.1. Initial Mapping of Procurement Process and CSF's

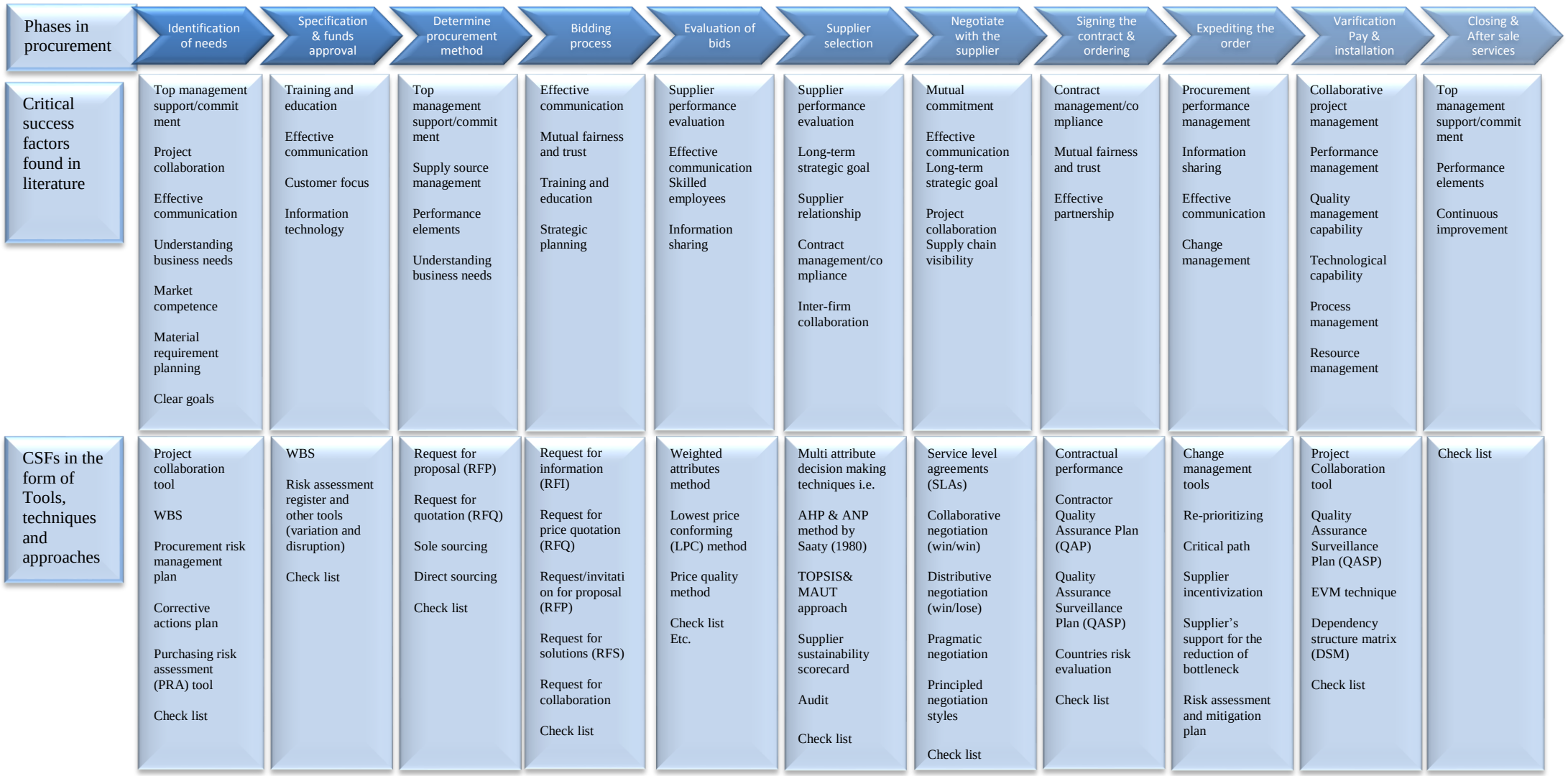


Figure 11. Overview of procurement process and its CSFs in the performing activities by author.

Unlike any other process, "*identification of needs and defining the specification"* are the first important steps of the procurement process in which the users and associated personnel play their important role. The needs are based on the requirements of a customer to whom the final project is going to be delivered. This may include product's technical or functional characteristics and specifications. The PR is created by using ERP software that will assist during the whole procurement process. Therefore, it is very important to clearly identify all the required input material or services for the pre-fabrication at this stage in order to create a pre-basic design for which check list is considered as an important tool. Budget is also approved after detailed discussion with the relevant stakeholders.

Next phase is to "*determine the appropriate procurement method"* which is considered critical for both customer and the participants associated with the project. There are many procurement methods i.e. request for proposal, sole sourcing, direct sourcing, (RFQ) quotation request etc. and the most appropriate should be adopted to increase the efficiency of the overall project. Subject oriented expert members and advisory group may play their important role at this stage and approval of funds are received.

After that, the next important phases in the procurement process of case company are "*bidding process and evaluation of bids"* in which a feasible method is selected from various bidding methods i.e. request for information, price quotation, solutions, collaborations etc. This process can be evaluated by evaluation committee, accounts officer and subject oriented stakeholders. There is a set criteria in the organization to evaluate when certain conditions are fulfilled i.e. quality, safety and TCO etc. There is a need to identify in case of looking for new or existing supplier based on the performance evaluation of the potential suppliers. Therefore, effective communication between the skilled employees is vital and often enhanced with training and education. Nevertheless, check list is very important in each phase.

Once bidding and its evaluation is done, the next phase is then "*selecting, negotiating and signing the contract with the suppliers*". It is very important to assess the credibility of the supplier by evaluating the prior performance and relationship. Therefore, it is critical

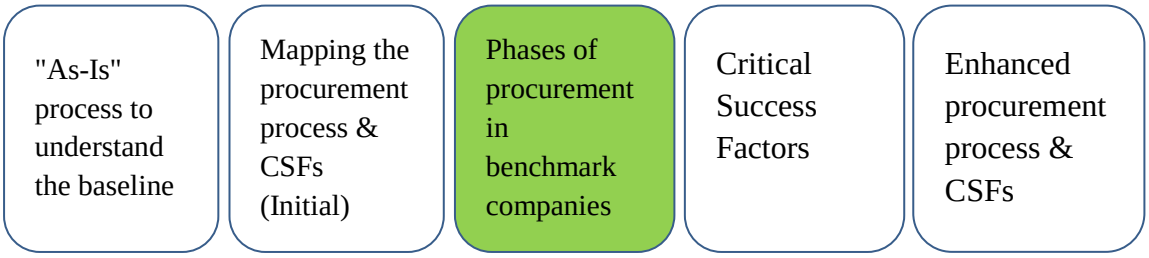
for the company to perform inter-firm collaboration and manage contract by planning long-term goals. The method that can be used for the selection purpose is decision making techniques with multiple attributes. There are various decision-making approaches and the most widely used are AHP, MAUT, ANP and TOPSIS to list prospective suppliers on the bases of required specification. *Supply chain visibility* and *mutual commitment* is very important when negotiating with the suppliers, supported by "*service level agreements*" (SLAs). Whereas, fairness and trust aids in building effective partnership with the suppliers supported by quality assurance plans and contractual performance.

Woima can start the "*expediting"* by placing the PO in which both parties agree on specific terms and conditions and later confirmed by sending an OC. Post-purchase feedback is provided in this phase which requires information sharing, effective communication and change management as a critical factor to enable high performing activities. Moreover, some tools and approaches are critical at this point to increase the effectiveness of the procurement process.

Once the suppliers are selected and purchases are received, the next phase is *"verification and installation"* of the acquired parts and material to the project delivery place. Verification includes comparing with the PO to ensure the right quantity of the product has been received with good condition. After which the invoice is recorded and procurement department clears the payment. Dependency structure matrix and quality assurance is a very handy tool at this stage which is supported by quality, performance, process and resource management factors.

After the prefabrication or installation of the waste to energy modular with the cooperation of their project partner, the final phase is to provide after sale services, continuous improvement plans and warranty to satisfy the customer. Conducting aftersales such as service and maintenance agreements.

4.3. Procurement Process in Benchmark Companies



The aim of benchmarking analysis is to identify how the procurement process is organized in these companies. Therefore, engineering and manufacturing companies were selected and benchmarked. The process is discussed with their procurement professionals to get deep insight regarding the process and its critical success factors.

4.3.1. Brief Introduction of the Companies

Anonymous company XYZ (Participant 1)

The firm and its procurement respondent chose to remain anonymous, and hence their identity is being withheld. This anonymous (XYZ) company was established in the mid-1900s with the aim of facilitating their customers with solutions related to water, infrastructure and mobility. They provide industry-leading designs for engineering and services with advance science and operations. Over the years the company has grown internationally with the operations in more than 30 countries and over 18000 competent employees. They also help in program and construction related management solutions. The revenue generated is approximately more than 4 billion Euros. Their vision is to facilitate with more connected and sustainable solutions by means of value, safety and diversity.

Wärtsilä (Participant 2)

Wartsila is a leader in providing technology solutions for energy sector and marine markets. Their aim is to provide innovative and sustainable solutions to enable environmental efficiency of the power plants and vessels. It was established in 1834 and over the years they have achieved huge progress. In 2018 they had around 19000

employees and total net sales of 5.2 billion Euros with the operations in more than 200 locations and in more than 80 nationalities. The company provides power plants, solution from liquid gas and solutions to store energy. The power plants have been delivered to approximately 177 countries with the capacity of 70 GW in total. The objectives of procurement operations in Wartsila is to satisfy the customers by validating low cost, timely delivery and good quality. Therefore, they have 5S principle "*standardization sort, set, sustain and shine"* in their production units to ensure good quality. Moreover, indirect procurement to acquire material is managed through centralized activity. (The Wärtsilä website).

Valmet (Participant 3)

Valtion Metallitehaat group was renamed in 1951 as Valmet which is known as a global supplier and developer of automation, technologies and it also provides services for paper, pulp and specially in the industry of energy. They have more than 200 years of history in industry and they were born again in 2013 with the demerger from Mesto group. They have approximately 12500 worldwide professional workers in 150 different locations who are committed and working for the customers. The vision of this global leader is to become a champion in providing best to its customers. The company is well capable of providing pulp mills, production lines for paper and energy power plants. The procurement in Valmet has targeted to put together close and long-term relationships with their potential customers. Valmet tries to ensure good quality, sustainability, on-time performance, cost and innovativeness in their procurement. The company operates in a widespread supply chain network with having outsourced international manufacturing and operations. (The Valmet website).

Table 7. General information of the benchmark companies.

Sr. No.	Company	Founded	Industry	Operation in Countries	No. of Employees	Revenue
1	XYZ	mid 1900s	Engineering & Services	30 + Countries	18000 +	Over €4 billion (2018)
2	Wärtsilä	1834	Manufacturing & service	80 countries with 200 locations	19000	€5.2 billion (2018)
3	Valmet	1951	Technology, Automation & service	35 + countries with 150 locations	12500	€3.3 billion (2018)

4.3.2. Analysing and Understanding the Process

Procurement process organized in the benchmark companies are not much different with each other. The essential and most common phases are adopted by each company in order to fulfil the objectives of ongoing project. These phases of procurement process in the benchmark companies are summarized in the table 8.

Table 8. Phases of procurement in benchmark companies.

<table>
<tr><th colspan="3">Phases of Procurement</th></tr>
<tr><th>XYZ (P1)</th><th>Wartsila (P2)</th><th>Valmet (P3)</th></tr>
<tr><td>Specification of Requirements</td><td>Specification of Needs and Funds Approval</td><td>Supply Planning and Requirements</td></tr>
<tr><td>Bidding process</td><td rowspan="3">Bidding Process, Determining Procurement Method, Evaluation and Negotiation</td><td rowspan="2">Bidding Process and Evaluation</td></tr>
<tr><td>Evaluation of bids</td></tr>
<tr><td>Negotiation</td><td>Negotiation</td></tr>
<tr><td>Signing the Contract</td><td>Supplier Selection and Contracting</td><td>Supplier Selection and Contracting</td></tr>
<tr><td>Expediting</td><td>Expediting</td><td>Expediting, Verification and Pay</td></tr>
<tr><td>Installation</td><td></td><td>Commissioning and Installation</td></tr>
</table>

Identification and Specification of Requirements

In all the interview and discussions from the benchmark companies, it is observed that procurement starts with the specification of requirements. These specifications are prepared by technical department in the form of PRs and transfer it to the responsible purchaser in the procurement department. All the respondents have the consensus that the procurement process starts when all the essential specifications whether technical or services are listed, keeping in mind the demand and requirement of the internal customer. The respondents have briefly described it as below.

"The technical department prepares the technical requirements for the inquiry and send it to the procurement department who (...) requirements and toss it to the venders." [P1].

"The whole process is pretty much the same but of course we also have quality gates and supplier validation in between.". [P2]

The participants further elaborated that ERP system is used to develop initial inquiry through PRs for which technical team and internal customers are responsible for the detailed description of quality requirements, schedule of the delivery, quantity required, material and other technicalities needed to meet the purchase requisite. "*Incoterms 2010"* is used to decide the obligation between the buyer and manufacturer.

"Identification of requirements starts from supply planning or if we have some customers preferred suppliers then we go with those requirements." [P3]

It is considered essential to think about where the project is going to be installed, if there is anything new that is required, what kind of supplies the company have and there is a need to think about the categories to buy according to frame agreements. Moreover, if the customers have some preferred suppliers then the requirements are in accordance to the customer's choice. Respondents have clarified the delivery term which is described as under.

"In our company, we use "Incoterms FCA" delivery term to manage our logistics." [P2].

"I am a regular buyer of several products therefore, I have a special rate or tier with the delivery company which is offering me a much better price what a manufacture would charge me for the delivery. So, I ask the manufacturer only deliver me incoterms EXWorks." [P1].

"Sometimes in project we have FOB but the FCA is the most preferable." [P3]

From the above discussion it can be observed that the participants have endorsed the fact that there are some very crucial components that are critical for the functioning of large engines and therefore, comprehensive requirement planning is necessary. Also, for each

phase, there should be quality gates to validate the activity as well as suppliers/manufacturers. As stated in Baily et al. (2008), first important thing to be incorporated in any contract agreement is a detailed specification of the required material or service.

Bidding Process

Bidding process starts with receiving quotations and selecting an appropriate vendor so that the required material or services are ordered to meet the project requirement. Respondents have shared valuable insights about bidding process as described below.

> *"For products and components, we have certain specifications that needs to put in and that is always the benchmark for instance for engine (…) supplier needs to be able to fulfil these requirements." [P2].*

> *"We issue the **request for quotations** basically for the inquiry for the suppliers where we might need some clarification during the bidding stage" [P3].*

> *"The quotation is split into two parts, priced quotation and un-priced quotation (…) buyer keeps the priced quotation and unpriced quotation goes to the technical department." [P1]*

This process contains two types of quotations, *priced* and *un-priced* quotations. In priced quotations, technical compliance and cost requirements are included and in un-priced quotation, the cost and technical requirements are hidden. The "*un-priced"* quotation is submitted back to the technical department for the review for the preparation of "*technical bid evaluation"* (TBE) and the "*priced quotation"* remains with the procurement department.

They further elaborated that buyer is the one who is responsible for receiving the technical requirement, adding procurement requirement, keeping the contact with the manufacturers and receiving their quotations. Therefore, price quotation is kept by the buyer. Henceforth, buyer writes an email regarding the conformation if all the manufacturers that are technically correct. Then in response to the buyer's email, the

technical department submit the TBE summary sheet listing the manufacturers are technically good and that one manufacturer is not fine.

It can be observed that the technical department has the upper hand at this point because if the bid is not technically compliance then buyer has no authority to negotiate.

Evaluation of Bids

Bids are evaluated and compared after the deadline for the quotations has been passed. There was a discussion about how benchmark companies evaluate the bids and respondents said.

> *"Company prepares commercial bid evaluation (CBE) and technical bid evaluation (TBE) evaluation (…) to check whether each manufacturer is technically acceptable or not and if one is not technically acceptable then there is no meaning of commercial negotiation." [P1]*

> *"Depending on what we are buying, for very generic commodity typically price is very much important. If there is a critical component, then of course the supplier capability in terms of quality, in terms of process stability and these kinds of things have more weight. So, it is a balance between these." [P2]*

Company prepares CBE and TBE. Moreover, TBE is prepared by the technical department in which there is column 1,2 and 3 having manufacturer 1,2 and 3 who are then compared with the technical requirement of the project. All the technical requirement from their initial inquiry are listed on the left side column and then on the right side, they will tick yes if the manufacturer meets it.

> *"After receiving all the bids in procurement, we make **total cost analysis** where we try to evaluate the motivators." [P3]*

However, if any of the listed manufacturer is not meeting any small requirement, it will be informed back to that manufacturer that you are lacking in certain requirements and ask if they will reconfirm. The reason of evaluation is to screen out the manufacturer for

their technical acceptability. In the end the acceptable manufacturers are listed in the cover sheet.

Based on the above explanation, it is perceived that the primary criteria to conduct bid evaluation is that it should be in compliance with TBE and E-bidding can be used to prevent from biased and deceitful selection of the manufacturers.

Negotiation

In one of the benchmark company, there are not many separate steps from the bidding to negotiation with the supplier. However, there are some sub-steps under this phase as mentioned above that company follows in order to come up with the final negotiation prior to the selection and contracting. In this activity, buyers will select all the technically qualified manufacturers and write them an email to provide them the raw bottom line to discuss if they can get any further discount or some other benefits. Primary way to negotiate is to receive a bottom-line price. In discussing the negotiation process, participants shared their views as follows:

> *"Once the negotiation is done and CBE is completed then buyer submit the CBE to the procurement management. The actual negotiation starts when the information regarding the cost and delivery terms is exchanged with the manufacturers separately then procurement team consult with central PM team in which (…) get it approved." [P1]*.

> *"Based on the total cost analysis depending upon the criticality of the procurement, we enter to the negotiation phase with one or several vendors." [P3]*

Manufacturers are physically negotiated when the price of the project is high. Once the primary negotiation is done, the buyer prepares a document called "commercial bid evaluation" (CBE) in which all the manufacturers along with their delivery period is listed who are technically correct. Decision to select the manufacturer is based on their cost and delivery terms. Then actual negotiation starts in which information regarding the cost and delivery time is exchanged with the manufacturers individually. Procurement team

receives CBE from the buyer and consult it with the "central project management team" to receive the approval. In the end, emails are written to the potential suppliers who were approved and to those who have been rejected.

> *"Supplier section that they have systems and processes in place to secure quality and they are able to manage the capacity. These kinds of checks are done so in addition to the normal commercial bidding and quotation handling and agreements." [P2]*

This discussion leads to a point where whether company is buying any kind of components, they are often connected to the product development. So, proper quality checks, cost and delivery terms for the better scheduling can trigger the effectiveness and success of total process.

Signing the Contract

Generally, contract is awarded to the potential and deserving manufacturers after proper and fair negotiation. Upon discussing this phase in procurement, following insights have been received from the respondents.

> *"The quality gates in between when we approve the supplier to validate the products in the supplier processes, that process is capable of producing the required capacity, quality and also the cost level." [P2].*

> *"PO is awarded to the supplier after which a legal document called purchase-sales terms and conditions having some prerequisites is signed by both companies. There are so many legal requirements in that terms and conditions. Once the product is manufactured (...) rest of the payment is done when the product is delivered at the company's site." [P1]*

Respondents maintained that depending upon the order, there are some discussions and dealings between the two parties about the advance payment when the product will be ready and full payment after the product will be delivered at the company site, known as "*payment terms".* Once the product is manufactured and tested at the supplier's place, company receives the testing report like an evidence. In case of doubt, company involves

a third-party inspection authority to verify that the finished product is technically fit or not. After the product has been delivered to the company and properly inspected, the remaining payment is transferred to the manufacturer. To secure the payment with the manufacturer, sometimes the intermediate party is involved with the document called letter of credit (LC) on the bases of credit rating, good business and company's commercial rating.

> *"We receive NDA if we have new suppliers and because the kind of material we have distributed too widely therefore, we got suppliers to sign the NDA." [P3]*

It is observed from the discussion that PO is awarded to the supplier after the completion of first task called inquiry. Though PO is same as inquiry in which all the technical requirements are same, but the cost is mentioned in the "commercial section" and exact delivery among the two parties is mentioned in the "delivery section". Then a legal document called "*purchase-sales terms and conditions"* is placed in which there are many legal requirements. Moreover, LC and third-party inspection is also a good option to secure the delivery and other term and conditions.

Expediting, Verification and Pay

Expediting is considered as a critical stage by the respondents as it requires strong level of communication and fast information flow in order to foresee the chances of error and work accordingly. Respondents have shared their view on this as follows:

> *"Expeditor's job is to ensure that the product is being manufactured on time, the product is being delivered on time and they will track the material and keep communication with the manufacturer, ensuring the manufacturer has ordered the raw material, ensuring that manufacturing process is going on, how much time it takes remaining for the delivery. The important and necessary documents involved in expediting phase are MSR, PSR and IRN." [P1].*

The *buyer* and *expeditor* both report to the procurement department. There is a document called monthly progress reporting (MPR) which is requested by the expediter to the

manufacturer, asking the manufacturer that at the end of every month. This MPR generally highlights not only the progress but the key issues that may lead to the delay in the delivery. The inspector will insure that the product has been inspected, checked and inspection release note (IRN) is prepared. Furthermore, record related to the product picked by the logistic company and keep tracking the location of consignment is also maintained. This MPR is prepared by the manufacturer and given to the buyer (expediter) and then expediter prepares another document called MSR.

It shows that buyer is responsible for the preparation of CBE before the order. Buyer will also prepare procurement status report (PSR) and then report to the management about the progress and current standing among the placed orders. Finally, the expeditor has the responsibility to prepare MSR which is received from the manufacturer.

> *"After finalizing the contract for the PO, we go for the* ***monitoring stage*** *and do the inspection. We make sure that they are done before we go for the final payment stage." [P3]*

This revels that when the delivery is completed, it is vital to summarize that how did it go. For instance, if there are any claims coming from the supply performance in the form of quality defects, late delivery and documentation error that need to be reviewed.

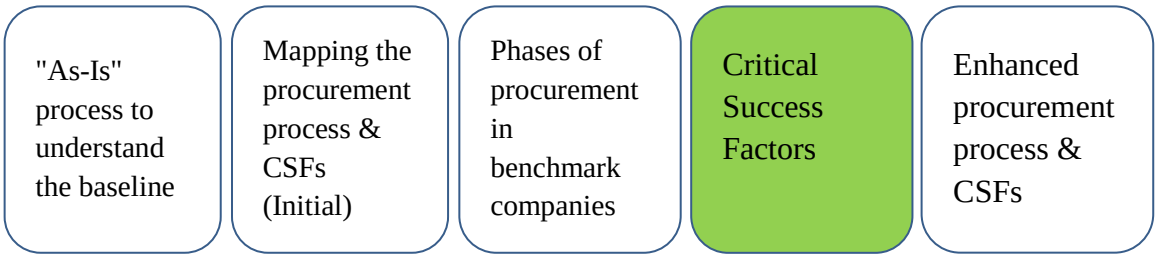
> *"We are measuring the* ***contract coverage level*** *when it is very much fluctuating the workload within the purchasing and supply management processes. So, it is not easy to say that certain amount of time is always minimum, let's say (...) so, quality of work is more important than targeting the certain date by which the task needs to be completed." [P2]*

Summary of the phases of procurement and their key aspects in each activity is illustrated in table 9 given underneath.

Table 9. Summary of procurement phases and their key characteristics.

Phases	Key Characteristics
Identification and Specification of Requirements	Technical team should prepare initial inquiry in the form of PRs.
	Detailed description of quality requirements for material and other technicalities.
	Supply planning and quantity required.
	Schedule of delivery i.e. Delivery term (Incoterm 2010).
Bidding Process	Issue RFQ: Priced and Un-priced.
	Priced quotation: Contain technical compliance and cost requirements.
	Un-priced quotation: for the preparation of technical bid evaluation TBE.
Evaluation of Bids	Preparing TBE and CBE summary sheet: Listing the manufacturers are technically good or not.
	Preparing *total cost analysis* to evaluate the motivators.
Negotiation	The information regarding the cost and delivery terms is exchanged with the manufacturers separately.
	Primary way to negotiate is to receive a bottom-line price.
	Negotiation on the bases of *total cost analysis* with one or several venders.
	Finalizing CBE in which all the manufacturers along with their delivery period are listed who are technically ok.
Signing the Contract	Screening through *quality gates* to approve and validate the suppliers.
	Payments terms are decided.
	Signing NDA from the new suppliers.
	(PO) is awarded to the supplier after signing the legal document called *purchase-sales terms and conditions* having some prerequisites.
	LC or *third-party inspection* is placed to secure the delivery and other conditions.
Expediting, Verification and Pay	The important and necessary documents involved in expediting phase are material status report (MSR), procurement status report (PSR) and inspection release note (IRN).
	Measure the *contract coverage level* to prevent from the fluctuation of workload within the purchasing and supply management processes.
	Go for the final payment after the inspection is cleared.

4.4. Critical Success Factors



As discussed in the earlier chapter, there were many success factors identified from the literature and listed in the initial procurement model under Section 4.2.1. Moreover, the factors found to have a great influence in the project success were also considered critical. The identified CSFs from the respondents of benchmark companies are *better logistic control, delivery terms, better negotiation, customer satisfaction, effective communication, change management, top management support, supplier assessment* and *environmental factors.*

Respondents were asked to share their views on critical success factors in the procurement process by which they stated that:

> *"We need to understand what is creating us that value and then it is also a balance of what is the effort needed internally vs the effort needed externally. So, this is typically driving the outsource. Moreover, the main concern is to provide a* ***low cost,*** *better* ***quality*** *output and* ***on time delivery****." [P2]*

> *"There are three key things that are most important in the entire procurement process and that is* ***cost, quality and time****. Because buyer wants cheapest product with good quality and on time delivery." [P1]*

As described in Muller & jugdev (2012: 758), *"Project success criteria, consists of some measures used to judge the failure or success of a project*". Likewise, all the respondents have endorsed the success criteria to be a very important part in achieving success for the whole project. Respondents went on saying that success factors vary whether the intention is *transparent procurement* or *right procurement.* Moreover, they said that there is no control on the technical requirements and on the prices because that are fixed after the order has been placed and pricing is not fixed buy the buyer.

Supplier's Assessment (Selection of Right Supplier)

Selection of good suppliers is based on the supplier's assessment, therefore, supply evaluation and approval is essential before entering the contract phase. When sharing their views about it as one of the important CSF, respondent said.

> *"It starts from the **selection of right suppliers** at the beginning so that we have good delivery. The most critical ones are for the suppliers at the cite and for the installations, so we do the **technical audit**." [P3]*

This shows that, based on the criticality it is advisable to allocate resources for the supplier's assessment, evaluation and approval regarding delivery, cost and quality supervision. Moreover, checking their references, financial stages and when everything is audited then the company is in a good position to proceed with supplier approval.

Delivery Terms and Better Negotiation

The terms regarding delivery is a critical decision for the company and manufacturer. The respondents have further elaborated it according to their perspective which is expressed below.

> *"Success factors are case by case if there is a better logistic control then **delivery terms** become a success factor and another one is **better negotiation**." [P1]*

> *"We still need like a traditional way of **discussion with suppliers** because they are a part of project which might not be complicated, but we want to make sure that the suppliers are also understanding the what kind of products they are supplying and how this is connected to this project process and overall environment." [P3]*

There are certain elements stated in the delivery term document (incoterm), upon which the company needs to decide carefully by taking into consideration all the possible outcomes that could affect the whole process. Moreover, better negotiation also plays and important role in the procurement activities. In order to negotiate better, the detailed information about the subject matter and appropriate timing is very important.

Effective Communication and Customer Satisfaction

All the phases of procurement are linked with each other. Therefore, strong level of cooperation and communication is vital for the success of the project.

> *"I see one of the critical success factors in having the whole chain under control by strong communication with the individuals or teams." [P3]*

These CSFs are further elaborated as several teams consisting of design team, commercial team, operational team, supplier development and supplier quality team. Another respondent has clarified it as described below.

> *"Different teams are operating and responding to the departments in the procurement process so all of these needs to work in harmony and therefore* ***effective communication*** *to remain align is one of the critical success factors. Moreover, if we consider the key success factors that what are we driving so eventually of course it is the* ***customer satisfaction.****" [P2]*

Therefore, remaining align with these is essential because typically they are reporting to different functions. There is supply management covering the category managers, strategic purchasers and the supply development. Then engineering function which is also managing the design. Thus, all of them needs to work in harmony in order to achieve the project success.

Change Management and Top Management Support

Change management in the procurement can play an essential role. It is not so well seen from the point of view where it is initiated and that typically triggers the top management who should understand that it influences the whole chain. The respondent has communicated briefly as given below.

> *"****Change management*** *in the procurement has a very vital role because the risks are greatest if we are not fully clear on what we are selling and what is the lead time to make that happen considering all the steps from design to delivery." [P1]*

The stated success factors have an influence on the procurement activities as well as the project success. The respondent further explained that the projects that they are selling is going to be larger and if changes are coming too late, the bull wick effect it creates in the supply chain will typically create quite a lot of problems.

> *"One of the critical success factors is **change management** for instance (…) changes are coming too late creating quite a lot of problems, which unfortunately is no so well seen from the point of view where it is initiated by which it typically comes back to the **top management support** that should understand that it influences the whole chain." [P2].*

Therefore, *change management* in the procurement has a very vital role. Unfortunately, it is very difficult to breakdown the situation and start looking for the error that initiated the problem. This scenario typically triggers the *top management* that should understand that it influences the whole chain and they should not allow unnecessary activities when it is absolutely not needed. It is clearly a risk and there is a need to understand the whole process quite well in order to make sure that the steps that have been taken, will not make this process into a project rather than a process because the process has to be there so that the organization can continue apply and measure it.

Top managers are typically detached or far away from the process but they can offer any typical process to overcome the problem. However, top management support has a very big impact on the success of the whole purchasing and supply process.

Environmental Factors

There are many factors that could affect the whole procurement process and thus considered critical. However, many organizations are now doing outsourcing that brings in some risks related to the cross-border regulations, organizational culture and market conditions.

> *"**Understanding the environmental factors** like **cross-country regulations, culture** and **market conditions** are necessary due to the fact that if our capacity or volume is increasing then it could be that we are not expanding our own factory but rather*

outsourcing certain phases or process so that we can get some assembly delivered." [P2]

"Of course, environmental factors are the critical success factor, while working like in the competitive global supplier network." [P3]

This shows that in outsourcing, company deals with global supply network, depending on the location of the final project that they decide. Whether, it requires sourcing from Europe or from open global sourcing. Thus, it is considered a critical success factor because there is a competitive supplier network to deal during outsourcing. The summary of identified CSFs is listed in table 10 given below.

Table 10. Summary of CSFs and their main learning.

CSFs	Key Aspects
Selection of Right Supplier	It is advisable to allocate resources for the supplier's assessment, evaluation and approval regarding delivery, cost and quality supervision.
Delivery Terms	Using appropriate method from *Incoterm 2010* to have a better logistic control.
Better Negotiation	To make sure that the suppliers are also understanding the what kind of products they are supplying and how this is connected to this project process and overall environment.
Effective Communication	The whole chain will be under control by strong communication with the individuals or teams. Work in harmony will ultimately enable them to achieve project success.
Change Management	Risks are greatest especially in outsourcing therefore, deployment of an effective change with vigilant planning, consent management and tight monitoring is the key to success.
Top Management Support	Change management triggers top management support and they should understand the influence of responding quickly with the change strategy.
Environmental Factors	Better understanding of cross-country regulations, culture and market conditions will result in an improved planning the procurement activities.
Customer Satisfaction	It is linked with all the CSFs, when effectively performed, will result in continuous and improved output for the customers.

4.4.1. CSFs From Tools, Techniques and Approaches

To identify tools, techniques and approaches that could result in achieving efficiency and success in the procurement process. First, some methods and tool from the literature were listed in the initial procurement model under Section 4.2.1. The identified CSFs from the respondents of benchmark companies are *e-bidding, AVL/AML, liquidity damage clause, total cost analysis, third party internationally recognized inspection agency, parts approval process* and *logistic control.*

E-bidding

The respondent elaborated that there is a possibility that someone from the company may negotiate with the manufacturer as the in charge of evaluating the received bids.

> *"One of the tools used is E-bidding in which buyer has no control over the information and bids are disclosed after the bid closing date (BCD) and automatically choose the best suitable option for the particular purchase." [P1]*

At this point there are chances of having biased and deceitful selection of the manufacturers. Therefore, E-bidding is a software in which buyer has no control over the information and the software has a better control and it is not going to disclose the bids before the BCD. After the closing date, the system of this software will automatically choose the best possible bid for the company.

Approved Vender List (AVL) or Approved Manufacturer List (AML)

These documents contain vender's/manufacturer's several years of record by which company decides to buy from that specific manufacturer who is listed best in that list.

> *"Company mark the manufacturers with three different colours and over the period of time there will be a good list of all the manufacturers with which the company had a good experience, or the company has visited them or audited them, authenticating that the company is a good manufacturer company. Moreover, AVL or AML is maintained on the bases of the company type and operations." [P1]*

The participant went on saying that sometimes company mark the manufacturers with three different colours i.e. red, yellow and green. Red shows that the manufacturer is unable to meet the requirement and the company has faced a bad experience. Yellow shows that the manufacturer is good and at the same time, company is not sure and confident about it. Lastly, green shows that the manufacturer is very good and the company had always a great experience working with them. This list is managed against several points by which manufacturers may shift between these colours over the period of time.

> *"By maintaining the (AML) to (...) assure that if I give new order to this manufacturer, he always give me **delivery on time** and he always manufacture the product to the required specification with **good quality**." [P2]*

Under this list, if the organization finds the manufacturers good fit for them then they will decide to keep them in that list and if not then they will be blacklisted. The record is maintained quarterly, half year or yearly.

Based on the above discussion it can be suggested that a big company regular buyer with better system could maintain AVL or AML document. Finally, there will be a surety on the bases of the company experience and by managing AVL or AML that the manufacturer is reliable for the quality and on-time delivery. As a result, the company knows that if they award their order to that particular customer, their product will have a good quality and it will reach on time.

Liquidity Damage Clause (LDC)

Companies can apply this clause in the contract to prevent from damages. Because of competition, many of the organizations are trying to outsource which brings in a lot of risk during the transportation etc.

> *"Company apply a method that allows to put a clause in the term and condition when preparing PO is called liquidity damage clause (LDC). Company has the option to charge 1% per week as a penalty. It is a very strong term generally put by the buyers in the contract to ensure the delivery is on time." [P1]*

"LDC is a part of the standard contracts structure and we always have a possibility of LDC." [P3]

This method is applied at the time of placing the PO as a clause in the terms and conditions in which the company can possibly charge 1% penalty per week if the delivery gets late, generally imposed by the company (buyer). However, it depends upon the situation as if the manufacturer does not want to have this penalty clause then both parties may decide on how to handle it. Therefore, it is considered a very strong term and it has a cap that it should not exceed more than 5% in any case. As a result, it is ensured that the delivery will be on time.

Third Party Internationally Recognized Inspection Agency

Another way for ensuring the quality is by contacting a third party internationally recognized inspection agency. These agencies conduct independent inspection and assessments in order to identify that the required specifications related to the product or process have been met or not. There are many world's recognized inspection agencies who are working to provide their best services.

*"I will call the **Bureau Veritas** international agency who does the inspection and they would always have a branch in Finland (...) they arrange an inspector. Summary report will be prepared and then compared with the PO and agency will put a stamp on the document as quality assured." [P1]*

The organization contact the international agency who has a branch in Finland to do the inspection. They would arrange an inspector who will visit for one or two days and prepare a summary report. They will compare it with the PO and if the product is 100% meeting the requirement then inspector will assure it by placing a stamp on the document as quality assured. If the third party has inspected the product and the product is damaged during shipment and the shipment was manufacturer's scope, then third party inspector will claim if it is damaged during the transportation.

Parts Approval Process

The use of ERP systems and software has enabled the organizations to speed up the process, improve accuracy, maintain record and quality standards. The observed benchmark companies are also using such software to avoid chances of errors and to increase the efficiency. The participants have put some light on this during the discussion as follows.

> *"We use Part approval process to ensure that the quality is being kept in accordance with the PO specification and manufacturer has clearly understood the requirement." [P3]*

> *"It also helps in comparing the ordered material to the required customer design so that at the time of commissioning at site, we can prevent from the unexpected risk or error." [P2]*

It is observed from the discussion that with the help of these tools and methods, company will be able to have a reliable purchasing, complying to the quality and on time delivery. All of these will ensure the effectiveness or the procurement process and therefore, these are considered as a critical success factor for the procurement.

Logistic Control

P1 and P3 has shared their views about one of the factors that can improve the effectiveness in the procurement process is the use of Logistic control tool. This tool has to capability to display real-time data with logistic plans and the information can be accessed whenever needed.

> *"Success factors are case by case if there is a **better logistic control** then delivery terms become a success factor and another one is better negotiation." [P1]*

> *"The company is using logistic control to see the real-time figures for each manufacturer/supplier." [P3]*

It can be summarized that LC consists of *"material requirement planning"* (MRP), in which volume requirements and the timing for the materials are calculated based on the required timetable of the final deliverable. The identified CSFs from tool, techniques and approaches are illustrated in table 11 given below.

Table 11. Summary of CSFs from tools techniques and approaches.

CSFs	Key Characteristics
E-bidding	Automatically choose the best suitable option for the particular purchase after the bid closing date (BCD).
AVL/AML	Marking the venders/manufacturers with 3 different colours on the bases of their compliance with the requirement and prior experience (time, cost, quality). There will be a good list of providers in future to work with.
Liquidity Damage Clause (LDC)	Allows to put a clause in the term and condition when preparing PO to ensure the quality and on time delivery.
Third Party Internationally Recognized Inspection Agency	Inspector does the inspection prepare Summary report and then compared with the PO, finally put a stamp on the document as quality assured.
Parts Approval Process	Speed up the process, improve accuracy, maintain record and quality standards in accordance with the PO specification. Also, prevent from unexpected errors at the time of commissioning at site.
Logistic Control	Consists of MRP, in which volume requirements and the timing for the materials are calculated based on the required timetable of the final deliverable.

4.4.2. Key Contributors in The Procurement Process

The individual or teams within these functions also contribute towards the critical success factors, it can happen that company has a certain person with the different technical background then the team he is communicating with. The lack of background knowledge for that individual while communicating can create critical failure mechanism that can put much more strain on the process. When asked about the key influencers or contributors, participants have explained briefly as follows.

> *"Indeed, there are some contributors in the process that have an influence on the procurement activities. these contributors are:* ***Internal customer, Technical team*** *(Specification, TBE), Buyer (CBE),* ***Manufacturer****,* ***Procurement officer*** *and* ***Inspector****." [P1]*

*"There are **Category teams** sometime referred as commodity teams. So, we have category manager and under his team, there is a **purchaser** and then for locally each of the plan we have **operational purchasers** (….) and then **strategic purchasers** together with the category manager creates the commercial framework agreements. Then we have **supplier development engineers** that are supporting in between typically the design and the commercial side of that we are looking the supplies processes with respect to the design." [P2]*

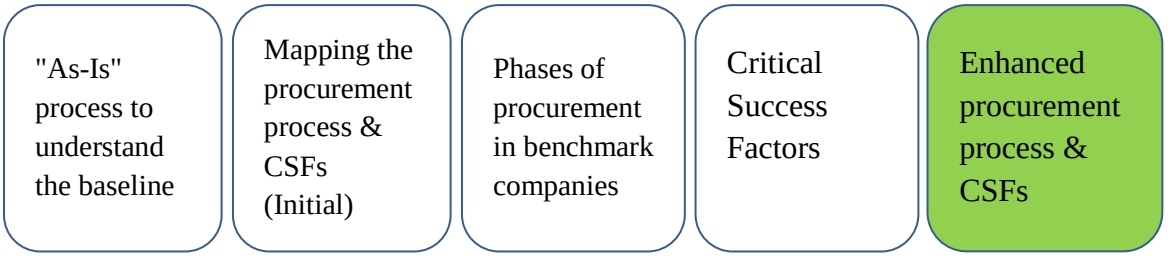
This discussion leads to a point that since, the company has a critical stage starting from the design then the up-coming phases include validating the conformity of suppliers on the stated requirements till the final installation phase. Therefore, right people negotiation with the right suppliers is essential to come up with the proper frame of agreements on how to work together. The contributors identified from the benchmark companies are illustrated in table 12.

Table 12. Important key influencers and their contribution.

Key Influencers	Contribution in the Procurement Process
Technical team	Responsible for identifying the required specification and preparation of TBE.
Internal customer	Responsible for detailed description of quality requirements, schedule of the delivery, quantity required, material and other technicalities needed for the PR.
Buyer	Responsible for receiving the technical requirement, adding procurement requirement, keeping the contact with the manufacturers and receiving their quotations.
	Responsible for the preparation of CBE and maintaining the record of PSR.
Procurement officer	Manages the activities related to purchase in the procurement department.
Inspector	Responsible for the inspection of consignment after with payment is cleared.
Manufacturer/supplier	Responsible for the delivery of PO in accordance with the stated quality and time.
Expeditor	Responsibility to prepare MSR received from the manufacturer.
Category manager	Creates the commercial framework agreements.
Operational purchasers	Maintaining required level of stock, managing the services performance while holding the cost of stock to the minimum possible level.
Strategic purchasers	Establish and provide best sources of supply for the required components and respond to the change supply requirements.
Supplier development engineers	Supporting in between typically the design and the commercial side by component development and managing advance product quality planning and parts approval process.

4.5. Enhanced Procurement Process and Success Factors

Once CFSs and key contributors influencing the procurement process are identified from the section 4.4, the process of developing enhanced procumbent process starts. The discussion about the enhancement process and To-Be process mapping is presented in the upcoming sections.



4.5.1. Discussion

The main objective of this research was to understand/identify the phases of procurement process and its critical success factors. Following are the research questions constructed for this study:

I. What is the procurement process for Woima corporation?
II. What are the critical success factors that can influence the procurement process of Woima in achieving success in their global project deliveries?

The literature shows that phases of procurement process exist already but the understanding of each phase and their activities in the procurement process was not vastly available. That is why during the interview/discussion, respondents were mainly asked about the activities performed during the procurement process and its critical success factors. The reason was to get deep understanding of the whole process. However, existing available phases and possible success factors from the literature were also shared with the respondents to get their opining, where necessary. The information received from the respondents shows that generally, companies are following the most essential phases of the procurement process. The common phases followed by benchmark companies are shown in figure 12 below.

Figure 12. Most common and essential phases followed by benchmark companies.

This is similar to the earlier model presented in (van Weele 2010: 9 & Johnson et al. 2011: 80). However, some of the researchers have also identified more phases in between the existing one. The procurement design presented in (Janne, 2015 & Markus 2017) had the same common phases along with some additional or sub-steps of these phases. Furthermore, study can present evidence that the phases and activities in the procurement process depends upon the nature and requirement of the customers.

Quite often, there are crucial components that are considered critical for the functioning of large engines therefore, comprehensive requirement planning is necessary. Also, for each phase, there should be quality gates to validate suppliers/manufacturers as well as the activity. As stated in Baily et al. (2008), first important thing to be incorporated in any contract agreement is a detailed specification of the required material or service. The primary criteria to conduct bid evaluation is that it should comply with TBE, otherwise there is no need to go for commercial negotiation. In addition, e-bidding can prevent from the biased and deceitful selection of the manufacturers. Proper quality checks, cost and delivery terms for the better scheduling is necessary for the effectiveness and success of the whole process. Finally, the important and necessary documents involved in "*expediting"* phase are MSR, PSR and IRN.

The critical success factors identified were similar to the existing literature. The aim is to identify if companies have evolved and opted some new factors that could influence in achieving success. However, it is revealed that companies are following the CSFs that are widely recognized and identified by the researchers. Respondents have shared their views on some factors that are widely recognized by the researchers and companies. For instance, *supplier's assessment, effective communication, top management support, delivery terms (incoterm), change management, information technology and*

environmental factors were identified from the benchmark companies and are supported by many researchers as well. According to Syazwan et al. (2014), approximately 23 amongst 42 papers were found, who have favoured *top management support* as a CSF and 30 papers favoured *collaborative partnership* that comprises of *information sharing, communication* and *trust* as CSFs. Some tools and techniques were also recognized from benchmark companies, during the period of data collection. The respondents have shared their experiences of using tool like *better negotiation, e-bidding, total cost analysis logistic control, quality gates, third party inspection agency and parts approval process* that can also bring a positive change in the overall procurement. The identified CSFs are shown in the figure 13 below.

Figure 13. Overview of the CSFs identified during the research.

However, these factors may vary from company to company and its requirements. Moreover, this study has enabled the researcher to develop an updated To-Be process mapping for procurement process and its critical success factors as shown in the figure 14 below.

4.5.2. To-Be Process Mapping for Procurement Activities

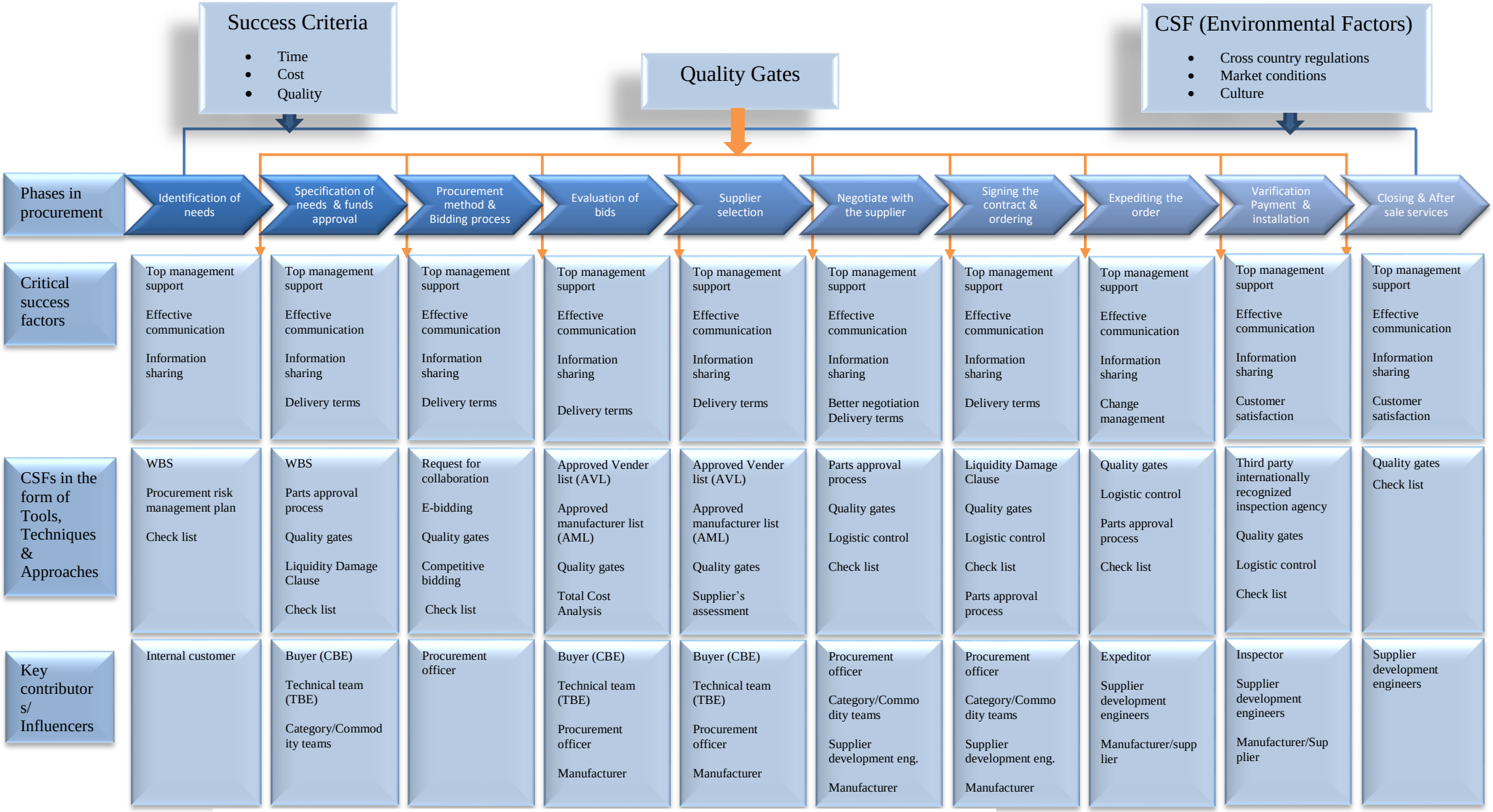


Figure 14. Recommended model of procurement process with critical success factors.

The above proposed To-Be model is developed for the case company after understanding the procurement process and the ways of managing the activities by the selected benchmark companies. Based on their experiences, the adopted procedures and methods have enabled them to achieve efficiency and success in the final projects. This model is consisting of procurement phases and its critical success factors. Moreover, it involves some tools, techniques and approaches that can serve as a success factor in achieving operational excellence and project success. All the listed elements in the To-Be model are also illustrated in the table 9,10,11 and 12. However, to accomplish the objectives, key contributors/influencers play their important role and produce a significant impact on the overall performance of the project. Therefore, strong level of communication and cooperation among these stakeholders is vital. The success criteria of the project are providing good quality products with sensible cost on the agreed schedule.

Tools like *quality gates*, *logistic control* and *parts approval process* are considered essential for the whole process from identification of needs till the prefabrication of powerplant. Therefore, utilization of such tools and approaches can speed up the process, improve accuracy, maintain record and quality standards in accordance with the PO specification. Also, it can prevent from the unexpected errors at the time of commissioning at site. However, the environmental constraints can affect the productivity and efficiency of the procurement if the forecasting about cross-country regulations, market conditions and culture are neglected. Thus, a clear understanding of these aspects is very important since most of the components are outsourced by the company. This procurement model is mapped to understand the factors that can assist in achieving effectiveness and efficiency in the procurement activities.

5. CONCLUSION

The aim of this study was to identify an effective procurement process and its critical success factors. The purpose of identifying the critical success factors in procurement activities is to ensure operational excellence of the whole procurement process. When parts and materials are outsourced from external suppliers, it brings a lot of risk and responsibility to successfully manage the whole project with the vision of satisfying the ultimate customer. This research was conducted for the case company Woima corporation with the aim of providing an efficient procurement process and its critical success factors to enable high performing procurement activities. As a result, an appropriate procurement design along with its critical success factors that can influence the procurement activities is presented.

Basic understanding was gathered from the prior research for which procurement/purchasing model by van Weele (2010) & Johnson et al. (2011) was presented in order to understand how the procurement activities are organized. Furthermore, this process model is explained in detail to get the deeper understand of inside activities. Various success factors in procurement activities were identified and listed in Chapter 4 as an initial performance improvement influencing factors. Achieving reasonable cost with improved quality and on time delivery is the main concern of identifying the success factors. However, the objective is to successfully manage the whole procurement process by taking into consideration some critical success factors and to satisfy the customer's needs.

Empirical portion of this study constitute of analysing the As-Is state of the case company and then compare it with the possible benchmark process to identify the differences. The information was gathered from multiple sources and combined with the literature in order to provide some recommendations to the case company along with an updated To-Be procurement process model. Furthermore, practical implications, future research suggestions and limitations are presented ahead in this chapter.

5.1. Managerial Implications

Procurement planning model and case design of procurement served as the current state As-Is analysis of the case company. It has been observed that company has already a shared platform for supplier bidding selection. Also, some important methods and approaches are performed to manage the process effectively. These approaches include WBS, audit and supplier's assessment and evaluation. The rich literature and company archives became the bases of mapping the initial model that contains the possible phases of procurement activities and some success factors.

Although Woima has some planning model and case design, the comparison of As-Is analysis with the benchmark process shows that there is a possibility to add *"quality gates"* and *"parts approval process"* between the phases of procurement process. These tools and methods have the capacity to ensure that the quality is being kept in accordance with the PO specification and manufacturer has clearly understood the requirement. Also, it helps in comparing the ordered material to the required customer's design so that they can prevent from the unexpected risk or errors at the time of commissioning on site. In the end, Woima will be able to have a reliable purchasing, complying to the quality and on time delivery. All of these are incorporated in suggested To-Be model that can ensure the effectiveness of the procurement process.

As the success criteria circulates around time, cost and quality, therefore some critical success factors are also found to be supportive in this scenario. Main stress by the respondents were on *supplier's assessment, effective communication, top management support, delivery terms (incoterm), change management, information technology and environmental factors.* Therefore, it is suggested that the adoptability of the aforesaid CSFs can bring a positive change in the procurement process of the case company Woima. Moreover, it is also suggested that tools like *AVL, total cost analysis* and *logistic control tools* coupled *with third party inspection agency* can assist the company in accomplishing the success criteria for their global project deliveries. In between the whole procurement process, key contributors can play a very important role. Findings also show that the stated tools and success factors must be utilized and adopted by the relevant influencers/contributors having right kind of knowledge to support the overall process.

These influencers are *technical team, internal customer, buyer, procurement officer, inspector, manufacturer/supplier, expeditor, category manager, operational/strategic purchasers and supplier development engineers.*

5.2. Research Limitations

In the mapping of procurement process and evaluation it with the benchmark process, the possible steps of the procurement were presented which contains number of critical success factors and extensive list of key influencers in each activity. Therefore, it was difficult to perform in depth analysis of each listed term in the procurement activities.

As this research focuses on the procurement process and its critical success factors, therefore, great deal of information is required to map a highly effective and efficient procurement process along with its critical success factors. However, the time and resources were limited to perform and explore further under this scope. This was a qualitative research in which the information about the process and factors were gathered through interview/discussion from the benchmark companies. It is assumed that participants have given realistic answers about how the procurement is organized in that company. However, the required information was collected and utilized in the research to get in-depth understanding of the success factors in the whole process. In the end, a standardized model of procurement was presented.

5.3. Future Research Suggestions

This research has identified some critical success factors to enable high performing procurement activities but, it would be interesting if the influence and benefits of blockchain technology on the procurement could be researched. Furthermore, companies are transforming their business and processes to some advance level therefore, it would be interesting if future researchers could identify the benefits and impact of AI and (augmented reality) AR on the procurement that can bring operational excellence, effectiveness and efficiency in the whole procurement process.

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APPENDICES

APPENDIX 1. Request for Invitation

Dear Sir/Madam,

You are requested to participate in face to face personal interview for the project related to the procurement process, where you are welcome to give your honest opinion and suggestions in the best manner. Interview will last for approximately 1 hour and there is no need to prepare anything in advance.

Purpose of The Research: The aim of this research is to identify and understand the procurement process and its critical success factors to ensure the effectiveness and operational excellence of procurement activities.

Benefits of The Research: It will provide valuable insight to the researcher in discussion and the organization while dealing with procurement activities. The identification of critical success factors can support the process and makes it an effective and high performing procurement activities.

Confidentiality Disclosure: The interview will be recorded if you allow and will be for research-based studies, but only researcher in discussion and supervisor will have the access. However, you may use a pseudonym for your introduction and your anonymity is guaranteed.

I will be looking forward to have a meeting with you. Your opinions and suggestions are valuable for this study. I expect that the proposed study will motivate and encourage you to participate in the research study that aims to provide tangible benefits to the research in discussion during the course of the research work.

Best regards,

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APPENDIX 2. Interview/discussion guidelines and questions

I. Introduction to establish a relationship

II. Instructions:

- ✓ The aim of this interview/discussion is to understand the phases of procurement process and its critical success factors.
- ✓ Respondent has the authority to skip the question if required.
- ✓ The anonymity and confidentiality are the priority.
- ✓ Interview will be recorded with the permission of the respondent.

Procurement Process and its Phases.

- Why have you opted to outsource? Have you ever considered outsourcing? What are your concerns?
- How do you describe the phases of procurement in your organization?
- How do you evaluate the performance in during each step? (Any tools, techniques and approaches)
- What are the base standards/benchmarks that are used during each step of procurement? (For example, while bidding, supplier selection etc. what is the requirement?)
- How important is the effectiveness of outsourcing procurement activities for you?
- Domestic or globalized outsourcing, which one do you prefer and why?

Success Factors in Procurement Process

- Do you think that outsourcing certain procurement activities add value to the company's success?
- What do you think are the critical success factors in procurement activities?
- Do you think that personal and environmental factors can influence the procurement process?
- How do employees contribute towards the critical success factors?
- What are the key contributors/influencers in the procurement activities?
- Do you think that critical success factors (CSFs) keep on changing with the evolution of technology?
- What is the ultimate vision of the company for future generation?