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DEVELOPING SUSTAINABLE VALUE PROPOSITION: A CASE STUDY FROM MANUFACTURING INDUSTRY

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ABSTRACT

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Increasing pressures to reduce costs, inprove productivity, and lower the environmental impact are forcing suppliers to present evidences of the monetary and societal value they create for the customers and society around. The extant academic literature on the practical activities related to topic is still sparse and this study addresses the gap by developing sustainable customer value proposition for Valmet's recycled fibre line solution for the Chinese market.

The research is based on literature review and single case study method. Theoretically the study is connected to the emerging literature of customer value and life cycle engineering, and to the research of sustainable development in the field of marketing. For exloiting empirical evidences, in-depth supplier interviews and customer survey were conducted.

The results suggest that selling of recycled fibre line solution requires tangible and credible evidence of the value and utility which is delivered for the customer. In addition to the economic benefits also societal benefits should be included in the value proposition that are the focus of attention in China. Still, the role of discovered benefits may be contradictory until they are communicated to appropriate decision makers. Managerially the study contributes to the customer value management and quantification knowledge and practices in Valmet's organization.

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Kasvavat paineet kustannusten alentamiseen, tuottavuuden parantamiseen ja ympäristökuorman pienentämiseen pakottavat toimittajia todistamaan rahallista ja sosiaalista arvoa, jota he luovat asiakkaille ja ympäröivälle yhteiskunnalle. Kuitenkin olemassaoleva akateeminen tutkimus käytännön toimista arvon näyttämiseen on vähäistä ja tämä tutkimus pyrkii vastaamaan tähän haasteeseen kehittämällä kestävän arvoehdotelman Valmetin kierrätyskuitulinjalle Kiinan markkinoita varten.

Tutkimus on toteutettu perehtymällä aiheeseen liittyvään kirjallisuuteen ja tekemällä tapaustutkimus aiheesta. Tutkimuksen teoreettinen tausta perustuu kasvavaan kirjallisuuteen asiakasarvosta ja elinkaariajattelusta sekä aiempiin tutkimuksiin kestävän kehityksen vaikutuksesta markkinointiin. Tutkimuksen teoreettinen aineisto kerättiin haastattelemalla toimittajan edustajia sekä asiakkaille suunnatulla survey-tutkimuksella.

Tulokset näyttävät, että kierrätyskuitulinjaston myyminen vaatii aineellisia ja uskottavia todisteita arvosta ja linjaston asiakkaalle tuomasta hyödystä. Taloudellisten hyötyjen lisäksi myös sosiaalisia hyötyjä tulee sisällyttää arvoehdotelmaan, sillä ne korostuvat Kiinan markkinoilla. Edelleen on tärkeää viestiä löydetyt hyödyt oikeille päätöksentekijöille, jotta niillä saavutetaan etua. Tutkimus tarjoaa myös manageriaalisia johtopäätöksiä arvon johtamisesta ja määrityksestä Valmetin organisaatiolle.

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Finally, the creative process of conducting this study has been personally very intriguing and educational. Scratching the surface of the world of academic research has given me guidelines into my future life and certainly some tools for tackling the new challenges that are awaiting.

Lappeenranta, June 2014
Janne Karhu

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ABBREVIATIONS

BATT	Best available technique
BDTPD	Bone dry tons per day
BM	Board machine
BOD	Biological oxygen demand
CHP	Combined heat and power plant
COD	Biological oxygen demand
CVD	Customer value determination
CVP	Customer value proposition
CVM	Customer value model
CVA	Customer value analysis
CSV	Creating shared value
GHG	Greenhouse gases
GSCM	Green supply chain management
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standarsization
LCA	Life cycle assessment
LCIA	Life cycle inventory assessment
LCC	Life cycle costing
LCP	Life cycle profit
NPV	Net present value
OCC	Old corrugated containers
OEE	Overall equipment effectiveness
RBV	Resource based view
RFC	Recycle fibre rocesses
ROI	Return of invests
SLCA	Streamlined life cycle assessment
TCO	Total costs of ownership
VBS	Value based selling

1 INTRODUCTION

Economic theories have long since qualified businesses in terms of their capacity to maximize profits. The current global context of business activity has challenged this approach by demonstrating its limits and the necessity of the broader scope, since industrial activities of the past half century have created serious societal problems. (Porter & Kramer, 2011) As awareness and concern for societal issues have increased, business and government are facing the key challenge of determining how to best promote and facilitate sustainable production and consumption. Thus, it has become increasingly important for organizations facing competitive, regulatory, and community pressures to balance economic and environmental performance. (Shultz & Holbrook, 1999)

At the same time, global financial turbulence has caused significant reductions in capital investments and subsequently created major changes to markets of capital goods and services. As a result, competition between few projects available has become fierce and margins hardly leave any profits for suppliers that are fighting for they existence. In such an environment, business marketers need new approaches for demonstrating the economic and environmental value that their offerings deliver to both the customers and to the society around (Polonsky, 2011). In addition, considerable evidence suggests that many organizations make their acquisitions of capital items simply on the basis of initial purchase cost without taking into account the long-term benefits and value creation potential.

This chapter gives background information and introduces the topic of this study. First, as the starting point, customer value in the industrial markets and the identified research gap are briefly introduced. Then, the main objectives of the study as well as research questions are presented, followed by construction of the scope and the theoretical background of the study. Finally general structure of the study is presented.

1.1 Customer value propositions in the marketing research

Marketing academics have recognized customer value as one of the most important research agendas. Growing number of suppliers in business markets increase their knowledge on what customers value to gain competitive advantage (Anderson, Narus, & Narayandas, 1999). Still, many technology based companies are not realizing the importance of value construct (Woodruff, 1997). This may be due to the fact that traditionally value was considered to be related to the functions and performance derived from the product itself. According to current thinking, value is created in customer's processes (Grönroos, 2008) and suppliers can only make value propositions intended to support customers in their value-creating activities (Vargo & Lusch, 2004). Even if majority of enterprises use value proposition term, less than 10 percent of companies have successfully developed and communicated them (Frow & Payne, 2008).

1.2 Indentifying the research gap

Sustainability can be considered as one of the factors creating value for customers with technology-based products. Althought sustainability plays an increasingly important role in firms operating in the industrial markets (Porter & Van der Linde, 1995), there is little prior research combining sustainability, customer value and sustainable customer value proposition. Thus, it becomes interesting issue because the extant literature shows that these two paradigms, customer value and sustainability, are related to each other. In addition, marketing discipline has been more concerned about conceptualizing customer value than offering operational tools for implementing a customer focus (Woodruff, 1997) and only few studies have attempted to translate the ideas to operational activities and processes (Lindgreen & Wynstra, 2005).

This study seeks to fullfill these gaps by utilizing case study approach to examine the role of sustainable development in customer value in industrial markets. The objective of the study is to develop a sustainable customer value proposition for a

process industry system by recognizing its key customer benefits both from economic and societal perspectives in the Chinese market. In addition, the purpose is to create understanding on how sustainable transition shapes the customer value in the future.

1.3 Setting the objective of the study and research questions

Case company Valmet is a global supplier of technology and services in several fields of process industries. The study focuses on Valmet´s recycled fiber system that produces recycled pulp from Old Corrugated Containers (OCC). In the field of such solutions, market is competitive and technical and performance differences between competitors are small. Valmet wants to improve its competitiveness in Chinese market, where the price is still the most important factor for customers making a supplier selection decision. Valmet has some efficiency benefits compared to competitors, but potential customers should be aware of monetary life-cycle and environmental savings that Valmet´s solution provides. As a consequence, the main objective of this study is to:

> ***Develop a sustainable value proposition for the recycled fiber system in the Chinese market.***

This main objective can be divided into three parts which will be addressed by answering the following research questions presented in Table 1.

Table 1. Research questions and objectives

	Research question	Objective
1.	What are the key benefits that Valmet´s OCC system provides in the Chinese market?	To identify customer value drivers of the OCC system from the supplier's perspective.
2.	What are the key determinants that influence supplier selection decision in the Chinese market?	To identify key customer value drivers affecting supplier selection decision.
3.	What are the potential key benefits that influence supplier selection decision in the future, considering the increasing environmental pressures in China?	To provide insights into business and environmental concerns that may affect formation of the customer value in the future

The first research question seeks to investigate how supplier has predetermined customer value of OCC offering in organizational level by recognizing key benefits of OCC system both from economic and environmental perspectives. The question is answered by conducting supplier interviews and content analysis. *The second* research question is closely linked to first one and it aims to investigate the current value sources for the target customers and especially the future value sources. The question is mainly answered through a qualitative customer survey. *The third* research question aims to shed light on how customer value can be reconstructed in the frame of sustainable development in China. For answering these questions, several sources of information are utilized including expert and supplier interviews, customer survey and extant literature.

The study is conducted as a part of the Cleantech Solutions research project implemented in 2011-2014. The research project strives to find new ways to increase industrial companies' competitiveness by identifying and developing novel processes and tools that facilitate the co-creation, assessment and rapid commercialization of cleantech solutions. The project is led by Lappeenranta University of Technology in collaboration with the University of Oulu and it involves several major Finnish cleantech companies and associations. (Cleantech

Solutions, 2014) This study is especially focused on assessing the financial and environmental performance of a chosen solution.

1.4 Scope and theoretical background of the study

Building up a suitable theoretical framework, proper basic assumptions for a study, are vital for the success. The study concentrates on conceptualizing and quantifying sustainable customer value and its communication to customers in the B2B markets. Thus, theoretically the study is connected to the emerging literature of customer value, literature of life cycle engineering, and to the research of sustainable development. All of them have drawn significant attention from researchers and they are known in their own sub-areas. However, the interrelationships among the topics remain unclear and this study aims to clarify how they can be combined to the form of sustainable value proposition. Figure 1 illustrates outline of this study in terms of the reseach disciplines that are involved.

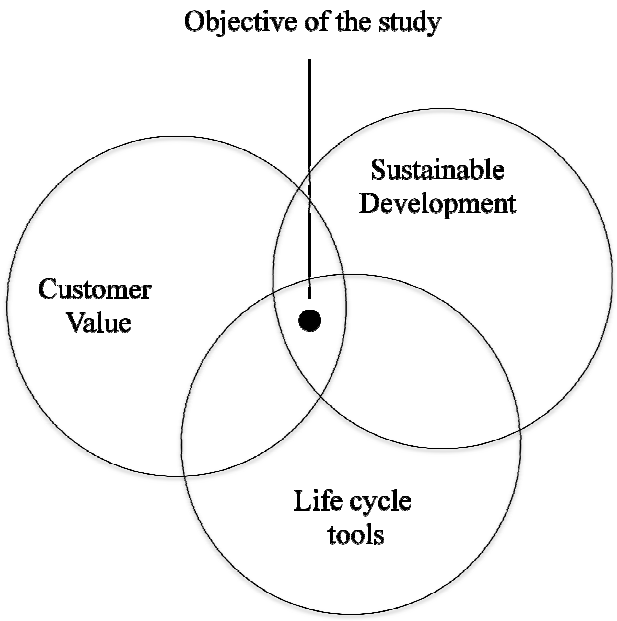

Figure 1. Objective of the study in relation with extent disciplines

Research questions are answered and objective is achieved by integrating literature with empirical data. As the concept of “sustainable value proposition” is not well known, study involves abductive logic with continuous discussion with theory and and empirical stages because theory cannot be understood without empirical observation and vice versa (Dubois & Gadde, 2002). By adopting this practice, the theoretical framework is shaped through empirical findings and the other way around. Thus, the scope of this study is rather explorative.

1.2 Structure of the report

Structurally the study is organized into nine chapters. Structure, and inputs and outputs of each chapter are presented in more detail in Figure 2, which helps to follow the progress of the study.

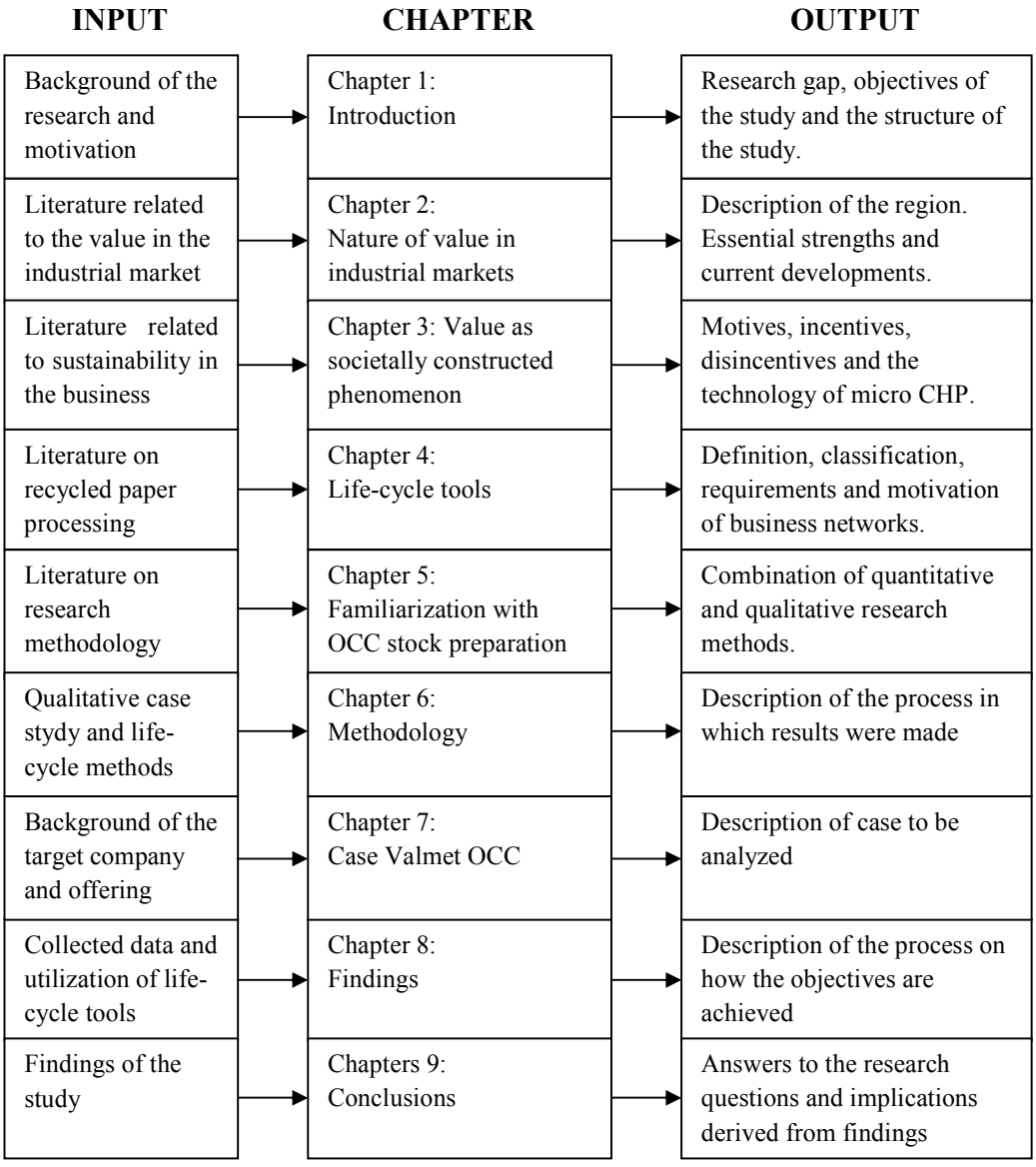

Figure 2. Detailed structure of the study

Following the present introduction and objectives of the study, literature review consists of three different research streams. *The second chapter* builds on understanding how value is constructed in industrial market. It briefly reviews the concepts of customer value and value based selling. Also the potential of customers buying behavior on customer value adding is discussed. *Third chapter* points out the fact that value is not constructed in dyads and it discusses the multidimensional nature of value in societal context. *Fourth chapter* is devoted to the introduction of value verification including both social and private value using life-cycle tools. *Chapter five* presents characteristics of stock preparation systems both from technical and economical perspectives.

The empirical section presents the researh methodology of the study in *chapter six* and deals with findings and conclusions. In the *seventh chapter*, the case company and their offering are introduced and charateristics of the Chinese market are discussed. Then in *chapter eight,* benefits of Valme's OCC offering are recognized from supplier and customer perspectives and the value dimensions that influences to buying decision are defined. Based on these, customer value proposition resonating with customer perceived value and competitive aspects is developed and verified using life-cycle calculation considering emerging societal development in China. Finally, in *chapter nine*, research questions are answered and most relevat managerial recommendations are given.

2 UNDERSTANDING THE NATURE OF VALUE IN THE INDUSTRIAL MARKETS

The concept of value has been an issue of major concern to both marketing researchers and practitioners even though it is the basis of the exchange theory of marketing.

> *"Value has always been the basis for all marketing activities; all parties involved in a market exchange expect to gain value with it."*

(Wolfgang Ulaga, 2003)

Literature review begins with a review of the existing literature on customer value. Value is a concept that has been used in various ways, leading to some confusion about what is meant by the term. To approach customer value from the perspective of value based selling, the concept of customer value, its definition and sources are discussed. To provide more applied and managerially focused direction, customer value measurement and quantification are reviewed.

2.1 Value in business markets

The concept of value is often discussed on a philosophical level and thus it is also one of the most overused and misused concepts. Different value approaches often have their foundation not only in marketing research but also in a variety of other research fields, such as strategy, organizational development, quality management, customer behaviour, customer satisfaction as well as in psychology and sociology. (Graf & Maas, 2008; Chernatony et al, 2000; Payne & Holt, 2001)

In marketing and organizational management literature value has been researched essentially from two perspectives: value-of-the-customer and value-to-the customer (Gupta & Lehmann, 2006). Value-of-the-customer research focuses on

the seller's perspective of value: the value of customer captured by the seller. Value-to-the-customer, on the other hand, concentrates on the value the customer receives or perceives (Ulaga & Eggert, 2005). This idea that only customers can determine the value of products and services was introduced by Levitt (1983) and has been one of the focal points of marketing research for the last 20 years (Grönroos, 2006).

In business markets in particular, customer value management is the cornerstone of the marketing management process which involves the process of understanding, creating and delivering value to customers (Anderson et al., 1999). There is a widespread understanding that the creation of superior customer value compared with the current and potential rivals is paramount to firm's long-term survival and growth (Anderson, Narus, & Van Rossum, 2006; Woodruff, 1997), driver for customer satisfaction and maintaining long-term customer-supplier relationships (Eggert, Ulaga, & Schultz, 2006), and the main component of sustainable competitive advantage (Porter & Tillman, 1985; Slater & Narver, 1994). Creating customer value and competitive advantage are linked through value delivery capabilities by the company´s use of resources (Slater & Narver, 1994). Still in many industries, both in mature as well as blue ocean markets, firms have found it difficult to become more customer focused and convey and share value that their offering provide (Töytäri, Alejandro, Parvinen, Ollila, & Rosendahl, 2011).

2.2 Nature of the customer value

In developing value based strategies, it is essential to understand the concept of customer value (Woodruff, 1997). Customer value builds on the notion that customers do not purchase products or services; they purchase the ability to create value for themselves. Even though the customer value construct is still lacking an universal definition, there is some consensus on the key issues related to the

matter. Ulaga & Eggert (2005) identified four recurring characteristic of customer value:

1. It is conceptualized as a trade-off between benefits and sacrifices
2. Benefits and sacrifices can be multi-faceted
3. Customer value is a subjective concept
4. Value perceptions are relative to competition

First, most highest-level definitions present customer perceived value commonly as a *trade-off between benefits and sacrifices* (i.e. Zeithaml, 1988; Anderson et al, 2006; Walter, Ritter & Gemünden, 2001) and emphasize its monetary characteristics. Anderson et al. (1999) defined customer value in business markets as:

> *"Worth in monetary terms of the technical, economic, service, and social benefits a customer company receives in exchange for the price it pays for market offering, taking into consideration competing supplier's offering and prices."*

According to Anderson et al. (2006) offering's value and price are independent of each other – raising or lowering the price does not change the set of benefits the offering creates to the customer, it only raises or lowers the customer's incentive to purchase. On this basis, when customers perceive greater benefits than sacrifices, customer value is created and value can be improved by either increasing benefits or decreasing costs. Second, these *trade-off benefits and sacrifices can be multi-faceted*. This means that benefits and sacrifices can be viewed for example from economic, technical, service or social perspectives (Anderson et al., 2009; Holmlund & Kock, 1995). Third, the value of the same offering varies for different customers , depending of its value in their usage situation and thus emphasizes its *subjective nature* (Ulaga & Chacour, 2001). Fourth, value perceptions are *relative to competition* meaning that delivering better

trade-off value than competitors will help to gain competitive advantage (Eggert & Ulaga, 2002).

There are also two distinct approaches to customer value; customer desired value and customer perceived value (Flint, Woodruff & Gardial, 1997). Customer desired value focuses on what the customer wants to have from a product or service offering in a specific use situation in order to achieve the customer's desired goals (Woodruff & Gardial 1996; Flint, Woodruff & Gardial, 2002). In contrast, perceived (or received) customer value refers to customer's assessment of the value that has been created by a supplier given the trade-offs between all relevant benefits and sacrifices in a specific-use situation (Flint et al., 1997). Customer satisfaction is a different, but complimentary concept to customer value. Both concepts describe evaluative judgments about product and its importance in a specific use situation (Woodruff, 1997).

As found, value is subjectively determined by beneficiary, rather than objectively determined by supplier, and it may be determined differently by different beneficiaries (Vargo, Maglio & Akaka, 2008; Woodruff, 1997). Even though many components of value could be categorized under the benefits or cost side and therefore translated in monetary value, the concept is broader in reality (Ulaga & Eggert, 2005). The customer value refers to perceptional intangible dimensions such as knowledge and interaction (Ulaga, 2003), trust, commitment and attraction (Grönroos, 2011), and also it has ethical and aesthetical aspects (Holbrook, 1994). Although these intangible dimensions are often considered as a non-monetary source of customer value, in the business-to-business context, the supplier's support will always have some direct or indirect effect on the economic result of a customer's business (Grönroos, 2011).

2.3 From goods and services to relationship-based value creation

In the marketing literature concept of value has developed within two distinct research streams: the value of goods and services and the value of relationships (Lindgreen, Hingley, Grant & Morgan, 2012; Lindgreen & Wynstra, 2005). Lindgreen et al. (2012) argues that, understanding of customer value has evolved from objects of exchange towards processes of exchange.

Lusch and Vargo (2004) claimed that value can be determined from two perspectives: value-in-exchange and value-in-use. In the value-in-exchange perspective, what could be labeled as a goods-logic, value is determined by the producer and embedded in offering being exchanged and seen as comparison between perceived quality and price (Ulaga & Chacour, 2001; Vargo & Lusch, 2004). Typical approach on value-adding strategies is that the supplier adds technical product features or supporting services to the core solution so that the total value of the offering is increased (Kaario, Pennanen, Storbacka & Mäkinen, 2003). Good example of this view is Michael Porter´s value chain roles of ‘‘producers’’ and ‘‘consumers’’ which are distinct. However, already Gummesson (1995) stated that customers do not buy goods and services, but they buy offerings which render valuable services.

Service-dominant-logic is based on assumption that suppliers should move their emphasis from the goods, to their actual service provision to the customer, where goods are just distribution mechanism for service. It embraces concepts of value-in-use and value creation throughout the relational process (Vargo & Lusch, 2004). In value-in-use perspective value is assessed and created in customer’s activities (Grönroos, 2006), and supplier can only make value propositions intended to support customers in their value creating activities. Value-in-use concept perceives customers as resource integrators who enhance their value by acquiring, using, changing and integrating resources including suppliers offering (Vargo & Lusch, 2004).

As goods-based approach tends to be relatively transaction oriented, in service economy relationship has an essential role. In fact, core offering displays the lowest potential in value creation in business relationship (Eggert et al,. 2006). Grönroos and Ravald (1996; 2009) assume that the relationship between a customer and a supplier has great influence on the perceived value of a customer through interaction. During such interactions the supplier can get opportunities to directly and actively influence its customer's value-creating process, both the flow of the process and its outcome. If there are no interactions, no co-creation of value is possible and the supplier remains a value facilitator.

It is noticed that value creation does not take place in isolation, so in relationship, suppliers must simultaneously offer value and gain benefits from customers (Lindgreen et al, 2012). The value of relationships in business markets offer significant opportunities for companies to create competitive advantages and achieve superior results (Hewitt, Money & Sharma, 2002) and previous marketing literature emphasize this relationship approach (Lindgreen et al., 2012). Thus, relational components must be included in the evaluation of benefits and sacrifices of preserving of relationship (Grönroos & Ravald, 1996), but they often will be ignored (Alejandro, Parvinen, Ollila, & Rosendahl, 2011).

2.4 Value based selling

The importance of the sales function in the company's customer relationships and in value creation is highlighted by academics and practitioners (Andersson et al., 2007; Terho, Haas, Eggergt & Ulaga, 2012). Value creation and marketing turn out to be intertwined; The opportunities for suppliers to engage themselves with their customer's value creation offer opportunities to extend their marketing activities by incorporating activities during firm-customer interactions in the marketing process (Grönroos, 2011).

Value Based Selling (VBS) is proposed as proper approach to differentiate from competitors especially in mature industries where customer's look only at the price and intensified competition has decreased the margins (Kaario, 2003; Andersson, Kumar & Narus, 2007). Because firms do not often have an accurate understanding on the worth of supplier's market offering to them, in VBS, the focus is on active identification of customer´s problems and the creation of mutually valuable solutions to these problems (Liu & Leach, 2001). Thus, VBS is aligned with both value-in-use (Vargo & Lusch, 2004) and value co-creation (Grönroos, 2011) approaches because value should be quantified iteratively with involvement from the customer side (Anderson et al., 2006;). According to Kaario et. al (2003) value based selling can be defined as:

> *"The selling of value is about selling – not products, services or solutions but – business impact that result in increased profits for the customers."*

VBS process presented in Figure 3 comprises understanding of the customer's business model, drafting value proposition that resonates with the target customers, communicating the value and capturing it through a value-based price (Terho et al., 2012; Andersson et al., 2007). This process is discussed in more detail in chapter 2.5.1.

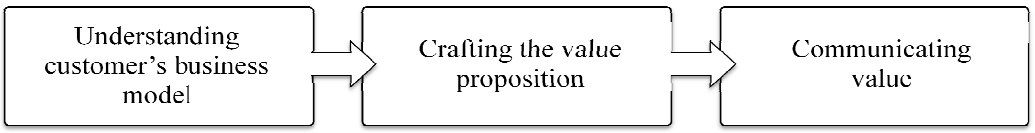

Figure 3. Value-based selling process (Adapted from Terho et al., 2012)

There is a evidence that implementation of the value-based selling process is difficult in real world context because value is often dictated by the way the problem is formulated and by the people who are making the value assessment (Kaario et al., 2003). Tuli, Kohli and Bharadwaj (2007) state that as product and a service selling addresses customer needs, it should be viewed in parallel to the

customer's purchasing processes. Identifying the required contacts requires understanding not only the organization structures but also the informal power structures of the customer organization (Kaario et al., 2003).

2.5 Cabapilities needed in value based selling

Scholars agree that salesperson plays a pivotal role in implementing firms marketing and selling strategy (Terho et al., 2011; Töytäri, Alejandro, Parvinen, Ollila & Rosendahl, 2011). Hence, shift to the emphasis on value-in-use view poses internal challenges for most traditional firms (Grönroos, 2008). Implementing value-based selling requires most firms to develop new capabilities that enable them to analyze their customer's processes and also environment where customer is operating. Development of such capabilities requires significant investments in customer relationships (Kaario et al., 2003). Unless salespeople understand and persuasively communicate the superior value proposition to the customers, the firm's strategic focus on value creation creation will not impact performance (Anderson et al., 2007).

A Resource-Based View (RBV) of the firm provides a conceptual framework for connecting supplier's marketing and sales processes to the recognition of customer's business processes. It emphasizes the strategic importance of particular resources, capabilities and competences in enabling organizations to conceive, choose and implement competitive strategies. (Barney, 1991) Hamel and Prahalad (1994) suggest that core competences are not physical assets but intangible processes such as communication, involvement, and deep commitment to working across organizational boundaries. The strategic challenge for a firm is to manage the fit between these competencies and customer value (Ulaga & Chacour, 2001).

2.5.1 Understanding customer's business model

Research has shown that there are huge gaps between what companies think their customer value and what the customers value in practice (Ulaga & Chacour, 2001;

Woodruff, 1997). Suppliers can choose either a reactive or proactive approach in assessing customer value (Woodruff & Gardial, 1996). Proactive marketers can actively influence changes in customer's desired value by helping customers interpret the changes in their environments, respond to those changes, and possibly avoid undesirable changes (Hamel & Prahalad, 1994; Terho, Haas, Eggert, & Ulaga, 2012). From the value-in-use perspective, proactive orientation sees a salesperson as a value facilitator that necessitates customer's participation (Grönroos, 2008) while reactive marketers wait to respond to chances as they occur (Woodruff & Gardial, 1996).

A deep knowledge of the customer's business helps salespeople to concentrate on issues that will make difference for the customer, and allows the supplier to differentiate from the competition (Anderson et al., 2006). Building a so-called Customer Value Model (CVM) helps firms to recognize the customer value and to modify the business model suitable for capturing the value (Pynnönen, 2008). CVM can be opened and analyzed by defining the single attributes of value elements that can be technical, economic, service or social by their nature (Anderson et al., 1999). Woodruff and Gardial (1996) introduced generic Customer Value Determination (CVD) framework that is applicable for developing CVM. It consists of five phases shown in Figure 4.

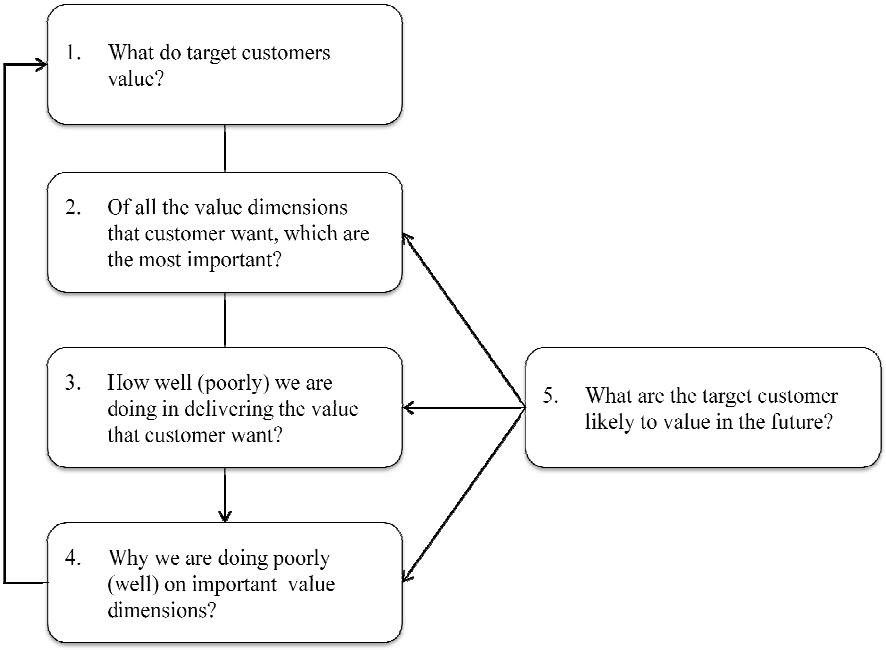

Figure 4. Customer value determination process (Woodruff & Gardial, 1997)

If customers cannot explicate their business need or value is not assessed, selling efforts remain at level of predefined needs without an understanding on the real drivers that contribute value to the customer's business (Terho et al., 2012). Grönroos (1996) states that firms begin to gain more knowledge about the value through the consumption process as it moves from a product oriented to a relationship-oriented value.

2.5.2 Crafting the value proposition

Customer value proposition has become one of the most widely used terms in business marketing. Despite the widespread use of the term, in accordance of Frow and Payne (2008), only few firms have developed and routinely communicated formal value propositions. Early work of Lanning and Michaels (1988) has been influential in defining value proposition as a statement of benefits offered to customers. Later the concept has been developed in various research streams including strategy, stakeholder and relationship perspectives (Ballatyne, Frow, Varey & Payne, 2011).

There is no all-inclusive definition for a customer value propositions (Anderson et al., 2006) but many authors agree on two issues (Rintamäki, Kuusela & Mitronen, 2007). First, it is known that effective value propositions cannot be pre-packed in advance by the sellers and they should be co-produced with customer (Flint & Mentzer, 2006; Ballatyne & Varey, 2006). Second, value proposition has a key strategic role within the organization in pursuit of competitive advantage (Anderson et. al., 2006; Webster, 1994). Hence, customer value proposition is an encapsulation of a strategic management decision on what the company believes its customers value the most and what it is able to deliver in a way that gives it competitive advantage (Rintamäki et. al, 2007)

Customers always assess a given market offering relative to all other alternatives. Andersson et al. (2006) suggest that suppliers usually use three kinds of value propositions to communicate value; all benefits, favorable points of difference and resonating focus.

1. **All benefits** approach is mostly used approach to communicate value to customers. It consists of all benefits that offering may deliver to target customers. This approach requires the least knowledge about customers and competitors' businesses and thus the least amount of work to construct. This may lead to situation where supplier stresses features that actually provide no benefit to target customers.
2. **A favorable point of difference** focuses on defining a competitive position relative to customer's next-best alternative. While better than an all benefits value proposition, this type of value proposition still has a major drawback. Without understanding on customers business, suppliers may stress the points that deliver relatively little value to the target customers.
3. **Resonating focus** approach concentrates on the one or two points of difference that are truly meaningful and deliver the greatest value to target customers. The approach seems to be very effective but it is not easy to

craft. Suppliers have to understand how value is constructed in customers' processes which requires time, persistence and some creativity.

According to Anderson et al. (2006), superior value propositions are built around few elements that matter most to the customers. They demonstrate the value of the offering in such a way that displays a sophisticated understanding on their customer's priorities but is enough general to attract adequate customer segments with homogenous value needs (Ballatyne & Varey, 2006). VBS is also likely to be effective when sellers can differentiate themselves sufficiently from competition (Terho et al., 2012). Here, Anderson et al. (2006) claims that it is particularly useful to sort value elements into three types in comparison to competition:

1. **Points of parity**. These are aspects or components that perform the same or have similar functionality as those of the next best alternative.
2. **Points of difference**. These are components of a supplier's offering in which the offering is either superior or inferior to the next best alternative.
3. **Points of contention** These are components or features in which the supplier and customer have disagreement on how the performance or functionality of the offering compares with the next best alternative.

However, today's fast-pacing markets also demand continuous innovation or improvement in the value proposition. Customers periodically change what they value, and in some industries changes occur, quite rapidly and extensively. Thus, value sellers also need to be aware of customers' value changes and they have to quantify the business benefits of the renewed operating model faster than competitors (Flint, Woodruff & Gardial, 2002).

2.5.3 Communicating the value proposition

Companies rarely take the trouble to communicate the economic, technical, service, and social benefits they provide to prospective customers. Most sellers

simply assume that buyers grasp the value of products and services (Narayandas, 2005). In VBS the essential aspect of the sales communication is the credible demonstration of the offering's contribution to the customer's business profits (Terho et al., 2012) or a buyer is likely to dismiss it as marketing puffery. Properly constructed customer value proposition demonstrates how valuable offering really is. (Anderson et al., 2006)

Value quantification is a clearly defined statement that is designed to convince customers that one particular product or service will add more value or solve a problem better than others in its competitive set. (Anderson et al., 2006). It can be carried out at different levels and it can have many format. According to Narayandas (2005), it is useful to group benefits and value drivers into four categories.

1. **Tangible financial** benefits have value that sellers can communicate and buyers verify.
2. **Nontangible financial** benefits are those with value that sellers can convey but buyers can't easily validate.
3. **Tangible nonfinancial** benefits have value that is difficult to quantify.
4. **Nontangible nonfinancial** elements have value that both sellers and buyers are unable to quantify.

Anderson et al. (2006) found that most value propositions make claims of savings and benefits to the customer without backing up such claims with supporting evidence. Clear value evidence acts as a powerful mechanism to reduce ambiguity (Anderson & Wynstra, 2010) and builds evidence for the offering's monetary value in the customer application for value-in-use (Grönroos & Helle, 2010), but even if value cannot be precisely quantified, it is important to show the size of value opportunity visible to the customer (Terho et al., 2012). The logic of calculations, the assumption behind them and the discussed business impacts are

often more important than exact figures. Calculations must be simply enough but still compelling (Andersson et al., 2003).

The logic behind the value quantifications is that there is usually high uncertainty perceived by the customer. Reducing customer perceived risk has been identified as one of main areas of value selling strategies (Roune, Bristow & Terho, 2011). Van Weele (2008) divides customer perceived risks into four classes; technical, commercial, contractual and performance risks. Customer references are widely used way to demonstrate a past history value successes and evidence of the suppliers capability to deliver superior value and reduce perceived risk (Jalkala & Salminen, 2010; Andersson et al., 2006; Van Weele, 2008) Performance guarantees are other widely implemented manner to prove suppliers commitment to delivering superior value (Roune et al., 2011). Also open dialogue, transparency and trust have an essential role in demonstrating credibility of the arguments presented (Kaario et al., 2003).

2.6 Role of the supply management in value creation

There is an increased marrying of supply chain management and marketing literature within the value creation research (Lindgreen et al., 2012). Supply strategies can be considered as mirror image of the supplier's sales strategies focusing on supplier evaluation. The overall objective of the evaluation process is to reduce risk and maximize the overall value to the customer (Andersson et al., 2006). Purchasing and supply management have traditionally been supporting functions in firms, characterized by transactional buying and short-term relationships. However, the changing role of supply function of firms is widely recognized by many researchers in the field of business studies (Ellram, 1995).

Customer's purchasing operations are usually considered as cost driven, and thus seen as a way to increase profits through pressing suppliers to continuously reduce prices (Anderson & Narus, 1998). From the late 1980s, in the field of purchasing,

researchers began to propose making the supplier selection decision from a total cost point of view instead of just focusing on the purchase price. Since early 90's, several authors have proposed the adoption of the concept of total cost of ownership (TCO). (Ellram, 1995) Nowadays, customers increasingly assess benefits gained from offering instead of just purchase price (Panasuranam, 1997). However, even if the value of a product offering is known, purchasing managers have most likely far greater experience of using price information than value information. (Andersson et al., 2006)

The supplier selection is the process during which firms identify and evaluate alternative suppliers. It is one of the most fundamental and important decisions made by buyers and organizations. (Andersson et al., 2006) Usually, investment analyses and calculations are used to indicate the economic feasibility or cost-effectiveness of investment options. Common measures are the return on investment (ROI), the net present value (NPV) and the pay back period that are often calculated using deterministic spreadsheet models. The role of uncertainty in the decision-making remains, however, vague in such models (Fabrycky and Blanchard, 1991). Difficulties increase from the increased levels of complexity involved in considering various supplier performance and relationship factors (Andersson et al., 2006).

3 VALUE AS A SOCIETALLY CONSTRUCTED PHENOMENON

In recent years, companies have used to create value at the expense of the broader community which is increasingly seen as a major cause of social, environmental, and economic problems (Porter & Kramer, 2011). The greatest problem lies with companies themselves, which remain trapped in an outdated approach to value creation. They continue to view value creation narrowly, optimizing short-term financial performance while missing the most important customer needs and ignoring the broader influences that determine their longer-term success.

However, sustainability has widely been accepted as a core business rather than passing phenomena, and an increasing number of firms are advocating the goal of sustainability. In this chapter, a broad view to sustainability both from social and economic perspectives is outlined and the role of environmental technologies in the sustainable development is discussed.

3.1 Sustainable transition in the industrial context

United Nations (2010) forecasts that the world population may stabilize around twice the current population in the second half of the 21th century. The major part of this population growth will occur in the third world countries, where the current standard of living is below the global average and often far below the acceptable levels. (UN, 2010) However, the standard of living will continue to rise in these countries. Thus, there will be a strong growth demand of industrial capacity and consumption of natural resources which affect to the environmental issues and resource depletion problems (Westcämper et al., 2000).

Social and economic sciences have been interested in common property and resource management. More than 40 years ago, in Tragedy of commons, Hardin (1968) argued that the world´s most compelling problem was selfish exploitation

of the plane's scarce resources. This dilemma of commons is often used in connection with sustainable development and it refers to the phenomenon in which the "member of a social group faces choices in which selfish, individualistic, or uncooperative decisions, through seeming more rational by virtue of short term benefits to separate players, produce undesirable long-term consequence for the group as a whole" (Schulz & Holbrook, 1999). Examples include the overconsumption of nonrenewable resources, noise, and pollution caused by different industries.

Term sustainability was first time defined in Our Common future, a report published by the World Commission on Environment and Development in 1987, also known as the in Brutland report:

> *"Sustainable development meets the needs of the present without compromising the abilities of future generations to meet their own needs."*

(UNWCED, 1987)

Since then sustainable development has become one of the most important political and business agendas both in the developed and in the developing and transitional economies. In 1990's sustainable development has more commonly been expressed in terms of the three "pillars" of economic, environmental, and social objectives or indicators (Norris, 2001), also called as a triple-bottom approach (Gauthier, 2005). However, some authors argue that the two terms "sustainable" and "development" are incompatible because development tends to destroy the ability to sustain (Mullaney & Pinfield, 1996).

In industrial context, it seems, that there is no specific definition for sustainability, but some attempts have been made. For example, Carter and Rogers (2008) define sustainability as "strategic, transparent integration and achievement of a firms social, environmental and economic goals in the systemic coordination of key

inter-organizational business processes for improving the long-term economic performance of the individual company and its supply chains".

There is still great diversity of determinants of sustainable transition in industrial context. In recent literature following determinants are identified as the most important; existing environmental regulation or anticipation of future regulation, niche market opportunities, a first mover advantage, corporate governance changes, awareness of problems and opportunities which may be improved by a firm having an cleaner technology, social or commercial pressure due to environmentally conscious consumers with preferences for cleaner products. (Van den Bergh, Truffer, & Kallis, 2011)

It has long been debated whether environmental performance is simply a cost of doing business or can it also enhance the economic performance of firms (Porter & van der Linde, 1995). Some authors suggest a win-lose game where strategic decisions with ambitious environmental goals come with economic costs (Hoffmann & Ventresca, 1999). On the other hand, many researchers suggest a win-win situation where the interests of all stakeholders can be satisfied (Porter & Kramer, 2006). However, there is increasing recognition or even moderate consensus within the literature that internal sustainable management is a key to improving enterprises' performance (Carter, Ellram & Kathryn, 1998) and sustainability and sustainable development can lead to competitive advantage for firms (Wagner, 2005). It is also widely recognized that basic competencies and internal capabilities should precede the development of sustainable practices (Porter & Kramer, 2006).

3.2 Creating and marketeting Shared Value

Peattie (2001) argued that sustainable development poses opportunities but also significant challenges to the marketing discipline and practitioners. In general, there is fundamental conflict between benefits of the firms and benefits of the

society. The economics of marketing is traditionally based on neoclassical thinking where the firms have primarily responsibility to create value for their shareholders. This kind of micro-marketing approach cannot capture wider perspective such as environmental issues because classical micro-economists suggest that individuals seek to maximize their own profits (Polonsky, 2011). However, marketing scholars and practitioners are becoming increasingly interested in how environmental related issues impact marketing activities (Frow & Payne, 2011; Chamorro, Rubio & Miranda, 2009; Hunt, 2011)

Recent changes in business context, such as globalization, have led to transition in how companies should analyze, create and deliver value (Porter & Van de Linde, 1995). While Porter (1985) suggested that firms create value through exchange activities across value chain, many authors (e.g. Kothandaram and Wilson, 2001; Polonsky, 1995; Payne, Ballatyne & Christopher, 2005) considers that value creation in nowadays takes place in a wider network of different stakeholders, and thus it should be approached from a wider point of view (Frow & Payne, 2011). Stakeholder theory, originally developed by Edvard Freeman (1984) groups a company's external actors, including suppliers and customers, its competitive environment and its regulatory environment (Delmas and Toffel, 2004), even if it is highly contested what a stakeholder is (Miles, 2012). However, according to Polonsky (1995), as all economic actors are interconnected, they have an ability to enhance sustainable development.

Porter and Kramer (2011) introduced the concept of "Shared Value" announcing that corporates need to redefine their role in society. They claimed that in reality, there is no inherent conflict between capitalism and social needs and they give rise to far broader approaches to economic value creation. Thus, competitiveness of a company and the health of the communities around it are mutually dependent. Firms can obtain private benefits from improved environmental performance in the form of efficiency savings or added market value, even to the extent that their

overall economic performance is improved. According to Porter and Kramer (2011) Shared Value can be defined as:

> *"Corporate policies and practices that enhance the competitiveness of a company while simultaneously advancing social and economic condition in the communities in which it operates."*

Figure 5 illutsrates that Shared Value is not sharing created value, balancing shareholder interests or just sustainability but rather about expanding the total pool of economic and social value. Approach provides a link between sustainability and the value oriented approach, and opens up new needs, new markets and new value chain configurations. This creates new strategic positions, and new opportunities for extending existing positions and new way to add value to core business. (Porter & Kramer, 2011). The social dimension on strategy can be more sustainable than conventional cost and quality advantages (Porter & Kramer, 2007).

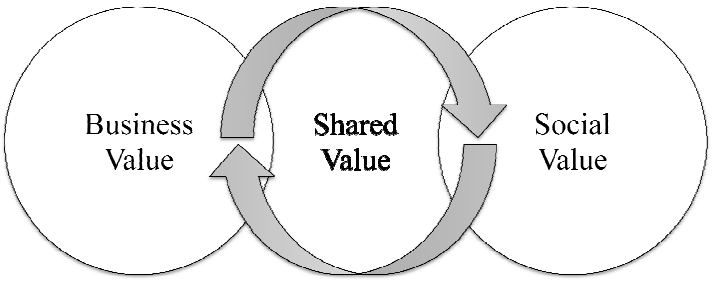

Figure 5. The idea of Shared Value (Adapted from Porter & Kramer, 2011)

The challenge for organization's in today's marketing environment is not only to produce value for their shareholders, but also to the important communities and groups that hold the firm accountable for its actions (Fry & Polonsky, 2004; Polonsky, 2011). Thus, when firms are developing marketing strategies, they must realize that they are responsible to numerous internal and external stakeholders, and they have to balance between the objectives of the organization, consumers,

society and the natural environment (Fry & Polonsky, 2004). This means that companies should incorporate a social dimension to their value proposition (Porter & Kramer, 2007). These factors have also caused the inherent complexities when trying to merge environmental concerns with marketing practices and marketers frequently ignore this broader approach and integration into strategy formulation (Polonsky, 2011).

3.3 Role of environmental technologies in sustainable transition

Most theoretical approaches on sustainability emphasize the relevant role of technological change in the transition towards a sustainable industry. It has the potential to improve social welfare by reducing environmental impacts from manufacturing activities and simultaneously improve economic performance especially in energy and natural resource intensive industries (Shirivastava, 2005; Klassen, 2000). According to Kemp and Pearson (2007), environmental technologies can be defined as:

> *"Technician methods and procedures through which the environmental impacts can be reduced in accordance with the objectives of sustainable development throughout its life cycle."*

The crucial element here is "throughout its life cycle", which represents the idea that product design, process design, and manufacturing practices should contribute to maximum recycling and harmless waste (McDonough & Braungart, 2006; Porter & Van der Linde, 1995).

Environmental technologies are usually grouped in two distinctive technological approaches, cleaner technologies and end-of-pipe technologies. Industries have traditionally consisted largely of add-on or end-of-pipe technologies, which have been a common response to curb pollutive emissions, merely shifting environmental problems. This is easy to understand from the mass balance

perspective. For example, cleaning polluted air by installing filters in chimneys will cause solid waste. Since this end-of-pipe approach is often costly and ineffective, industries have increasingly adopted integrated cleaner technologies (Van Den Bergh, Truffer, Kallis, 2011) which involve the design of innovative new products or production systems in which pollution and waste were eliminated at the design stage (Porter & Kramer, 2006).

Pollution per se is nothing more than a form of waste (Porter and Van der Linde, 1995). As such, pollution consumes resources and increases costs without generating any offsetting value. By eliminating pollution, costs can be reduced and any associated legal problems avoided or reduced. (Shrivastava, 1995) Firms engaging in sustainable development gain cost advantages associated with designing products that minimize the environmental impact of wastes thereby reducing simultaneously the consumption of energy and materials. This can be seen as the win-win solution, in which companies could improve their environmental performance and benefit from either consumer demand for greener products, or from cost saving and efficiency gains (Porter & Van de Linde, 1995).

However, the widespread adoption of cleaner technology suffers from a conflict between social and private incentives. Firms do not usually have necessary incentives to adopt clean technologies, which are found beneficial from the social point of view (Shrivastava, 1995). In general, clean technologies lead the reduction in external costs that are paralleled by a reduction in private costs. Only when the external cost is translated into private cost through a public policy that regulates the environmental externality will the cost structure become more incentive-compatible, thus improving the likelihood of adopting environmental technologies (Van den Bergh, Truffer, Kallis, 2011).

4 VERIFYING SHARED VALUE USING LIFE CYCLE TOOLS

Life-cycle thinking is the scientific approach behind business decision support related to sustainable consumption and production. Measurement of environmental and economic impacts often requires some form of conversion methodology and estimations. Direct and indirect impacts of material and energy flow can be measured using Life Cycle Analysis (LCA). Analysis reveals which materials or processes causes environmental impacts on various stages of their life cycle. Furthermore, the increasing interest in Life Cycle Cost (LCC) and Life Cycle Profit (LCP) analyses have lead to the use of LCA as a theoretical lense to evaluate also economic issues.

4.1 Environmental life cycle assessment

Environmental impacts occur across all stages of a product´s life cycle, from raw material extraction to manufacturing, from use to reuse and final disposal, namely from cradle-to-grave (Zhu & Sarkis, 2006). Life cycle assessment (LCA) is a standardized quantitative tool that provides a concept, framework, and method to identify and evaluate the environmental impacts of products, processes or services with all the stages of a process or product (ISO, 2006; Norris, 2001). LCA can be used for example to:

- Identify and quantify the energy and materials used and the waste released to the environment
- Assess the impacts of those energy and material used and released to the environment
- Identify and evaluate opportunities for environmental improvements
- In decision making in industry, governmental and non-govermental organization
- Create marketing opportunities for products

(Norris, 2001; Kloepffer, 2008; ISO 2006)

Growing activity within the field of LCA has been invested to the development and harmonization of the LCA method. Most widely accepted and rigorous method is presented by International Organization for Standardization (ISO). International standards ISO 14040/2006 and 14044/2006 introduces principles and framework as well as requirements and guidelines for assessment. According to the current ISO standard (2006), the life cycle assessment study consists of the following stages presented in Figure 6:

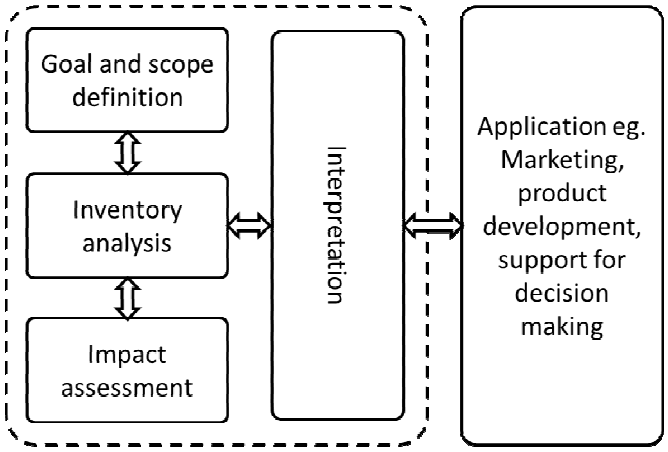

Figure 6. LCA framework (adapted from ISO, 2006)

1. **Goal and Scope**. LCA process begins by setting goals to determine the purpose of the study and boundary of the process or system to be investigated. This is to ensure that no relevant part of the system will be omitted.
2. **Inventory analysis**. Objective of the second phase is to quantify all the materials and energy inputs, as well as waste and emissions outputs that cause the environmental burdens throughout the life cycle. It involves the collection of necessary data to meet the goals of the defined study.
3. **Impact assessment**. Third phase is aimed at evaluating the impacts associated with the identified forms of resource use and environmental

emissions to better understand their effects to the environmental and human health including resource depletion.

4. **Interpretation**. Last phase involves a systematic procedure to evaluate the information from the inventory analysis and impact assessment of the product system and to draw conclusions from all of the foregoing results in relation to the objectives of the study.

(ISO, 2006)

Standardized LCA delivers benefits when used appropriately, but it can be time consuming and technically challenging. Simplified (also streamlined) LCA is easier and faster to carry out and it consist of the same four steps as the full LCA (Antikainen & Seppälä, 2012). Simplifications can be made at various stages of the analysis, including the use of substitute data material, matching the system boundaries so that the investigated processes will be reduced, reducing the subjects of resources, leaving out a detailed impact assessment or by replacing the numerical data with qualitative information. (Todd & Curran, 1999)

The simplifying methods should be chosen consistent with the study's goal so that the subsequent results will be adequate to support that goal. For example, if the objective is to compare two products to determine superiority of one over another in the entire life cycle, then it makes sense to limit the streamlining process as much as possible. (Weitz & Sharma, 1998) Simplified LCA is easier and faster to carry out but simplifications often come at the price of accuracy and coverage, and risk for drawing false conclusion is raised (Antikainen & Seppälä, 2012).

4.2 Integrating life-cycle costs in the LCA

Many companies have assessed the environmental impacts of their offerings, but in decision making economic aspects usually matter. Neither the internal or external economic aspects of the decisions are within the scope of traditional LCA

(Norris, 2001). It can be difficult to communicate LCA results to the customers, and it would need some sort of economic context or relative comparison to incorporate information to their purchasing decisions. Life Cycle Costing (LCC) is a framework for calculating the Total Costs of Ownership (TCO) including the cost of acquisition, operation, maintenance, conversion and decommission them into one key economic figure (Fabrycky & Blanchard, 1991). Thus, LCC is the logical counterpart of LCA for the economic assessment purposes (Kloepffer, 2008).

LCC is older than LCA, though it is not yet standardized, except for some special purposes. LCC was developed by US department of defence for procurement purposes for quantifying the costs of several investment alternatives especially when they are unique and the sources of uncertainty stem from both the variability of the performance and the varying subjective valuations of the decision maker (Rosqvist, 2001). International Electrotechnical Commission (IEC) published standard 60300-3-3:2004 in 2004 that gives recommendations how to carry life cycle costing. Also ISO has released LCC standard as part of ISO 15686 but it concentrates on buildings life cycle economy. Despite the similarity of their names, LCC and LCA differ in terms of the modeling principles, as seen in the Table 2, but the features of both methodologies can be used in the development of economic process modeling (Soukka, 2007).

Table 2. LCA and LCC differ in purpose and approach (Norris, 2001)

Method	LCA	LCC
Purpose	Compares relative environmental performance of alternative product systems from a broad, societal perspective	Determines cost-effectiveness of alternative business decisions, from a perspective of an economic decision maker
Activities which are considered part of the life-cycle	All processes causally connected to the physical life cycle of the product	Activities causing direct costs or benefits to the decision maker during the economic life of the investment
Flows considered	Pollutants, resources, and inter-process flows of material and energy	Costs and benefits of monetary flows directly impacting on decision maker
Units for tracking flows	Primary mass and energy; occasionally volume, other physical units	Monetary units
Time treatment and scope	The timing of processes and their release or consumption flows is traditionally ignored; impact assessment may address a fixed time window of impacts but future impacts are generally not discounted	Timing is critical. Present valuing of costs and benefits. Specific time horizon scope is adopted, and any costs or benefits occurring outside that scope are ignored

LCC coupled with LCA is an effective approach for analyzing the economic and environmental burdens associated with a product or process by identifying, quantifying and assessing the impact of the utilized energy and materials as well as waste released to the environment. The consequences of leaving LCC out of LCA are summarized as (Norris, 2001):

- Limited influence and relevance of LCA for decision making
- Inability to capture relationships among environmental and cost consequences, which also inhibits the search for the most cost-effective means to environmental improvements
- Potential to miss economically important or in some cases even pivotal environment-related consequences

According the IEC (2004) standard, there are two different perspectives to life cycle costs; supplier and buyer. From the customer's point of view life cycle costs can be broken down into three phases:

$$\text{Life cycle costs} = \text{cost}_{\text{acquisition}} + \text{cost}_{\text{ownership}} + \text{cost}_{\text{disposal}} \qquad \text{(Eq.4-1)}$$

Acquisition costs are easy to assess as they are usually visible before investment decision. This phase determines the reliability, maintainability, and the effectiveness of the asset or the project as typically 70-80% of an asset life cycle costs are "locked" in this phase. (Alting, 1995) Therefore, it is important to have a good understanding on how specific assets or systems will be performed in the future. Costs of ownership are more difficult to be estimated. Operating costs and maintenance costs as well as downtime caused by indirect costs are often substantial compared to the acquisition price. Disposal cost or residual value are also future costs and often difficult to estimate and they are often assumed to be zero. (Haram & Horner, 2003).

LCC has seemingly potential in the field of marketing because many organizations make acquisitions simply on the basis of initial purchase cost. Usually number of people are involved in the purchasing process and their positions may vary across customer organizations. When this informal purchasing center is fragmented, people tend to focus only on their visible costs and underestimate direct, indirect and cumulative impacts of their actions. As a result, there is little or no incentive to holistically apply the principles of LCC, because it is more rewarding for each group to minimize the cost that they are responsible for without considering the impact of their actions on total project cost. (Norris, 2001)

4.3 Life-cycle profit assessment creates comprehensive picture

Investment cannot be compared only on the basis of costs, because the benefits provided by the investment differ with respect to return, comfort, and risk. It is

then necessary to extend the expression LCC to Life Cycle Profit (LCP), which takes a broader view and adds life cycle revenues to LCC. LCP is a systematic approach that aims to estimate the costs, profits and profitability of an investment for the future over the entire life span of asset (Hagberg & Henriksson, 1996). LCP analysis has been developed as a basis for the comparison between investment alternatives (Riikonen, 1996) and it relates closely to Overall Equipment Effectiveness (OEE) which measures performance metrics but does not take account costs and revenues. The basic idea of LCP is illustrated in Figure 7.

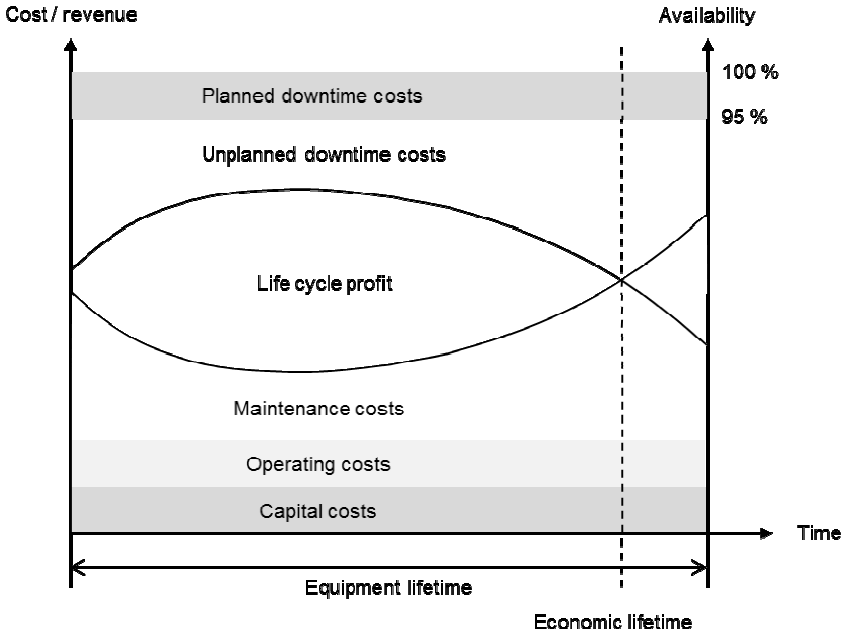

Figure 7. Idea of LCP approach (Adapted from Idhammar, 1996)

Idhammar (1996) defines LCP as the present value of all revenues that the equipments generates minus the life cycle cost. The life cycle costs are the sum of maintenance, operating and capital costs. On the contrary, life cycle revenues are the possible revenues at an availability rate 100% minus planned and unplanned downtime costs which represents losses of the potential opportunity to increase uptime. The life cycle profit is then the inner part that is formed by total cost and total revenues (Idhammar, 1996). This idea can be formulated as:

$$\text{Life cycle profits} = \text{Life cycle revenues} - \text{Life cycle costs} \qquad \text{(Eq. 4-2)}$$

Capital investment is a decision process, where the attention of the decision to be made is first focused on the achievement of some reservation value or utility value of investment alternatives. After this precondition is satisfied, the attention turns the maximum value or utility among the set of admissible investment option. (Runge, 2000). The sources on uncertainty on investment stem from both the variability of the performance of the invested system and the varying subjective valuations of the decision maker given the new information as future unfolds. It is argued that the quality of investment decisions is improved by the iterative nature of the assessment process, where LCP model refinement is continuously done, until decision maker feels that adequate information for decision making has been acquired. It is important to note that the goal of the LCP assessment is not the derivation of only numerical results, but the gain of qualitative insights in the decision maker's preference structure and the uncertainties involved (Rosqvist, 2001).

However, LCC and LCP were not originally developed in an environmental context even they contain the words "life" and "cycle". Since the origins of analyses are in the neoclassical economy and concentrated on traditional cost factors with aim to translate costs into one-dimensional monetary unit, neither approach does not by itself address environmental impacts and possible external costs caused by them (Gluch & Baumann, 2004; Helu, Rühl, Dornfeld, Werner, & Lanza, 2011). Environmental impacts are dealt as part of LCA in physical – as opposed to monetary – terms. These external costs to be expected in the decision relevant near future, comprise real money flows as well and must be included in the analysis. (Gluch & Baumann, 2004)

4.4 Problems related in life cycle approaches

Despite the self-evident potential, LCC and LCP approaches have number of challenges and uncertainties that can hinder their applications. Depending on the scale of investment, quantifying the life cycle costs may be difficult. For example when the costs of paper machine are investigated, the problem is huge amount of data needed (Peltonen, Kortelainen, Kuukka & Virtanen, 2002). Barringer and Weber (1996) noted that LCC is not an exact science. It is highly dependent on the assumptions and estimates made whilst collecting data. Thus outputs are only estimates, and estimates are not accurate. Also attempting to estimate far in the future could lead to forecasting errors (Ashworth, 1996). Woodward (1997) identified the following five major sources of uncertainty.

1. Differences between the actual and expected performance of the systems could affect future operation and maintenance costs
2. Changes in operational assumptions arising from modifications in user activities
3. Future technological advances that could provide lower cost alternatives and hence shorten the economic life of any of the proposed systems
4. Changes in the price levels of a major resource such as energy or manpower, relative to other resources can affect future alteration costs
5. Errors in estimating relationships, price rates for specific resources and the rate of inflation in overall costs from the time of estimation to the availability of the asset.

Once completed, LCC and LCP results should be subjected to a sensitivity analysis to determine the influence of major input variables. Traditional approach to sensitivity analysis is to change one factor at a time, the so called ceteris paribus method. (Woodward, 1997) Nevertheless, its assumption that other variables will remain unchanged while a variable is being analyzed has become its major limitation (Flanagan, Kendell, Norman, & Robinson, 1987). In practice, risk

variables do not occur one at a time. Nonetheless, given robust and realistic assumptions, LCC and LCP are practical tools for ranking total cost of ownership between alternatives. Furthermore they helps managers to understand the impact on the acquisition phase on total costs of ownership of the system.

5 STOCK PREPARATION IN PAPERMAKING

The environmental and economic benefits of using recycled raw materials are becoming increasingly self-evident in many industries. For this reason a growing number of paper and board manufacturers globally are favoring recovered fibers as raw material. As the recovery rates increase, the use of recovered paper and board is also witnessing an upward trend. In the following chapter, OCC processing, environmental impacts of recycled papermaking and economies of production are briefly introduced.

5.1 Recovered fibres in papermaking

Limited virgin fiber resources and increased environmental awareness have made recovered paper indispensable raw material for the paper industry (EIPPCB, 2007) and its use is growing rapidly. The recovery and the collection systems of recycled paper were first created mainly for economic reasons in countries with high population but low resources of wood. Nowadays they serve environmental aspects in most industrialized countries (Laakso & Rintamäki, 2003). In 1980, the propotion of recycled fibre in the world fibre supply was 20%, in 2005 it had increased to 50% and in the future global recovery rate is expected to grow further to about 56% by 2020. (CEPI, 2012; Gottsching & Pakarinen, 2000; EIPPCB, 2013)

Traditionally, recovered fibres have been used for lower paper grades such as newspapers and packaging boards, but the increased recycling rates require developing processes to fields that were previously reserved to virgin fibres (EIPPCB, 2013). Because different types of recycled paper have different properties and possibilities to be reused, they must be sorted into several grades. The main qualitative characteristics of waste paper are the moisture, composition, as well as the number and nature of non-paper components. Very few grades are homogeneous and most are heterogeneous mixtures of various types of paper and

cartonboard defined by reginal standard. Rough categorization of recycled paper grades is presented in Table 3.

Table 3. Types of recycled paper (adapted from Göttsching & Pakarinen, 2000)

Grade	Description
Old corrugated containers (OCC)	Corrugated cardboard boxes used in moving or shipping
Mixed paper (MP)	Phonebooks, magazines, mail, colored paper
Old newspapers (ONP)	Old newspapers
High grade deinked papers (HG)	Copy letter, letterhead, and envelopes

The focus of this study is on brown grade products such as corrugated board (OCC). Corrugated board is widely known as the material of container boxes and it is the largest produced and the most frequently used packaging material in the world. It is environmentally friendly and saves natural resources because the raw material used is renewable and the recycling is well organized. (Laakso et al., 2003)

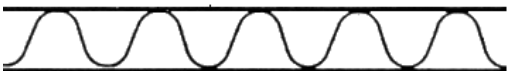

Figure 8. Sectional view to corrugated board

The corrugated boards, illustrated in the Figure 8, are usually composed of one or several fluted board layers and one or several liners, which have been combined with glue. These layers of paper are assembled in a way that gives the overall structure a better strength than each distinct layer. (Göttsching & Pakarinen, 2000)

5.2 Processing of recycled grade papers

As recycled paper is a secondary fibers material, which is a mixture of different products, types of paper and board, the recycling process is more complex than the primary (virgin) pulp production (Göttsching & Pakarinen, 2000). Processing

systems vary according to the paper grade to be produced e.g. packaging paper, newsprint, testliner, or tissue paper. Generally recycled fibre processes can be divided in two main categories (EIPPCB, 2007):

1. Processes with exclusively mechanical cleaning without deinking. They comprise products like testliner, corrugating medium and cartonboard.
2. Processes with mechanical and chemical processes i.e. with deinking. They comprise products like newspaper, tissue, printing and copy papers.

So called stock preparation is continuous process to produce recycled fiber pulp from recovered material for use in boardmaking. Its purpose is to modify the different ingoing raw materials in such a way that the finished stock finally supplied to the paper machine suits the requirements of the paper machine and the quality demands put on the produced paper or board. The primary tasks for processing are 1) to recover useful fibres to optimize process yield and 2) to remove contaminants, eliminate their effects, or both as much as necessary to meet the quality requirements. (Laakso et al., 2003) According to Göttsching & Pakarinen (2000), these contaminants can be classified as:

- Various additives used in the paper manufacturing like fillers, pigments, coatings and other functional and technological additives
- Substances used in the processing of paper products such as printing inks, coatings, adhesive, and laminates
- Materials that fall into the paper during its use and in the collection of waste paper, including wires, sand, stones, clips, clamps, etc.

There are also several ways of setting up equipment in an OCC stock preparation line. Traditional strategy to balance yield and purity requirements has been to design processes with several stages of separation as well as recirculation of large portions of the rejected materials. This leads to complex systems with high energy

requirements. (McKinney, 1995) The simplified key unit processes and their tasks of the stock preparation line are presented as follows, even if the degree of sophistication of the whole process depends on the furnish used and the paper grade to be manufactured:

1. Recovered paper is supplied to the mill in bales or as loose material. The purpose of the pulping is fiberizing the raw material by mixing it with water and removing impurities like wires and plastic without breaking up the non-fibrous material.
2. Pulping is followed by cleaning which is typically at least two-stepped process to minimize fiber loss and breakdown for impurities. In the first stage coarse and heavy impurities like small stones are removed to avoid wear and disturbance in the downstream equipment. In the second stage smaller and lightweight impurities are removed and pulp is prepared for the next stage.
3. The decisive process for clean stock is combined fine screening and fractionation as they continue where cleaning left off. In the screening stage unwanted material like shives, fiber bundled, sand and plastics are removed. The purpose of fractionation is to separate and selectively classify stock fibers according to various characteristics, such as long and short fibers. Each fraction is then used directly for papermaking or undergoes further treatment.
4. After cleaning and screening, fractions are thickened and dispersion is used to improve stock quality for reducing unwanted contaminant to a size not interfering with downstream processing. Disperging also improves fiber strength and reduces residual ink parties from recovered fibers.
5. Reject and sludge handling in the processing of paper for recycling, various types of rejects and sludge in varying quantities are collected and have to be handled. These are treated in the sludge and reject system. The highest possible fibre recovery also contributes to minimising the quantity of residues.

Göttsching & Pakarinen, 2000; Laakso & Rintamäki, 2011; Metso, 2013; EIPPCB, 2013):

Important criteria for the evaluation of efficiency and cost effectiveness of each processing stage are the specific energy demand and stock consistency range. Variations between stages can be high due to widely differing technology available and the amount of work occured in the previous stages concerning deflaking and contaminant removal. (Göttsching & Pakarinen, 2000) Most recovered paper processing mills are nowadays integrated with paper manufacturing, giving benefits in quality, efficiency and economy (EIPPCB, 2007). Therefore, there is a certain overlapping between stock preparation and papermaking and associated processes such as water circulation.

5.3 Environmental impacts of recycled fiber production

The raw materials for recycled paper production consist mainly of recovered paper, recirculated water from paper machine, chemical additives and energy in the form of steam and electricity. However, manufacturing process does not convert all of its inputs into final products. According to Srivastava (1998) environmental impacts of a RCF mill can be classified into four categories: 1) emissions to water, 2) athmosperic emissions, 3) solid wastes and 4) noise. These inputs and outputs can be described as mass stream overview presented in the Figure 9.

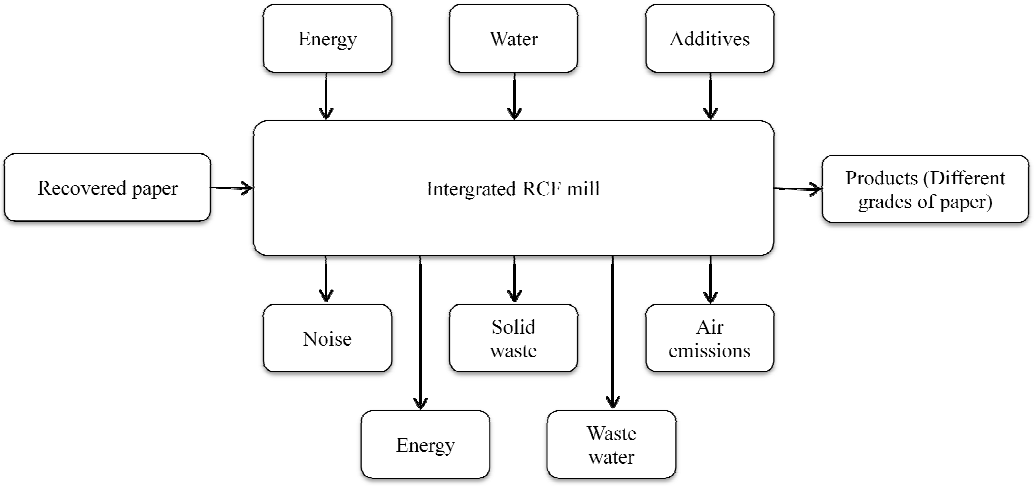

Figure 9. Mass balance of integrated RFC mill (Adapted from EIPPCB, 2013; Srivastava, 1998)

Typical resource consumption and emission levels per tonne for packiging grade pulp production are combined in the Table 4. Atmospheric emissions are mainly related to energy generation by combustion of fossil fuels in power plants or other fuels in steam boilers of Combined Heat and Power plants (CHP) (EIPPCB, 2007). Even if increased recycling is contributor to environmetal efficiency, the use of recycled pulp can actually cause more CO2 emissions if energy is purchased instead of produced using biomass in CHP (Hynninen, 1998). Consumption of energy and chemical form a logical entity, but as stock preparation and paper machine are connected closely over the process water circuit, it makes no sense to separate water flows (EIPPCB, 2007).

Table 4. Inputs and pollutants of recycled fiber processing (adapted from EIPPCB, 2007)

	Input	Output
Energy	- Fossil fuels for steam and electricity generation - Electricity 150 - 250 kWh/t - Thermal 0 MJ/t (depends on if dispersion is applied)	- Emissions from energy generation: SO_2, CO_2, CO, HCI - Waste heat to air and water
Chemicals	- Process aid such as biocides in at pulping	
Water	- Cooling water, process water - Water flow 1,5 - 30 m3/t	Emissions before wastewater treatment - TSS < 200mg/l - COD 27-36 kg/t - AOX < 4g/t
Waste		- Solid waste 50-100 kg/t, organic content 70-80 %
Other		- Noise and vibration

The paper industry has steadily improved its standards in complying with environmental demands related to water consumption and water effluents, energy consumption and fiber consumption. In order to improve, pulp and paper industry has made important investments, not only in the production process itself, but also in the flue gases and liquid effluents treatment systems. (Holik, 2006)

5.4 Economy of papermaking

Intensive global competition and sustained cost pressures have highlighted the importance of asset mananagement in the paper industry. A multitude of economic forces are influencing the profitability of pulp and paper mills, and since the paper is a commodity, are low production costs are mandatory. Facing the operational efficiency challenge, pulp and papermakers seek to maximize their profitability both by optimizing production efficiency and minimizing costs by:

- Reducing the consumption of raw materials, energy and water as well as chemicals

- Producing clean pulp without impurities in combination with low fibre loss. Runnability of paper machine also depends on the cleanness of pulp.
- Improving the paper and board quality with respect to improvement of converting quality.

(EIPPCB, 2007; Göttsching & Pakarinen, 2000)

From producer's perspective resource savings usually equate to profits. Savings in energy and raw material consumption are obvious from monetary perspective but some resource savings are not as unambigious. For example, fresh water consumption is often reduced in a mill in order to lower operational costs by saving energy and raw materials, not only due to water price itselfs. Lower water consumption also means less investment and lower operating costs, which concern raw water purification and effluent treatment. (Göttsching & Pakarinen, 2000)

From a wider perspective, the biggest contributors to asset performance in continuous process industries are operation efficiency and maintenance, and especially the cooperation of these functions (Wauters & Mathot, 2002). Most accepted and widespread tool of asset performance measurement in continuous process production such as the paper industry is Overall Equipment Effectiveness (OEE) launched by Nakajima (1988) (Airola, Komonen, & Paulapuro, 2005). OEE is the overall efficiency index that measures the operating efficiency on the basis of time loss structure of the processing equipment, and breaks the performance of a manufacturing unit into three separate measurable components (Mätäsniemi, 2008) presented in the Table 5.

Table 5. Structure of OEE metrics (Adapted from Nakajima, 1988; Mätäsniemi, 2008)

Performance area	Relating losses
1. Availability rate	- Equipment failure/breakdown losses - Set-up and adjustment losses
2. Performance efficiency	- Idling and minor stoppage losses - Reduced speed losses
3. Quality rate	- Defect and rework losses - Start-up losses

In more detail, availability is comparison between amount of time that the process is working and the amount of time that it was scheluded to work. Performance is comparison between amount of the product that actually was produced and amount of the product that theoretically should be produced. Quality is comparison between number of the good (specified) products and number of the product that was actually produced. (Nakajima, 1998) There are some basic formulas to measure components of OEE:

$$\text{Time availablity} = \frac{\text{Equipment uptime}}{\text{Total time}} \quad \text{(Eq. 5-1)}$$

$$\text{Performance efficiency} = \frac{production\ time}{equipment\ uptime} \quad \text{(Eq. 5-2)}$$

$$\text{Quality factor} = \frac{\text{Theoretical production time for effective units}}{\text{Theoretical production time for actual units}} \quad \text{(Eq. 5-3)}$$

(Nakajima, 1998)

OEE is not only an operational measurement tool, but it is also a key performance indicator for detecting process improvement activities. Each component points to an aspect of the process that can be targeted for improvement. (Wauters & Mathot, 2002). Based on equations 5-1, 5-2 and 5-3, the structure of OEE for the continuous production process can be formulated as:

$$\text{OEE} = \text{Availability} \times \text{Performance} \times \text{Quality} \qquad \text{(Eq. 5-4)}$$

(Wauters & Mathot, 2002)

In the paper industry OEE is usually applied in sector-specifically described in the Figure 10 by dividing it to the the production efficiency and time efficiency. The production efficiency quantifies the production losses, the quality of end products and overall production performance. The time efficiency describes the opportunity to have more time available for production, as opposed to time for grade changes, breaks and maintenance. (Sivill & Ahtila, 2009; Airola et al., 2005)

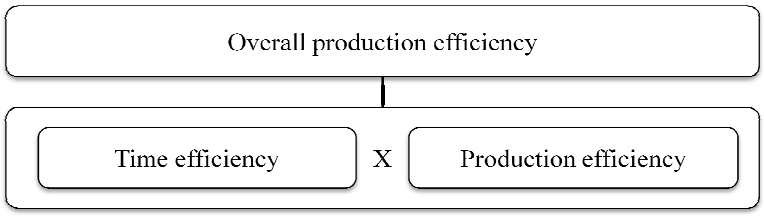

Figure 10. Overall production efficiency in paper industry (adapted from Sivill & Ahtila, 2009)

However, the incremented value of OEE indexes are not meaningful from the profit making viewpoint per se (Kwon & Lee, 2004) and it is important to calculate the profit contribution of increased performance (Hipkin & De Cock, 2000). The profit contribution is meaningful for managers to carry out the managerial decision-making activities based on decreased costs and increased incomes (Kwon & Lee, 2004). Even if asset performance is one of the most important factors that influence production cost-revenue structure and thus profit margin, other contributing factors such as raw materials, utilities, people and work methods must be taken into account (Wauters & Mathot, 2002).

There is much variation in the economic calculation methods used in the paper industry to compare efficiency figures although basic formulas are quite similar. One very common approach is direct costing method that includes only the variable manufacturing overheads in assessing the profitability of products. (Airola et al., 2005) In accordance with the direct costing method, total profit contribution effect during a given time period can be simply calculated by using the following equation:

$$\begin{aligned}&\text{Total profit contribution}\\&\quad = \text{additive profit contribution}\\&\qquad + \text{saved costs}\end{aligned} \qquad \text{(Eq. 5-5)}$$

where,

$$\begin{aligned}&\text{Additive profit contribution}\\&\quad = \text{additive sales}\\&\qquad * \text{contribution profit per unit}\end{aligned} \qquad \text{(Eq. 5-6)}$$

and,

$$\begin{aligned}&\text{Saved costs}\\&\quad = \text{saved labour costs} + \text{saved utility costs}\\&\qquad + \text{saved maintenance costs}\\&\qquad + \text{saved depreciation costs}\end{aligned} \qquad \text{(Eq. 5-7)}$$

(Kwon & Lee, 2004)

Despite of these simple equations, it is not an easy task to describe cross-media effects in a way that would not cause any dispute. Many of the asset efficiency factors descibed above are trade-offs by their nature. For example, the energy consumption and yield of the process depends on the raw materials used and the product properties to be achieved. Furthermore, they will vary with the design of

the whole plant and depend among others on the size of the mill, how a measure fits together with other mill equipment and the system boundary taken into account. In principal, data on economics can only give a rough picture and indicate the levels and course of costs. (EIPPCB, 2007; Göttsching & Pakarinen, 2000)

6 RESEARCH DESIGN

According to Thornhill, Saunders and Lewis (2008), research design is an overall plan how the research question will be answered. In this chapter the research design for the qualitative case study is presented including a description of the research design, data collection and analyzing methods.

6.1 Qualitative case study design

The main objectives of this study are to understand the nature of customer value, develop value proposition and verify economic and societal benefits using life cycle tools. To achieve these objectives, qualitative single case study approach is adopted. As objective is rather multi-dimensional by its nature and explored phenomenon is not well understood, qualitative methods can be used to obtain intricate details about the specific phenomenon to investigated (Corbin & Strauss, 2008). The subjective and contextual nature of customer value has made it difficult to identify common drivers for customer value (Ulaga & Chacour 2001; Ulaga & Eggert 2005). Thus, Flint (2002), Ulaga and Chacour (2001), and Woodruff and Gardial (1996) suggest that qualitative methods are the most suitable for uncovering customer value dimensions.

In qualitative research multiple different types of approaches are available, but case studies have been frequently used within management sciences and industrial marketing research (Dubois & Gadde, 2002). The main argument in favor of the case method, in line with Yin (2003) and Eisenhardt (1989), that it is especially suitable when it is intended to understand contemporary complex social phenomena in real-life context. Flint (2002) suggests that flexibility of the method fits perfectly for understanding the complex value creation situation and dynamic relationships in industrial markets. In addition, according the Eisenhardt (1989), case study is also the most appropriate in the early stages research on a topic. Although the quantitative and case studies are often used interchangeably (Yin,

2003), no method is excluded and methods used for collecting data are chosen with regard to suitability of the task (Eisenhardt, 1989). Case studies are thus versatile and useful in describing a present phenomenom which has been remained a dispersed topic in a academic world.

6.2 Sampling approach and data collection

Process of data collection involved several stages and it was performed during spring and summer 2013 in Finland and China through various methods, including supplier and expert interviews, customer survey and analysing company's internal data as well as other literature. As the objectives were emphasized on analysing customer value, customers have also a crucial role in data collection. Also according the principles of developing a resonating value proposition (Anderson et al., 2006), both supplier and customer value dimensions should be evaluated. Supplier perspective was examined first. The nature of this research aim and pursuit of a qualitative research approach, led to selection of in-depth interviews as an appropriate data collection tool .

The interviewees were selected using purposive sampling (Patton, 2002) based on their active involvement in R&D, marketing and selling and they mostly represented management level. Yin (2003) suggests that multiple sources of evidence should be used to establish validity and reliability of qualitative study. The use of multiple highly knowledgeable respondents made it possible to capture diverse perspectives with limited bias (Dubois & Araujo, 2007; Eisenhardt & Graebner, 2007). Totally 7 interviews were conducted in the supplier company. To obtain additional complementary perspective, two expert interviews were conducted. A specific sample size was not determined a priori and the sampling process ceased when saturation was reached. The profiles of interviewed, durations and main themes are shown in the table 6.

Table 6. Profiles of interviewed persons

Grade	Company	Type	Duration
Technology manager	Valmet	In-person	1 h 30 min
Head of unit	Valmet	In-person	2 h
Process manager	Valmet	In-person	1 h 20 min
Sales manager	Valmet	In-person	1 h 10 min
Sales manager	Valmet	In-person	1 h 20 min
Sales manager	Valmet	Telephone	1 h 30 min
Marketing manager	Valmet	In-person	1 h 30 min
An external expert		Telephone	30 mins
An external expert		Telephone	40 mins

Apart from the questions which collected general information about participants, remaining questions (Appendix 1) were structured around five themes.

1. Benefits of OCC fiber line
2. OCC fiber line market in China
3. Selling process for OCC fiber line
4. Role and leveraging of customer relationship in China
5. Developing benefit model for the Chinese market

Two expert interviews differ from other interviews and were mainly focused on understanding prevailing market situation and especially environmental challenges in the Chinese paper industry. Interviews were semi-structured in their nature with predefined question list allowing interviewees to freely answer and expand above the initial questions (Yin, 2003). During the interviews new questions emerged and some were regarded as irrelevant. Interviews lasted between 20 and 120 minutes and most of them were audio recorded and transcribed verbatim so that accurate information was gained from the transcripts and some direct quotations could be used. Totally interviews resulted 120 pages of text.

Customer perspective was examined by using qualitative survey method. Because study was focused on the Chinese market whereas author of study resides in Finland, commonplace method for obtaining data beyond the physical reach of the observer was needed. Surveys can be also reproduced and distributed simultaneously relatively rapidly and inexpensively. (Leedy & Ormrod, 2005) Close ended survey questionnaire was elaborated with Metso representatives based on literature (Zhu & Sarkis, 2004; Zhu, Sarkis & Geng, 2005; Zhu & Sarkis, 2006; Liu, Yang, Qu, Wang, Shishime & Bao, 2012) on green supply chain management adoption in China and themes emerged from preliminary analysis of supplier interviews.

The survey questionnaire (Appendix 2) was composed of three parts. In the first part respondents were asked to compare Valmet's OCC system to other suppliers in terms of key performance indicators. The second part contained a list of both efficiency and environmental related items and respondents were asked to assess their meaning in supplier selection decision currently and especially in future. Finally, in the third part participants were invited to assess characterisctics of Valmet as a company. Respondents were mainly asked to indicate their responses on five point likert scale while range of scale depends on question to be answered.

A sample characteristic was selected by the case company including several customers, sites and representatives' positions, taking into account the objectives of the research. Then the survey package consisting of Microsoft Excel based questionnaire and a cover letter (Appendix 3) were mailed to selected representatives. Participation in the survey was solicited mainly by assuring confidentiality of the responses. Even though the deadline for answering was stretched several times, only 4 useful responses were received. Most of the respondents were positioned at managerial level and were responsible of process development or other process related positions. It should be noted that managers responsible of sourcing were not reached. As the total number of responses is relatively low, further statistical analyses were not feasible.

6.3 Data analysis

After interviews and customer survey were completed the analysis of data was conducted. Data was analysed throug qualitative approaches such as content analysis, categorization, interpretation, and quotations. Even if the amount of interviewees was quite low, amount of transcripted data was massive. The major challenge in practical qualitative research is data reduction. The content analysis of interview data was conducted according to the principles of three staged qualitative Flow Model by Miles and Huberman (1994), which includes data reduction, data display, and conclusion drawing/verification described in the Figure 11.

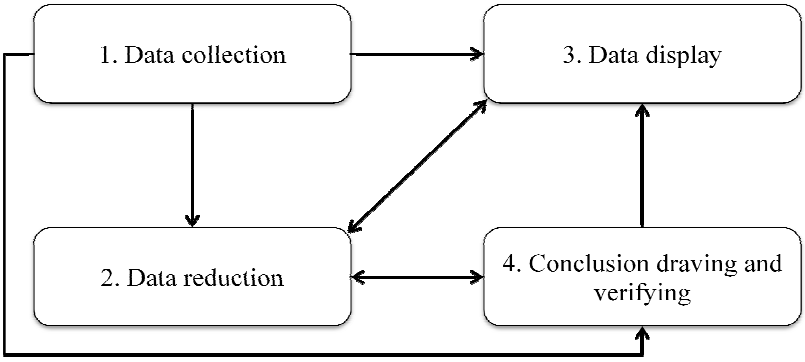

Figure 11. Principles of analyzing data

In practice analysis included focusing on identifying main categories of both supplier predefined and customer desired value dimensions and understanding characteristics of the Chinese market through inductive reasoning. As the survey findings were somewhat constrained in the amount and type of data, the material from survey was analyzed deductively to verify and understand the nature of interview data already available.

6.4 Methodology for life cycle analyses

As the purpose of the study was also to quantify recognised customer benefits, life-cycle tools were utilized. The most important requirement is that the system

boundaries for the LCA and LCC/LCP are defined. Alting & Jøgensen (1993) distinguishes between four phases in a product's life cycle: raw material acquisition, manufacturing, use and disposal. In this study, both environmetal analysis and economic analyses are streamlined by limiting as well as eliminating the beginning and the end phases of the product life cycle focusing on to use-stage of OCC system. Choosing streamlined approach helped to focus on process economics as well as societal impacts that were felt the most significant in supplier selection decision. In addition, as competitive offerings tend to be technically similar, especially environmetal impacts in other stages were assessed as equal.

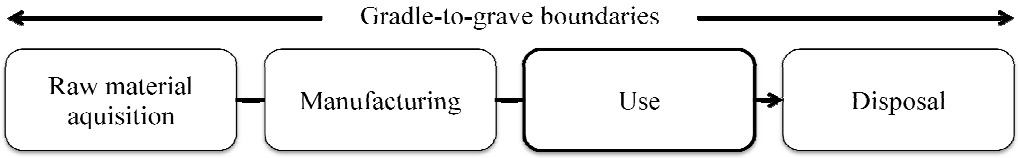

Figure 12. Principles of system boundaries

Economic impacts were assessed applying integrated LCC and LCP tools. LCC and LCP calculations were applied based on OEE metrics. OEE was selected for economic calculations because it is well known method and commonly used in the paper industry. Even if OEE is usually applied in the sector specific form in paper industry, in this stydy basic approach was adopted. Finally, some sensitivity analyses from economic perspective were made to ensure the findings. Because the recycled pulp making process is considered as quite complex, the life cycle calculations were not made equipment by equipment but over the whole OCC system.

The LCA was conducted to find the environmental impacts caused by the OCC system during its use-phase. This streamlined approach was selected as methodological framework based on ISO recommendations (ISO, 2006) and it is more specifically described in the findings section. The official dischage limits of IPPC are presented as kilogram per produced ton (EIPPCB, 2013) and same kind

of evaluation was used in this study. Impact assessment results were calculated for one tonne of OCC stock in integrated containerboard mill for global warming (GWP), acidification (AP) and photochemical smog creation potential (SMOG). The primary purpose of the functional unit is to provide reference unit to which the inventory data is normalized. All the energy and materials consumed, as well as emissions to the environment, were normalized to this functional unit. Finally the results were interpreted taking into account the scope of the study.

The primary data for analyses including electricity, raw materials, water and chemical consumption were collected at the Valmet's corporative sources. When primary data were not available, the secondary or generic data were used from the literature and specialised databases. Ecoinvent 2.2 database was used for purposes for LCA calculation.

7 CASE VALMET OCC SYSTEM

In this chapter, the background of the case company and the present case are introduced. In addition, many interviewees shared lots of information and their opinions on usual pitfalls in marketing of OCC system. These stories were interesting, as they give valuable insight into the world of industrial selling in China. Before concentrating on findings, some discussion about the current situation are being presented.

7.1 History of the Valmet

Valmet is a global supplier of services and technologies for the pulp, paper and energy industries employing totally 11,000 people in over 50 countries. Their technology offering includes entire pulp mills, tissue, board and paper production lines, as well as power plants for bio-energy production. Valmet's service portfolio cover everything from maintenance outsourcing to mill and plant improvements and spare parts. Valmet's main customer industries are pulp, paper, and energy. All of these are major global industries that offer growth potential for the future. Valmet's objective is to become the global champion in serving its customers. (Valmet, 2014)

The history of Valmet Corporation goes all the way back to the 18th century. It was then small shipyard in the Viapori fortress until it ended up in the ownership of the Finnish state and became as part of the Valmet in the early 20th century. Valmet was originally established when Finnish state decided to combine their various industries working on war reparations to the Soviet Union. Later in the 1960s, Valmet focused on pulp, paper and energy production technologies and became a listed company. In 1999, Metso Corporation was created as a result of the merger of Valmet Corporation and rock crushing and flow control solutions provider Rauma Corporation. (Valmet, 2014)

Present known Valmet was reborn through the demerger of the pulp, paper and power businesses from Metso Group in December 2013 when Metso's pulp, paper and power business was transferred to Valmet Corporation, and the Mining and Construction and Automation business remained part of Metso. Hence, up to the present time, history of Valmet has been colorful including plethora of business acquisitions. As a result of acquisitions, mergers and demergers, Valmet today supports a host of products from numerous companies (Valmet, 2014)

Sustainability is at the core of Valmet´s strategy and business operations. According to their mission, they help customers to process natural resources and recycle materials into valuable products and lower the impact on the ecosystem reducing the consumption of raw materials, energy and water and emissions and wastes. Valmet believes that one of the best ways to promote sustainable development is to innovate in technologies and to change current ways of operating to align with principles of sustainability. At Valmet, life cycle assessments have been launched, with the goal of adding value for customers, so they can monitor and improve their own environmental efficiency. (Valmet, 2014)

7.2 Valmet's OCC system offering

Valmet´s current recycled paper technology dates back to the 1970´s when Tampella, later acquired by Valmet, began to manufacture OCC systems under the licence. Even if technology cycles in paper industry are long, it is natural that some development on OCC systems have happened during the decades. The most significant improvement was seen after the first and second oil crises when energy efficiency was improved mainly for economic reasons. In addition, recent year's aims to save natural resoures and to protect the environment, have led to the development of many new technologies, but radical new approaches for stock preparation processing are still missing. As a result, core offerings among competitors tends to be quite similar and they are all based on the same basic technology and processes.

Valmet's OCC system is based on traditional strategy to balance yield and purity requirements with several stages of separation as well as recirculation of large propotions of the rejected materials. Valmet and its precedessors have paid attention in developing equipments for simplified OCC processes, decrease their energy, fiber and water consumption and to improve stock quality. Special attention has been paid on the development of efficient removal of contaminant at the early stage of the pulping and the reduction of energy consumption in the latter energy intensive operations such as dispersion and refining without deteriation of the stock quality. From environmental perspective, European environmental regulations have provided guidance for developing the system.

7.3 Current market scope and main issues

As the global market for OCC systems have been relatively quiet, competition is fierced among suppliers. Valmet already has been continuously present in China since 1933 when they delivered their first paper machine to the counry (Metso, 2013). Valmet has made many successful integrated OCC mill projects in Europe, but failed in Asia and China althought some lines were delivered there in the mid 2000´s. However, Asia and especially China provide market opportunities and growth rates on corrugated products which means that there are demand for 4-6 OCC system in a year in Valmet's scope regarding capacity and grade needs.

Usually, customers globally are not only buying OCC system alone but comprehensive production line for testliner or fluting consisting of board machine and OCC system. Valmet currently concentrates on these solution based projects where there is a possibility to deliver both the board machine and OCC system. There has been organizational issues on combining board machine and OCC projects with the result that board machines have been sold but without OCC system. Customers have not seen OCC system as sigfinicant as board machine and they have been aquired from other supplier.

7.4 Nature of selling processes in China

As usually in industrial market, also OCC system selling processes are quite a long and complex. Rough technical specification and performance level is given by customer and the supplier specifies their system in accordance with these requirements. Customers are usually searching for acceptable technical performance with low price. One way to gain advantage compared to competitors is to be involved in technical definition phase of OCC system that is likely to be almost half of the battle of winning the bidding process.

Price premium is difficult to justify, even if operating costs of offered system would be lower than competitors. In Valmet's case, it is not just premium pricing but also higher line measurement costs compared to competitors system's due to the lack of Chinese deliveries. Purchasing price is considered to be the most important factor in supplier selection after the technical specification is confirmed by customer. Still, it was largely recognized that life-cycle considerations in supplier selection decision are inevitably inreasing due to rising energy price and increased importance of environmental issues.

Valmet has used customer value calculations occasionally in selling situations. However, value valculation are not used as a systematic selling tool because they are not felt as appropriate approach. There has been intra-organizational dissenssion about benefits and their verification methods, also due to lack of necessary data or other information. Especially lack of appropriate data gathered from customer references was seen as extremely problematic. Few of the interviewees admitted that there are serious shortcomings in customer reference management.

Another, especially China specific, issue in exploiting value calculations is that system specification may chance suddenly and suppliers are expected to adjust these modifications even during overnight. One interviewee described the nature of the issue as follows: *"At the evening they want the board machine but in the morning paper machine."* Also the nature of purchasing processes in China were felt to constrain the use of value calculations considering economic value but particularly environmental value. Supplier felt that they were put in "compartments" and growing out from there were regarded as somewhat challenging.

All the interviewees underlined that customer references, preferably good ones, and especially Chinese ones are paramount when operating in China. The Chinese want to prevent mistakes in purchasing decision, because they have their job at stake. In addition, the role of personal promise should not be underestimated. The Chinese business culture is distinquished from the western culture in many ways. They prefer to deal with people they know and trust. This relationship is not simply between companies but particularly between individuals at a personal level.

The challenge is not just price, lack of technical performance, or selling skills. Few people talked about Finnish humility that is characterized on Finnish behavior and is thus reflected on selling situations. It has been found that competitors' weaknesses are avoided to talk to customer, even though competitors raise the issues related to Valmet's offering and even provide false information. In the general attitudes towards own offering was also seen to have room for improvement. Some interviewees call for more trust on own products and support for the view that none of the competitors is better than Valmet.

7.5 New approaches for selling are needed

As a summary, there appears to be five reasons that have led for difficult market situation for OCC system equipment manufacturers and particularly for Valmet.

1. Excessive price competition with low profits
2. Difficulties in differentation due to the mature stage of technology and similarity in competitive offerings
3. Customers decision making unit is fragmented and that leads to emphasizing purchasing price in supplier selection
4. Some competitors emphasize investment costs, whereas Valmet emphasizes life-cycle costs
5. Lack of customer references in China

Based on literature review, the customer value proposition approach may help to provide new insights both for Valmet and customers in proposed issues. Developing sustainable value proposition was also felt extremely important and it was hoped to bring new perspectives on engineering's traditional recipe for success: a strong focus on developing high-quality and advanced technology. One interviewee summed up the problem as follows:

> *"We are lacking a way, desire, and perhaps motivation to study and justify this in our own"*

Also the environmental specific information as a part of value proposition was found increasingly important. Most of the respondents admitted that environmental aspects are inevitably coming especially in China

> *"It is important to include these environmental aspects to value proposition, because I think that they are relevant in the future. We need to promote green paper and need to save energy and protect the environment, which is the current trend in China."*

8 FINDINGS

In this chapter the findings from the analysis of the data collection through supplier and expert interviews, customers' survey and other supporting materials will be presented. General process for developing sustainable value proposition in this study consists of three stages. This funnel shaped process and primary data sources in each phase are further described in the Figure 13.

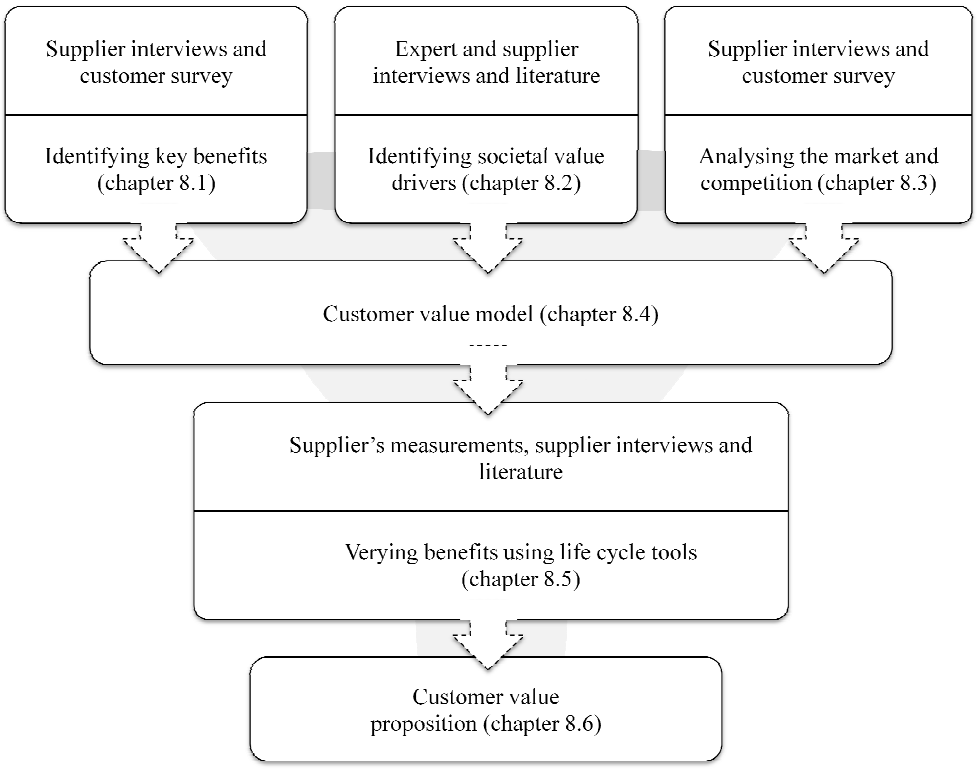

Figure 13. General process for developing sustainable value proposition

At first, in section 8.1, the benefits of Valmet's OCC system and customer value dimensions are assessed through supplier interviews and customer survey. Then, in section 8.2, sustainability issues and three drivers for companies sustainable performance considering stakeholder perspective in China are recognized based on supplier and expert interviews supplemented by extant literature. Finally, in section 8.3, charasteristics of Chinese OCC systems market and competitive

situation are explored through supplier interviews and customer survey. Customer value model is constructed in section 8.4 and qualified using life-cycle tools in section 8.5. Finally, sustainable customer value proposition for Valmet's OCC system is introduced.

8.1 Identifying the key benefits of Valmet´s OCC system

In this study customer value model (CVM) is presented by applying approach adopted from Narayandas (2005) presented in section 2.5.3 because one has to have insights on both the tangible and nontangible components of value dimensions (Payne & Holt, 2001). Hence, customer benefits elicited from supplier interviews and customer survey research have been analyzed the three levels of analysis:

1. Tangible financial benefits
2. Nontangible financial benefits
3. Nonfinancial elements

From phraseological perspective, the term benefit was considered appropriate by interviewees for describing characteristics that differentiate products and offerings from competition and also is valuable for customers. Following twelve tanginble financial benefits were found by supplier representatives. Direct quotations are used for illustrating the findings. It is notable, that the original interviews were conducted in finnish, and the direct quotations present are translated. Consequently, absolutely meanings and overtones cannot be drawn.

8.1.1 Tangible financial benefits

When tangible financial benefits were discussed, most interviewees consistently recognized that technical and performance differences between Valmet and its competitors are minor and they are trade-offs by their nature. It also depends on customer and their final product which attributes are valuable in their business

because technical specification and performance level is usually specified by a customer.

1# Energy consumption

All the respondents identified low electricity consumption as a key benefit when assessing customer value of Valmet's OCC system. This was due to the fact that customers operating costs are dominated by required electricity required and they can exceed several times the investment costs. Energy savings were considered easy to communicate and quantify also from life-cycle perspective.

> *"In many sales cases we have been able to demonstrate, that **total energy consumption of our system is lower than certain competitor's system**. Of course it depends on line concepts offered, some competitor may offer simpler concept with lower energy consumption, but then quality is not at the same level."*

Energy efficiency is also the focus of on-going R&D projects at Valmet. Still, some respondens felt that minor differences in informed energy consumption were not relevant since customers make their own estimations and conclusions.

2# Stock quality

Quality of recycled stock was regarded as the second major benefit for Valmet. As mentioned previously, stock quality and energy consumption are basically trade-offs by their nature. Still, respondent felt that overall performance between these factors is better than competitors. However, most of the respondents found it also difficult or even impossible to communicate benefits of improved stock quality to customers.

> *"Generally, stock quality or, or in other words, purity is at a high level.* ***According to the measurements our stock is slightly cleaner than competitors' stock****. But it is not necessarily competitive advantage as many customers feel that stock quality of other (OCC system) suppliers is sufficient."*

Some of the respondents also consider that quality factors have emphasized too much in marketing as well as in R&D and existence of trade-offs and customer preferences has been forgotten.

> *"...It has been imagined that quality is the most important driver at the customer end. Even to the extent, that you could, after reaching a certain quality level and communicating it to the customer, somehow compensate the expensive price or e.g. a higher energy consumption with this quality statement"*

Still, the paperboard machine is the best and most costly stickies detector in the world. But, even if pulp quality is important factor, customers may keep it given by implicitly.

3# Process yield

Process yield related benefits are again two (or even three) folded. It is largerly governed by raw material quality and increased quality will normally result in higher yield.

> *"Fiber loss rate (yield) is one relavant factor* ***which we have some kind of advantage compared to others****. There are some customer references in Europe with very low fiber loss…"*

On the other hand, if raw material is utilized better it also decreases the amount of organic rejects and sludges that stock praparation generates huge amounts. Both of

them decreases operating costs of OCC system. Once again, required yield is balanced with number of process equipment needed and thus with energy consumption.

4# Process reliability

Many interviewees also mentioned greater process reliability as a key benefit because equipment failures and other process shortfalls cause huge capacity losses.

> *"…Of course the overall efficiency and drivability of equipment (OCC system) is important. How much they need maintenance and how much unexpected malfunctions occur. They all cause unplanned downtime in process.* ***Traditionally, we (Valmet) have a good reputation in these****"*

Some respondents emphasize the role of process automation systems in process reliability. Especially the time of start and stop-sequences were mentioned as a key performance indicator considering process reliability and efficiency.

5# Water efficiency

Fresh water consumption and purity of process water were mentioned often as a benefit, but differences between Valmet and its competitors are minor and measurement of this benefit was felt difficult and also customer-specific.

> *"In my estimation and according to measurements,* ***raw water consumption in our (Valmet) system is lower in relation to competitors****…"*

> *"... Traditionally, we provide solutions that* ***reduces effluents to the water treatment plant****, that in turn facilitates the further processing of waters.*

Over-consumption of groundwater was regocnized the largest environmental issue related to the Chinese paper industry and some customers have been asked guarantees for water consumption and discharges.

8.1.2 Nontangible financial benefits

Also some nontangible financial benefits were recognized related to Valmet's OCC system. But as found in the extant literature, they were also found difficult to quantify and communicate.

6# Integrated solution provider

Most supplier representatives suggested that one of the key benefits of Valmet is its ability to deliver integrated solutions where recycled fiber line, board machine and automation systems are bundled together.

> *"If same supplier delivers OCC system and board machine, they also have overall responsibility for the operational performance of the entire production line. In case of two separate suppliers, responsibility breaks between those systems. And if problems occur, suppliers tend to usually blame each other. In the case of one supplier, there is only one guilty."*

These benefits consist of process optimization benefits, project cost benefits and possible guarantee and warranty benefits after start-up. Respondents also admitted that quantification and especially communicating the benefits in monetary terms is difficult.

7# Workplace safety

Even if Chinese safety culture is still low compared to western countries, workplace safety is improved by creating unified safety standards nationwide to improve risk prevention capabilities. This was largerly recognized by many interviewees.

> *"...Some companies in China have already been requiring western safety standards. I think it is one of the most obvious trends. Companies can calculate how much lost working day or being sick costs. Metso (Valmet) aims to be the best in these matters, and we can also bring it to the public.* ***Our machines are safe, they are made safe and they are safe to use****."*

Still, interviewees argued that laws are meaningless without proper enforcement - Safety equipment has to be also installed and staff taught how to use it. Even if quantification efforts were regarded difficult, incorporating safety factors in value the proposition were felt important.

8# After sales services, 9# wear part durability and 10# maintainability

From service and maintainability perspective, three benefits close together were found. The role of local after sales services including maintenance services, spare-parts services and especially "babysitting" services were usually mentioned by respondents.

> *"****In China, we have a local organization ready to support our customer with their problems.*** *There are spare parts and maintenance services available. Then we are providing a support packet where we are involved in quality and energy consumption opmization at the customer site."*

In addition, benefits related to wear part durability and equipment maintainability were emphasized especially by technologist.

> *"Real concern is not the repair cost itself but rather the loss of production and revenue. Downtime in terms of planned and unplanned maintenance comes straight out of owners' revenues.*

Maintainability and wear part durability related related benefits were found extremely difficult to assess and quantify since they are highly dependent on customers operating practices and priorities.

8.1.3 Nonfinancial benefits

Lastly, following two nonfinancial benefits were considered as less important in comparison to those which contribute directly to customer's financial objectives. Still they were considered to have meaning in supplier selection decisions.

11# Business reputation

Business reputation is the key for long term customer relationships. Also the benefits of large-scale supplier were emphasized by many interviewees.

> *"But that's what our customers appreciate, as I understand, is that* ***if they have purcased our OCC system, and some problems occur, Metso (Valmet) solves the problems****...And we get some price premium"*

Some respondents also discussed about importance of social integration between supplier and society around in terms of supplier reputation.

12# Fullfilling promises

Production requirements are usually included in the performance guanrantees given by a supplier to ensure their promise. Valmet has traditionally achieved or even exceeded performance quarantees in terms of quality and production efficiency including availability, yield and energy consumption.

> *"I have the impression that w****e*** *(Valmet)* ***have fulfilled performance quarantees better than our competitors.*** *In many cases, according to the measurements made by customers, performance has been better than we have promised."*

Survey findings strenghtened the impression of Valmet's good reputation among customers. Still, it remains unclear whether good reputation affects supplier selection or not.

8.1.4 Overall understanding of societal benefits

When discussed generally about social and environmetal benefits of Valmet's OCC system, opinions and overall understanding varies substantially. Identification of environmental impacts of OCC system was unexpectedly weak and some discussion and direct leading was indeed needed. Finally, most of the interviewees found the connection between economic and environmetal benefits.

> *"Improvements in production efficiency means **lower operating costs, achievement of environmetal objectives**, and thus reduces need for future investments."*

Tightening environmental legislation widely was seen as the most important sustainability driver even they were not considered as substantial for customers.

> *"Even if major environmental regulations are being planned, most of the customers do not seem to care about them. This may be due to fact that **the Chinese do not want involve suppliers in solving their environmetal issues.** This creates the illusion that they are not interested in environmental issues, even if the transition is clear."*

> *"Still, they are more and more interested in environmental information."*

When discussed generally about communicating societal benefits, some respondents stated that they should be communicated at the political rather than customer level.

"Meaning of environmental benefits would be greater if they could communicate to policy-makers or othet who might potentally influence the supplier selection decision. This kind of argumentation would potentially polish their public image"

However, cooperation with customer for environmetal purposes was considered the important development area in the future.

8.1.5 Summary of identified supplier's predefined and customer's desired benefits

Totally twelve significant transaction and relationship based measures benefits drawn on the Table 7 were identified based on interviews from supplier's side and they were selected as the baseline in developing customer value model and further value proposition.

Table 7. Summary of identified supplier's predefined and customer's desider benefits

Feature	Times mentioned by supplier	Current importance for the customer	Importance for the customer in the future	Associated with Valmet offering by customers	Direct economic impact for customer
Tangible benefits					
f1# Stock quality	7 / 7	Average	Increasing	Yes	Yes
2# Energy consumption	7 / 7	High	Increasing	Yes	Yes
3# Process yield	7 / 7	High	Increasing	Yes	Yes
4# Water efficiency	4 / 7	Average	Stays same	No	Yes
5# Process reliability	5 / 7	High	Stay same	No	Yes
Intangible benefits					
6# Solution provider	7 / 7	Low	Stays same		No
7# Workplace safety	4 / 7	Average	Increasing		No
8# Maintainability	4 / 7	Average	Stays same		Yes
9# After sales services	5 / 7	High	Increasing		No
10# Wear part durability	2 / 7	Average	Stays same		Yes
Nonfinancial benefits					
11# Business reputation	6 / 7	Low	Stays same		No
12# Fulfilling promises	5 / 7	Low	Stays same		No

As discussed earlier, low energy consumption, excellent stock quality and good process yield were highlighted by interviewees as the main tangible benefits of Valmet's OCC system with some constraints. Availability of after sales services, good reputation among customers and especially capacity to deliver entire board production line were emphasized of the tangible financial benefits. Their importance on supplier selection decision in customer's side now and in the future as well as associtions with Valmet's offering were subjectively assessed based on customer survey answers. In addition, these benefits were assessed in terms of their direct economic impact on customer's business.

From the customer's side, four of twelve benefits idenfied by Valmet were assessed as the most important factors in supplier selection. Not surprisingly, almost all of them were tangible financial benefits such as energy consumption and process yield but also some intangible financial benefits were regarded important. Most of these benefits were also associated with Valmet's offering when customers were asked to compare suppliers' features. In other benefit categories, especially workplace safety and appropriate after sales services were highlighted by customers. After sales services including spare parts and babysitting service were seen extremely important. Somewhat surprisingly, suppliers ability to deliver integrated solutions were not considered as important. In the future, naturally all tangible financial, but also after sales services and workplace safety related benefits were assessed to be most important factors in supplier selection.

As stated in the theoretical framework, relationships between recognized tangible financial benefits can be complex and trade-offs by their nature and this was also acknowledged by interviewees. It also seemed to depend on respondents position, what kind of benefits are recognized and emphasized. When going upwards in the organization, more holistic perspective to benefits was adopted. Respondent also admit that there are not any specific China related benefits as the process and motives for supplier selection tends to be rather similar in China and in Europe.

8.2 Identifying sustainable societal value drivers in China

China is the most singular of the transition economies. Since China opened three decades ago to the world economy, it has become the largest, the fastest growing, and the most heavily engaged country in field of international business and investment with average 10 percent annual growth (CIA, 2013). However, also the sustainability issues in China have increased dramatically alongside with economic growth. They are tied tightly to industrial processes that are supporting the economic growth as industry is a major consumer of energy and raw materials

accounting over 70 percent of total pollution. (EIA, 2013) Thus, trade-offs among the economic, environmental, and social pillars of sustainable development tends to have been ingnored in China.

The drivers for sustainable development in China are often different than in the western countries, where the most effective messages are typically visual images of global impacts. In the following, environmental and human health related issues in China are described and drivers for adopting cleaner technologies recognized. Section is mostly based on extent literature, but guidelines are adopted both from the supplier and expert interviews such as from customer survey.

8.2.1 Environmental issues in China

China has many serious environmental issues, severely affecting its biophysical environment as well as human health. Various forms of air pollution are the broadest issue in China. Electricity generation is dominated by fossil fuels and coal-based electrical plants are primarily source of pollution which has been identified as one of the main areas needed to tackle. In addition to harmful particulates, Chinese electricity generation causes about half of the worls's energy-related CO2 emissions and over 90 percent of Chinese energy-related CO2 emissions (Seligsohn, 2009). Even if the Chinese government has made an effort to diversify its energy supplies, they account relatively small shares in energy consumption mix and the dominance of coal power plants will continue in the near future (EIA, 2013)

Also water resources in China are affected by both severe water quantity shortages as well as water quality problems. The burden of both air and water pollution is not distributed evenly across the country. Especially northern China suffers from water shortages because 80 percect of the water resources are located in southern China. More than half of China's surface water is polluted and one quarter of it is so dangerous that it can not be used even for industrial purposes. Also the quality

of groundwater is critical issue because about 50 percent of the groundwater is described as severely polluted. Low water prices lead to water wastage and pricing is the key to harm reduction (China Water Risk, 2013).

It is estimated that health costs of air and water pollution in China are about 4.3 percent of its GDP. When the non-health impacts of pollution, which are estimated to be about 1.5 percent of GDP are added, the total cost of air and water pollution in China is about 5.8 percent of GDP. (World Bank, 2008) Althought the numbers of environmental and labor relatied legislation have been passed in China, ultimately they have not been enforced. This indicates that the overall quality of China's environment and human health continues to decline. (Van Rooij, 2010)

8.2.2 The role of pulp and paper industry on the environmental issues in China

The paper industry is capital and technology intensive, creates considerably scale effects, and plays an important role in driving the development of the related industries in China (Finpro, 2011). It plays an important role in the structure of the Chinese economy because it contributes 18 percent to the economy. The Chinese paper industry has been blamed of environmental problems, which have been traditionally caused by widespread use of outdated technology and a lack of environmental awareness (FAO, 2006)

Compared to world advanced level, the Chinese paper industry has a significant development area in the field of structural readjustment, technical upgrading, energy saving and emission reduction. Industry suffers particularly from low energy and chemical recovery efficiency, overuse of raw materials, and high occurrence of environmental pollution. Problems are not solely generated at the final production stage but also during upstream activities such as in energy and chemical production. Paper companies could significantly improve environmental efficiency with new technology and equipment modernization or replacement but this is not always an option due the high capital costs. (Finpro, 2011)

8.2.3 Sustainability drivers for adopting cleaner technologies in China

To understand what are the next moves in sustainability policies and trends, knowledge on the various stakeholders in China and their interests is needed. Pressures and drivers for improving environmental performance arises from a number of external and internal groups of stakeholders that are increasingly calling for policy efforts to combat increased societal issues. Based on the interviews, customer survey and literature, drivers for environmetal performance in Chinese companies can be divided into three main categories presented in the Figure 14.

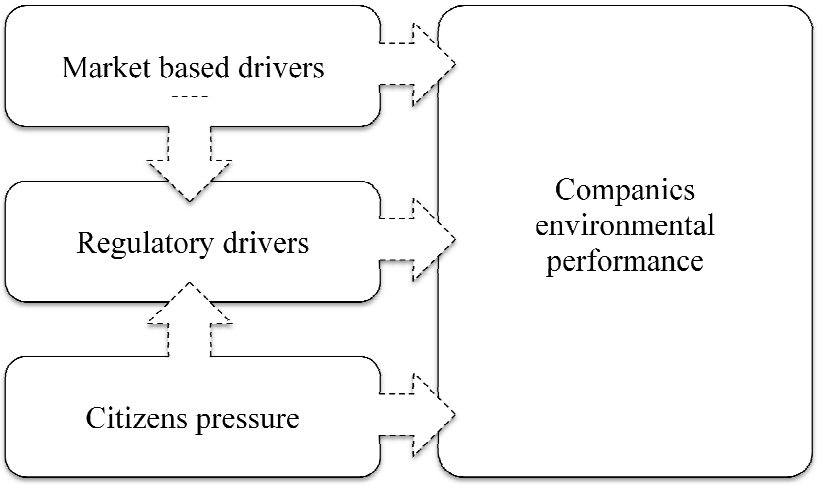

Figure 14. Drivers of sustainability in Chinese pulp and paper industry

The regulatory pressures arises primarily from environmental concern by legislators but market based drivers and citizens' pressure affects on two ways since companies approach to environmental protection has been evolving from a regulation-driven reactive mode to a more proactive approach. Thus, market and citizens' pressure affects directly to the companies but they also urges for the legislators to make necessary sustainability actions to ensure stedily economic growth in China. These drivers are further discussed in the following.

Regulatory drivers

The scarcity of resources, pollution of environment and pressure from citizens has caused the Chinese government to increase environmental regulatory and tax policies. They are considered as the most important factors for cleaner technology adoption in China. China is unusual because its transition continues to be planned by the state and it preserves an active involvement of governmental institutions in business affairs (Child & Tse, 2001). Government has recently set common rules on environmental permissions and renovating policies for industrial installations focusing on companies that are large consumers of resources such as paper and pulp manufacturing plants but heavy industry possesses considerable power to resist environmental regulations.

For paper industry, these rules are set out in the Twelfth Five-Year Development Plan of Paper Industry realased in 2011. Plan targets balancing growth of total paper and board consumption and production, heighten the ability to make technical innovations, as well as achieving world advanced level in technology. It identifies the future development of the China's paper industry as a technology-intensive, energy-saving and environmentally friendly sector. Shutting down of backward production capacity and implementing new emission limits so that a large number of small and medium enterprises are pushed out of the market are something that is central for the advancement. (Finpro, 2011)

These targets may be quite strict. For example the mean energy consumption (coal equivalent) per produced ton of virgin pulp is asked to be reduced 18% from 0,45 to 0,36 ton and water intake per produced paper ton 28% from $85m^3$ to $70m^3$ by 2015. The Plan do not include any certain emission or resource saving limits for OCC systems but it sets capacity limits for new projects as well as production line to be eliminated. However, paper industry has recently begun a transformation and during the recent 11th five-year period between 2005-2011, it achieved the goal on increasing output and reducing pollution (Finpro, 2011).

Currently, China does not have any national carbon tax policy. China has symbolically ratified the Kyoto protocol but it is not obligated to reduce greenhouse gas production at the moment as it is defined as a developing country (UNFCCC, 2013). However, the World Trade Organization (WTO) will soon impose carbon tariffs among its member states including China (WTO-UNEP, 2009). In greenhouse gas emission allowance trading, CO_2 emissions have price and this will affect also the costs of papermaking. Most propably the price of energy will also rise. However, these factors are much more devasting for the higher energy intensive industries than recycled grade papermaking.

Market based pressures

Key component of China's economic growth is to embrace globalization by increasing openess to international investment and trade. Still, opinions are divided whether globalization is good for environment or not (Bouce, 2004). Christmann and Taylor (2001) suggested that export and sales to foreign customers are major drivers for improving the environmental performance of industrial enterprises in China. In the case of the paper industry, it faces both domestic and international market pressures. Traditional trade barriers have evolved from tariffs to "green fences" where some interest groups apply pressure to balance between social, environmental and economic priorities. Thus, the benefits from China's entry into the WTO could be diminished unless it meets the relevant international environmental standards (WTO-UNEP, 2009).

Citizens pressure

The largest pressure China faces to solve sustainability issues comes from within. While state control of pollution violations has been difficult, there is increased recognition that the Chinese citizens play an important role in pressuring firms into compliance. In China, steady economic growth and financial stability are enabling people and communities to overlook imbalancies of society until the problems affect them personally by damaging their health or material interests. (Van Rooij,

2010) But as environmental and human health problems are increasingly occurring in individuals' "own backyards", it makes people to demand more actions on from government and companies. China's workplace death rate is many times higher than those of other developed countries and worker pressurre is critical for improving labor conditions and practices in China (O'Rouke & Brown, 2003). Thus, at their most basic level, environmental sustainability and human health safety are the same thing concerning resource conservation.

8.3 Charasteristics of OCC systems market in China

Different studies highlight the importance of both competitive and environmental analyses in marketing planning. Analyses are needed when companies try to match their capabilities and strategies with the external environment. In this section, characteristics of OCC system market is analyzed mainly from demand perspectives and in more detail from the supply side. Competitor analysis is made for purposes of recognizing points of parities and differences between competitors and Valmet. Still, it has to be remembered that China is in no way a uniform and homogenous market. Although China is unified in the geo-political sense, socially and economically the picture is much more disparate and fragmented.

8.3.1 Recycled paperboard market in China

The center of gravity of paper and paperboard production has shifted from west to east over the past few decades because of the vast growth of population and urbanization. New paper and paperboard capacity projects are built in China whereas consumption has decreased in Europe and United States. Also the type of paper products has changed in response to changing market conditions. Rapid growth of electronic devices is influencing negatively to printing grades while growth in manufacturing sector has an increasing demand for recycled packing materials in Asia. As there is a contradiction between the supply and demand, raw material for recycled products is mainly imported in China from Europe and

United States. (RISI, 2013) Some key figures related to this development are presented in the Table 8.

Table 8. Containerboard forecast in China (adapted from RISI, 2013)

Category	**Annual forecast**		
Transaction prices / tonne	**2013**	**2014**	**2015**
Corrugated medium	317 €	323 €	327 €
Kraft top liner	323 €	340 €	341 €
Kraftliner 175 gsm	456 €	465 €	469 €
Cost indicators			
OCC fiber price / tonne *	171 €	192 €	200 €
Unbleached kraft pulp price / t **	414 €	454 €	466 €
Electricity price / KWh ***	0,096 €	0,110 €	0,120 €
Production indicators			
Japan	9954 t	9789 t	N/A
China	52541 t	56815 t	N/A

* Price of OCC (old corrugated containers), CIF China and SE Asia from the USA.
** Weighted average of unit import values for China and South Korea.
*** Industrial average. Tariffs are highly dependent on geographic location.

Growth in the Chinese demand for imported recovered materials is predicted to slow down because in recent years the Chinese own collection and recycling systems have developed (RISI, 2013). Total production of recycled paperboard and corrugated boxes in China is predicted to grow due to the increased demand for fast-moving consumer goods and high tax on imports. Currently China holds a 25 percent share of global corrugated output and contributes s half of the incremental corrugated business forecast. In 2010, containerboard consumption and production accounted for 42% of the total Chinese paper and board production and it will rise more than 50% by the end of 2015. Demand in China will still continue to grow at an average pace of 5.7% between 2012 and 2017. It is predicted that in 2013 China will surpass the United States and become the world's largest corrugated box market. (RISI, 2013)

8.3.2 Demand for OCC systems in China

The Chinese paper industry is dominated by state owned companies operated by local, provincial and the central government. There are also plenty of private owned companies as well as foreign owned companies. As the economic growth is highly dependent on investments, almost all projects are greenfield investments and modernization projects do not exits because older plants are rather demolished or completely rebuild. Investments are usually long-term projects, and they are also extremely sensitive, to the economic situation. This reflects partly the Chinese business “Live in the moment” philosophy.

The Chinese market is fragmented and only small percentage of producers have a strong cash position. Many of them are focused on improving their cost efficiency but only few large producers may be in a better position to absorb the capital required to comply with the new regulatory policies. Especially major new corrugated board mill projects in China in 2014 are expected to escalate domestic and imported raw material prices. Fluctuation of raw materials’ price including corrugated carton and mixed paper grades as well as energy over the past years has made is difficult to forecast profitability. Therefore profit margins are predicted to decrease over the coming years. (Deloitte, 2012) There are also concerns about overcapacity in the booming Chinese market.

In recent years, considering the falling raw material quality with increased contamination levels and rising raw material cost, greater demands are being placed on the performance of OCC systems. Different grades of containerboard are being produced with faster machines at lower basis weights. (RISI, 2013) Althought the quality of stock has currently minimal impact on board price, ongoing market development in small flute and high-quality graphic boards may open up new applications for value-added corrugated boxes, requiring greater investment in state-of-the-art manufacturing equipment to improve product quality. (Deloitte, 2012)

8.3.3 Valmet's competitive position

There are only few significant player's in OCC systems and paperboard production lines markets in the world. Valmet's main competitors are German Voith and Austrian Andritz while U.S. based Kadant has gained particular foothold especially in China. Nature of competition between players tends to be fierce and even negative margins are accepted to ensure contract. In addition, there are some smaller players but they will not pose a threat to traditional players since they provide only sub-processes, second grade products and small capacity equipment's. In the following three main competitors are described based mainly on supplier interviews.

Kadant Black Clawson

Kadant Black Clawson is the most successful player in China. It has been in the Chinese market over 15 years and reached a kind of standard supplier status. They have delivered dozens of recycled pulp lines in China and therefore can measure appropriate line concept with low project costs but also with low safety margins. Kadant has traditionally set the lowest price on the table since their offering is based on mature technology tested by many customers. From the customer's perspective Kadant was clearly recognized as the most attractive supplier among the Chinese customers despite their basic technology – or just because of it.

Andrizt

Andritz has used aggressive pricing in recent years and they have strenghtened their position in the Chinese market by focusing particularly on problem areas of Kadant´s offering. They have invested heavily in technology development and they are also Valmet's biggest competitor in service and aftermarket business alongside Voith. Even if Andritz is originally Austrian company its operations in China are based local organization and manufacturing that leads to low cost structure and good competitive position against Kadant.

Voith

Voith can be said to be a technology leader since it has been in recycled paper equipment business over fifty years. Unlike other competitors, Voith operates mainly from Germany and they have quite a thin organization in China. Voith has traditionally put their efforts on maintaining technology leadership and staying away from the price competition. Similar to Valmet and Andritz, Voith has ability to deliver complete production line including stock preparation, board machine and automation system. In addition, Voith has invested heavily on sustainable values with their EcoMill concept that emphasizes resource saving as a source of cost reductions.

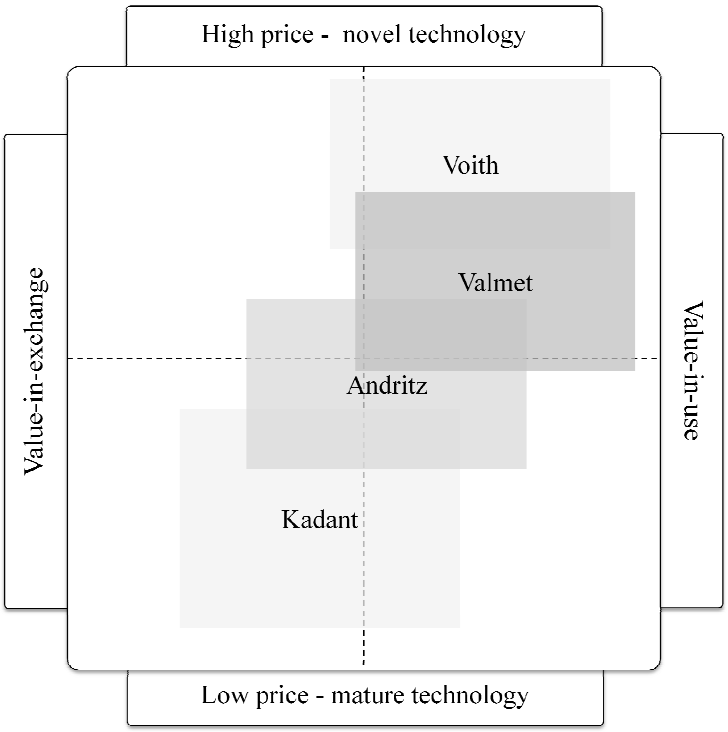

Figure 15. Competitive position map

Based on discussed above, Valmet's competitive position is mapped in the Figure 15. Competitors are assessed in two-dimensional matrix in terms of their technological advancement that correlates on price and their customer value creation strategy.

8.4 Choosing value drivers for customer value quantification

In the previous sections large number of benefits and customer value dimensions were identified and compared to alternative suppliers. Also sustainability issues related to the Chinese paper industry were recognized considering emerging opportunities for sustainable companies. As a customer value proposition is specific to customers with similar interest, the value drivers in the customer value proposition must be selected and compared with the next best alternatives for the target customer. In the proposed customer value model, these findings are bundled together in order to choose appropriate value drivers for value qualification. In the table 9 potential value drivers are prioritized according to six metrics:

1. Customer resonance between features is assessed subjectively depending on frequency and importance that the dimension received during interviews and survey findings.
2. Societal resonance is assessed subjectively based on environment and industry analysis.
3. Comparison to competition is made against overall market based on subjective assessment of supplier interviews and customer survey. Points of difference (POD) shapes events that will deliver positive value when compared with the alternatives. In case of OCC systems, some of them may be trade-offs by their nature. Point of parities (POP) shape events that deliver equal value compared to the next best alternatives. In this case, points-of-contentions (POC) describe benefits that are difficult to compare.
4. Quantifiability of features in monetary terms is assessed subjectively based on interviews and literature.
5. Unambiguity defines whether or not the value dimension can be clearly associated with cost savings or increased revenues.
6. Finally, impact on future assess impact potential in future based on customer survey and literature.

Table 9. Customer value model of Valmet OCC system

Feature	Customer Resonance	Societal resonance	Compaarison to competition	Uambiguity	Quantifiability	Impact in the future
Tangible benefits						
1# Stock quality	High	No	POD	No	Yes	Increasing
2# Energy consumption	High	Yes	POD	Yes	Yes	Increasing
3# Process yield	High	Partially	POD	Yes	Yes	Increasing
4# Water efficiency	Low	Yes	POD	No	Partially	Stays same
5# Process reliability	High	No	POC	Yes	Yes	Stays same
Intangible benefits						
6# Solution provider	Low	Partially	POP	No	Partially	Stays same
7# Workplace safety	High	Yes	POD	Yes	Partially	Increasing
8# Maintainability	No	No	POC	Yes	Yes	Stays same
9# After sales services	High	No	POP	No	Partially	Increasing
10# Wear part durability	Low	No	POC	Yes	Partially	Stays same
Nonfinancial benefits						
11# Business reputation	Low	Yes	POC	No	No	Stays same
12# Fulfilling promises	Low	No	POD	No	Yes	Stays same

Some of the presented value drivers are more readily quantifiable in monetary terms than others and the level of customer and societal resonance will vary substantially. Thus, it is necessary to direct resources in the value assessment process and prioritize the verification targets. Customer value drivers chosen in value quantification and further value proposition are highlighted in the Table 9. In this stydy, they were chosen subjectively based primarily on four metrics:

1. Current customer resonance (Customer resonance)
2. Competitive position (Comparison to competition)
3. Quantifiability in monetary terms (Quantifiability)
4. Impact potential on customer value the future (Impact in the future)

It is natural that the greatest benefits are assessed through tangible financial factors but nonfinancial tangible benefits fall into "grey zone" where some of the benefits may be quantifiable. Still, as Payne and Holt (2001) stated, some non-financial elements should be inclueded in the value proposition.

8.5 Verifying shared value using life cycle tools

The aim of the verifying shared value is simply to deliver an estimation of the financial savings and consequently assess reduced environmental impacts associated with Valmet's OCC system compared to competitors' alternatives. In this study, environmental impacts are quantified using a simplified LCA method and the economic benefits are given by calculations presented in the theoretical framework. Especially LCA model is rather indicative since several simpifications are made. As a results, shared value consist of both of these elements as described in the Figure 16.

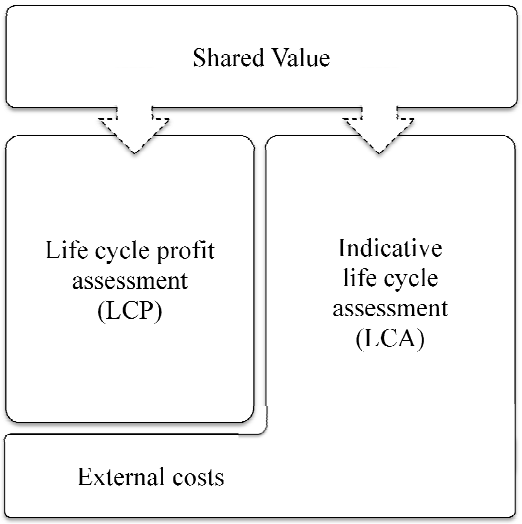

Figure 16. Life cycle tools for verifying Shared Value

Reference line used for calculations presents modern, high capacity system with production of 2100 dry tons (DT) per day. A block diagram of present line is shown in Appendix 4. Reject handling was not examined. The raw material used in calculation is the mixture of European origin old corrucated containers (EOCC) and mixed waste consumer packages (MXW). For energy calculations, the Chinese grid for 2010 is used as the primary source even thoug it shoud be noted that GHG neutral combinated heat and power (CHP) based energy generation is also increasing in the field of recycled paper processing. Major parameters used in a calculations, their amounts, with current and estimated prices in the future converted in euros are presented in the Table 10.

Table 10. Parametres used in life-cycle calculations

Parameter	Amount	Current price level (2013)	Price used in sensitivity analyses (2015)
Production capacities			
OCC system capacity	2100 dt/d (1800 dt/d)		
BM capacity	650000 t/a fluting	317 €/t	323 €/t
Raw materials			
OCC Grade 1.02 [1]	70-80% of total	192 €/t	200 €/t
Mixed waste grade 1.04[2]	20-30% of total	90 €/t	110 €/t
Energy			
Electricity[3]	52 kWh/dt	0,096 €/kWh	0,13 €/kWh
Steam[4]	0,3 GJ/dt		
Water			
Fresh water	OCC 0,5 m^3/dt, OCC and BM 5,5 m^3/dt,		
Effluents	N/A		
Production parameters			
Fiber loss rate / Yield[5]	1,45 % / 94,00 %		
Pulp ingede-sticy rate	Short fibre 500 mm^2/kg, Long fibre 2000 mm^2/kg		
Direct emissions			
Reject	200 dt/d (full capacity)		
Sludges	100 dt/d (full capacity)		
Water from treatment	N/A		
Other cost factors			
Number of operators and wage rate	5	5600 €/y	8000 €/y
Other factors			
Base level for availability OCC	92 %		
Area performance at BM	98 %		

(1) European OCC grade 1.02 contains a mixture of various qualities of paper and board, containing a maximum of 40% of newspapers and magazines
(2) Mixed waste grade 1.04 contains used paper and paperboard packaging, containing a minimum of 70% of corrugated board, the rest being solid board and wrapping papers
(3) Specific energy consumption for main equipments without reject handling
(4) Used only if dispersion is utilized
(5) Usable fiber loss / Overall yield including contaminants

However, it must be noted that very few information was available for purposes of verifying benefits. Measurements in competitors' lines, customers' lines and at test mill located in Finland were conducted, but they were not systematically documented or results were not comparable. Respondents representing Valmet's sales and marketing department also found this problematic area in their sales efforts. Thus, most of the parameters used in calculations are estimated by interviewees. In case of the lack of data or insufficient estimations, existing data from appropriate engineering literature was used. Therefore certain approximations and conjectures were made in the calculations.

8.5.1 Quantifying financial asset performance benefits

Quantification of economic benefits through OEE based calculations creates and communicates clear and compelling picture on how Valmet's OCC system will drive potential business results for the customer. The financial model used here is fairly simple as it makes no sense to try to form a too detailed picture of the complex concept. Model is constructed so that the chosen tangible and intangible value drivers are measured and quantified but non-financial intangibles are not assessed due to their subjective and one-off nature.

Many tangible and intangible benefits occur at different levels of production line, which may cause the system appear disjointed. However, these metrics fall into schemantic hierachical tree (Dhudshia, 2008) that clarifyes the situation. Figure 17 presents the hiearchical tree of the Valmet's OCC system's tangible and intangible benefits combined with board machine (BM). As a schemantic presentation shows, OCC system's reliability, stock quality and equipment safety affects the reliability of the OCC system. Reliability and maintainability of the OCC system affect availability of BM. Production performance and quality rate combined with availability, form the OEE of production line. Acquisition and operation costs of the OCC system form LCC of the OCC system. And finally, when decreased life-cycle costs of the OCC system are subtracted from increased life-cycle sales of

BM, LCP contribution of the OCC system is formed. All costs of BM are excluded from model.

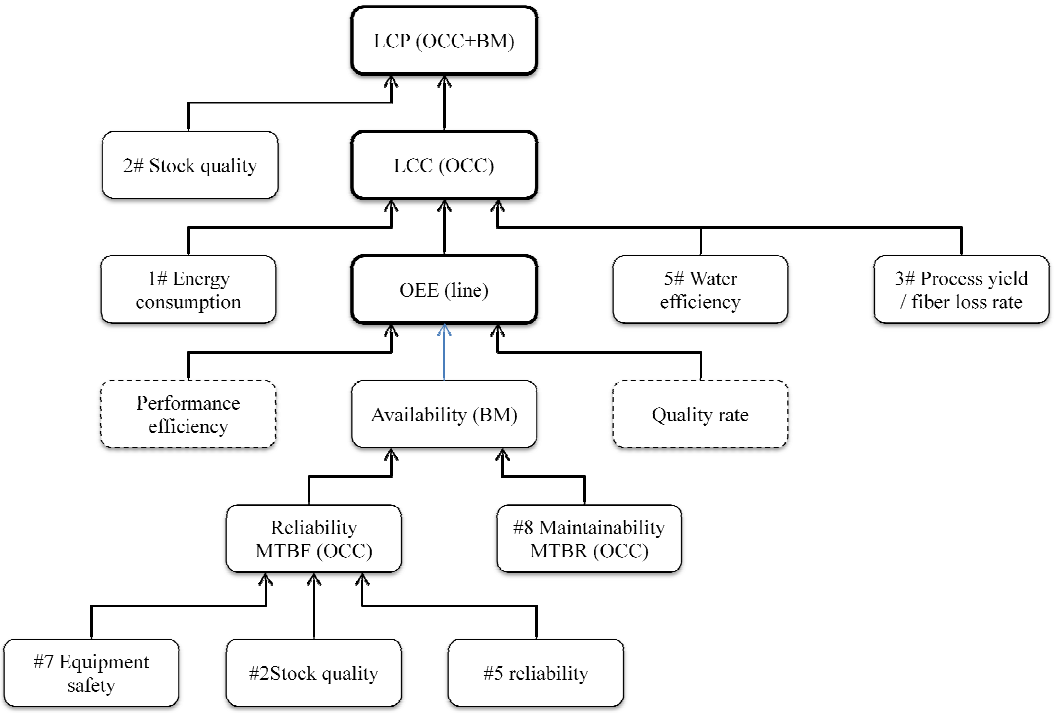

Figure 17. Hierarchy of equipment performance metrics (Adapted from Dhudshia, 2008)

In the economic model, it is assumed that planned and unplanned downtime as well as other production breaks of BM can be reduced simultaneusly with improved quality, reduced energy consumption and increased yield. In fact, availability is the key factor in improving performance because breakdowns, start-ups and slow running equipment are contributors of reduced performance in areas of quality, energy consumption and yield. Moreover, it was supposed that improved pulp quality affects better runnability of boardmachine but also the market price of paperboard in particularly in the future. Following calculations based on equations 5-3, 5-4 and 5-5 described in the theoretical framework, identify cost savings potential (Table 12) and profit contribution potential (Table 11) between Valmet's OCC system and alternative(s) jointly with board machine during **one year** timeframe.

Table 11. Additive profit contribution potential

Value driver / Performance metrics	Data quality	Achievable benefit	Expected benefit
Availability performance (base level 92%)			
Maintainability MTTR			
8# Better maintainability	Estimation	2 d/y	1 d/y
Overall reliability MTBF			
2# Stock quality effects on board machine	Estimation	1 d/y	0 d/y
7# Better equipment workplace safety	Estimation	1 d/y	0 d/y
5# Better equipment reliability	Estimation	2 d/y	2 d/y
Availability hours at base level	8100	h/y	
Increased availability hours	8192	h/y	
Increased annual production potential at BM	6900 dt/a	dt/y	
Increased annual sales potential at BM	2 143 554	€/y	
Quality performance			
2# Stock quality effects on board price	Estimation	2 %	0 %
Increased annual sales potential	4 216 100	€/y	
Total increased annual revenues	**6 359 654**	**€/y**	
Annual profit contribution (profit 8%)	**508 772,32**	**€/y**	

Table 12. Cost savings potential

Value driver / Performance metrics	Data quality	Achievable benefit	Expected benefit
Cost performance			
2# Lower energy consumption	Measured	3 %	3 %
Saved annual energy	3 285 000	kWh/y	
Saved annual energy costs	315 360	€/y	
3# Better yield	Measured	10 %	5 %
Saved raw material annually	3700	t/y	
Saved raw material costs annually	632 700	€/y	
7# Better workplace safety	Estimation	1 working-year	0 working-years
Saved annual working time	1	Years	
Saved annual labor costs	5600	€/y	
Total annual saved costs	**961 260**	**€/y**	

As customer value is a *comparison of benefits and sacrifices*, life cycle profit is a comparison of revenues and costs (Eq. 4-2). When increased revenues, saved costs, and safety margins are taken into consideration, total profits will vary between ca. 700.000 and 1.500.000 euros annually. Difference between expected and achievable profits shape safety margin and minimize risks of penalties unsatisfying the customer. It has to be emphasised that calculations are straighforward and all the trade-off effects have not been fully taken into consideration. In practice this means that actual monetary effects do not necessarily have as substantial as described. Furthermore, it has to be always remembered that OCC system is “the other half” of paperboard production line. If the performance of OCC system is increased, it sets requirements also for board machine and other processes related.

8.5.2 Quantifying societal benefits using simplified LCA method

As objective of this study was to develop **sustainable value proposition**, also the value of societal benefits are assessed considering their possible financial impacts. In the following, environmental analysis is being carried out by using principles of simplified LCA method in order to compare environmental impacts of Valmet's OCC system against alternatives in consumption of natural resources and in emissions to air and water during its use-phase. Impacts on society were assessed mainly from environmental but also from human well-being perspectives. Finally external costs which may reflect to customer's profits are assessed.

Stage 1: Setting boundaries for the system

Environmetal analysis is limited to use-phase because it makes the largest contribution to the environmental impacts. In addition, from marketing perspective, it is the most visible stage for decision makers. This phase of an LCA examines the material and energy inputs and emission outputs generated while a OCC system is in use. Only few environmental benefits were found that can be directly linked to stock preparation phase and differentiate Valmet's OCC system from competitors' systems. As stated in theoretical framework, main contributors of environmental burden are the usage of water as well as emissions to water, athmosperic emissions related to energy generation in power plants and organic solid wastes from stock preparation process (EIPPCB, 2007). Boundaries of present analysis are illustrated in the Figure 18.

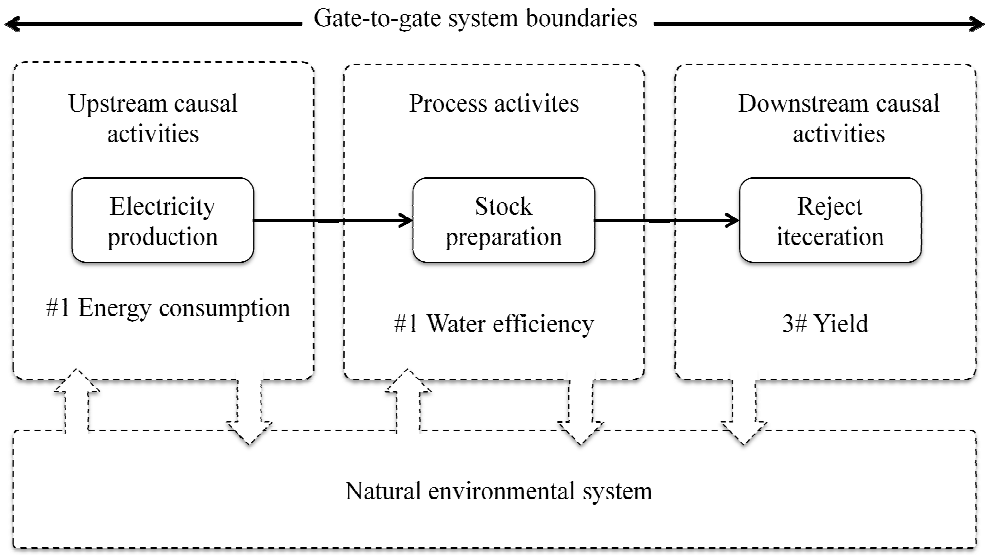

Figure 18. Boundaries of assessed system

Estimates of benefits compared to competitors' in each activity stage are further described in the Table 14. They are mainly based on calculations presented in previous section.

Table 13. Societal value drivers in different activity stages

Value driver / activity stage	Estimated benefit	Reduction / functional unit	Annual reduction
Upstream causal activities			
1# Lower energy consumption	3 %	5 kWh	3 285 000 kWh
Process activities			
5# Water efficiency (fresh water consumption)	10 %	0,05 m^3	34 000 m^3
Downstream causal activities			
3# Better yield	10 %	0,005 t	3700 t

Stage 2: Inventory analysis

Water resources and emissions to air have been previously identified as the top environmental concerns in China. As the result, environmental benefits for the evaluation were chosen based on these concerns. Environmental value of Valmet's OCC system is derived mainly from lower energy consumption that decreases electric generation emissions and better yield that decreases the amount of sludges to be disposed. Water efficiency is excluded from LCA due to several issues discussed later. Emissions of the activities to be investigated are listed in table 14.

Table 14. Emissions of different activity stages

Emission factors	**$S0_2$-eg**	**$N0_2$-eg**	**CO_2-eg**
Electricity generation (grid average, t/kWh)	1,10E-05	8,00E-06	1,16E-10
Reject and sludge disposal (t/t waste)	-	-	9,64E-01

Electricity generation cause pollutant emissions of Nitrogen Dioxides (NO_X) and Sulfur dioxides (SO_2) such as Greenhouse Gases (CHG) consisting of Carbon Dioxide (CO_2). Reject and sludge disporal cause CO_2 emissions regardless further processing method. It is also possible to quantify in monetary terms the value of some avoided pollutant emissions by looking at their value in pollution trading markets.

Stage 3: Impact assessment

Given the crucial importance of climate change and acidification, three indicators are used in this study, global warming potential, acidification potential and photochemical smog. GHG emissions from human activities are are the most significant driver of observed climate change since the mid-20th century (IPCC, 2014). It is recognized that decreased emissions of pollutants and greenhouse gases have beneficial impacts on health and other quality of life concerns. Acidification is mainly aroused by the emissions of acidic gases containing

elements Nitrogen and Sulphur. They damage soil, change the pH value of water, and cause some health problems for humans. Photochemical smog is generated by photolysis of pollutants in athmosphere and it causes several problems for environment and humans especially in China. The smog mainly consist of CH_4, SO_X and NO_X. (EPA, 2013) Impact categories used in this study are described in the Table 15.

Table 15. Illustration of main components of impact categories

Impact category	**Scale of impacts**	**Parameters**
Global warming	Global	Non-renewable CO_2, CH_4, N_2O
Acidification	Regional, local	SO_2, NO_x, HCl, NH_3, HF, H_2S
Photochemical smog	Local	CH_4, Hydrocarbons

Table 16 provides estimates of the calculated potential environmental impacts and impact reductions in the studied categories broken by electricity production, and disposal of rejects and sludges. The first column provides the type of emissions reduction associated with the energy generation and reject disposal. The second and third columns present the quantity of reduced emissions associated with the production of one tonne of recycled pulp. These quantities are multiplied by a capacity to calculate an annual reductions. It is notable that the software used for the calculations, did not capture the impacts of photochemical smog.

Table 16. Estimated emission reductions from stock production by Valmet's offering

Impact category	Emission t/functional unit	Emission reduction t/functional unit	Annual emission reduction t
Global warming (t CO_2-equivalent)	**1,40E+02**	**1,53E-02**	**7,42E+03**
Electricity generation	6,00E+01	1,00E-02	3,94E+03
Rejects and sludges (landfilling, non recycleable)	8,00E+01	5,30E-03	3,48E+03
Acification (t SO_2-equivalent)	**7,30E-04**	**8,30E-05**	**5,45E+01**
Electricity generation	7,30E-04	8,30E-05	5,45E+01
Photochemical smog (t C_2H_6-equivalent)	**0**	**0**	**0**
Electricity generation	0	0	0

In many cases, one can not distinguish the fresh water and discharged effluents exactly between stock preparation and board making. The process water used in the stock preparation is recycled within integrated water cycle of the board machine and only limited quantity of fresh water enters in stock preparation cycle. Water leaves from stock preparation to the board machine cycle via removal of impurities. Even if water circuits in mills are integrated, some process effluents from OCC system are directly delivered to wastewater treatment plant. They include propotion of forms of solids such as BOD (Biological Oxygen Demand) that contribute especially emission of greenhouse gases (CHG) such as Carbon Dioxide (CO_2) and methane (CH_4) and require further processing to convert them harmless for environment. As the final environmental impacts depend largelly on COD/BOD removal capacity of wastewater treatment plant, environmetal impacts of effluents are not assessed. Still, reducing forms of solids in effluent reduces energy and chemical consumption in wastewater treatment plant. (Dalh, 2004)

Stage 4: Interpretation of results

In-depth interpretation of results were not done since the goal and scope of the study was limited primarily on marketing purposes. Thus, results are intrerpreted as describing demonstrative eco-profiles between Valmet's OCC system and competitive offerings shown in Figure 19 followed by briefly explanation. The largest score of each impact category is set on 100 in eco-profile.

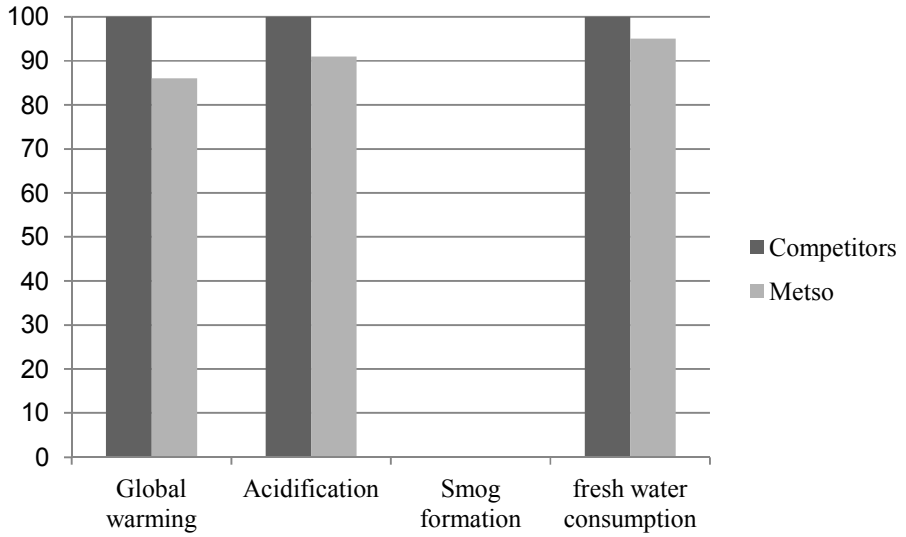

Figure 19. Comparison of environmental profiles.

The following conclusions can be made based on the impact assessment. There is clear evidence of environmetal benefits of Valmet's OCC system. The overall net GWP of one tonne stock production within the assumed boundary and other conditions is approximately 60 kg of CO2-equivalent and that is about 15 percent lower than competitors. Acidification potential given in SO2-equivalents has increased by 10% because lower energy generation emits relatively less SO2 and NO2 emission. In practice, this mean that 1,3 million kilograms of coal is not burned in a year. In addition, Valmet's OCC system saves 34 000 m^3 scarce freshwater resources in a year through decreased fresh water consumption and the use of treated effluent from the wastewater treatment plant. For comparison,

without any recycling if the brown grade board would be handled by either landfill or incineration, CO_2 impacts would be around 120 kg per tonne (CPA, 2012) and thus overall GWP of recycled board production tends to be rather negative.

Overall, it can be concluded that environmental comparison between Valmet's OCC and competitor's system is in favor of Valmet. It becames clear that private benefits are achieved simultaneously with public ones. Valmet's production process has fewer steps, which helps to lower impacts during the most impactful use-phase. Except fresh water consumption, the shown health and environmental impacts depend largely on the electricity consumption. Options to reduce direct environmental impacts of OCC system should focus on reducting energy consumption and reducing of fresh water consumption. Again, It has to be said that environmental analyses should be stretchened over the whole integrated mill processes in order to achieve relevant results. If OCC system is assessed alone, particularly environmental assessments remains inadequate.

8.5.3 Considering external costs

Social and economic benefits are mixed to a large extent. Many societal benefits can be quantified in economic terms, at least partly, since they express themselves through some identifiable economic impact. Classic solution for negative externalities is to use taxation or emission market. For example in Europe, emission trading system is based on CO_2-equivalents. With no Chinese nationwide emission market, even if some pilot regional emission markets have initiated, it is only speculative to assing a monetary value of environmetal benefits of Valmet's OCC system in China. Economic benefits derived from reduced emission, though significant in relation to competion, were barely registered in calculations in this context. In addition, the pollution trading markets primarily involve utility companies such as electricity producers.

8.5.4 Sensitivity analyses for profitability factors

Models in life-cycle calculations can be highly complex and their input-output relations may be poorly understood by decision makers. In such cases, the economic model can be viewed as a black box where the output is an opaque function of its inputs. Sensitivity analyses are essential for every economic evaluation. In addition for handle uncertainty of results, they can be used to estimate future profits in environment of changing resource prices, by evaluating how much each input or output is contributing to the profit making capacity. Estimating future profits also enhances communication to decision makers.

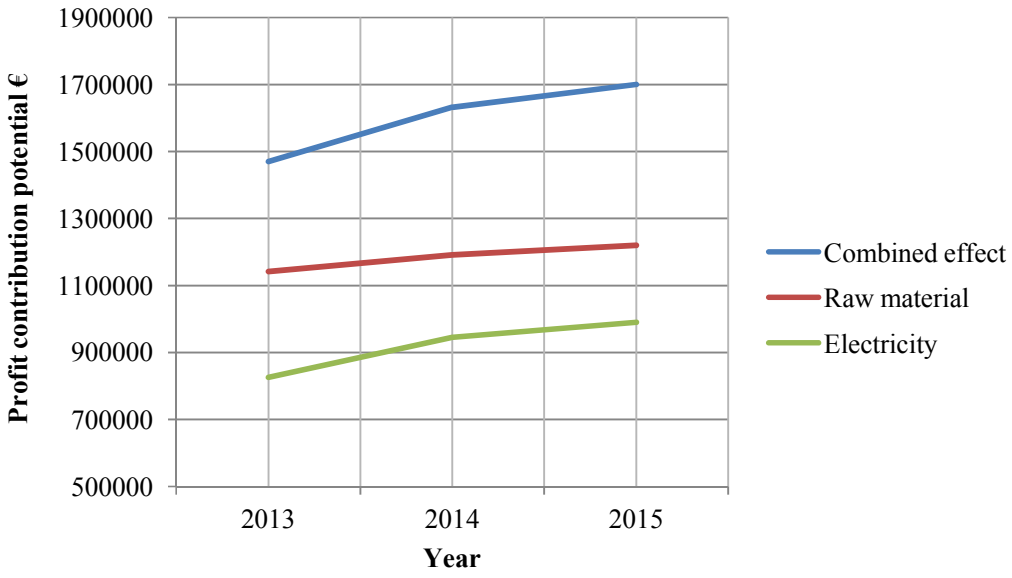

Figure 20. Profit contribution potential in the future

There were two input or output related factors that were predicted to have most important influence in profits in the future according both to literature and interviewees; The price of raw material and driven up energy costs. In real world context, volatility of factors would be rather mutual than independent (ceteris paribus) but in the following analysis only independent volatility of factors is considered. Figure 20 indicates that compared to the competitors, profit

contribution increases to 1,6 million euros by 2015 when the rise of electiricity and raw material prices has taken into consideration in economic model. In this scenarion, safety margins we not taken into consideration.

8.6 Proposed sustainable customer value proposition

In the following, findings of the study are reconstructed into the form of **sustainable value proposition**. It is known that when developing customer value propositions one should know competencies, customers, and competitors. But in developing sustainable value propositions this is not enough. As environmental issues become more important in business, the role of environmental specific information as a part of value proposition will become increasingly important. Proposed sustainable customer value proposition for Valmet's OCC system reflects Shared Value thinking proposed by Porter and Kramer (2011) and it consists of four sections illustrared in the Figure 21.

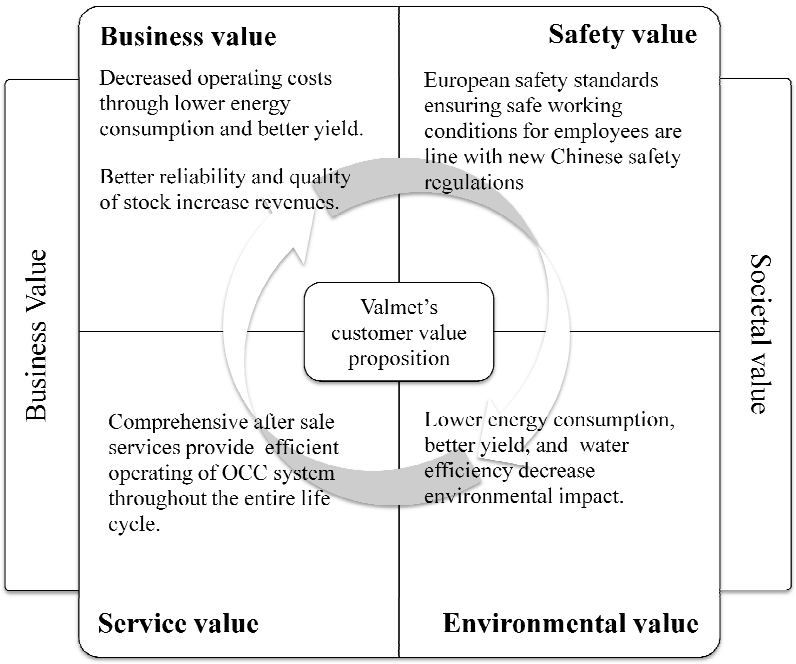

Figure 21. Customer value proposition framework for Valmet's OCC system

In this study, Business and Environmental sections were quantified using life cycle calculations while Service and Safety sections are rather non-financial benefits but still importantant in customer value creation. The characteristics and estimated benefits of each section are describe in more detail in the Table 17.

Table 17. Detailed description of value proposition

Value category	Description	Estimated benefit	
Business value	Stock quality, equipment safety and reliability increase availability of board machine by 192 hours in a year. Better stock quality enables higher grade products.	500 000 €/year	Tangible value
	Lower energy consumption and better process yield provide cost savings in raw material acquisitions.	960 000 €/year	
Environmental value	Lower energy consumption and better yield decreases greenhouse gas emission and environmental acidification.	CHG emission 3940 t/y SO2 emissions 54 t/y	
	Water efficiency saves water resources.	34 000 m^3/y	
	Better yield decreases amount of rejects and sludges for iteration	GHG emissions 3480 t/y	
Service value	Facility to provide comprehensive after sales services.	Not assessed	Intangible
Safety value	European safety standards ensure safe working conditions.	Not assessed	

When the future perspective is added in the value proposition, in line with sensitivity analyses, business results compared with competitors' increase mainly due better yield and lower energy consumption. Increased costs of these raw materials emphasize the perfomance differences between OCC systems. It was estimated based on the forecasts, that the business value increases about 100 000€ in a year between 2013-2015. From societal perspective, quantified benefits stay the same. But as found, their significance in supplier selection in the future is likely to be increased.

9 CONCLUSIONS

The purpose of this study was to **develop the sustainable value proposition for recycled fiber system in the China's market.** First, the findings are synthesized and answers are presented to the each research question. As usual for case studies, these results cannot to be generalized per se (Yin, 2003). In addition, during the research process, shortcomings in organizational practices related to value based selling were found. Therefore in managerial implications, quite extensive debate especially on prerequisites of value based selling is being conducted. Finally, limitations of the study and the scope of further research are summarized.

9.1 Answers to research questions

The research objective was divided into three research questions. The answer to the first research question is derived mainly from the supplier interviews, while questions 2 and 3 are answered based on the supplier interviews, customer survey and existing literature. Answers are summarized in the Table 18.

1. *What are the key benefits that Valmet´s OCC systems provides in the Chinese market?*

The first research question was set out to recognize the most meaningful benefits that Valmet's OCC system provides in China. In general terms benefits can be considered as positive values that customer receives when buying Valmet's offering compared to alternatives. These benefits can be broadly categorized into tangible financial benefits that go straight into bottom line, and non-financial benefits that are harder to quantify but none the less provide real value to the customer's. Financial benefits can be further divided as either cost-saving and revenue-enhancing.

Most meaningful financial benefits that differentiates Valmet's OCC from competitor's system were found to be pulp quality, energy consumption and process yield. These benefits are not particularly China specific. They were also found to be easyly to quantify if appropriate measurements are available. Integrated solution provider, comprehensive after sales services, business reputation, and European safety standards were found to be most significant non-financial benefits. When considering shared value, Valmet's OCC technology could play an important role in increasing production efficiency and reducing emissions to the environment. Especially energy efficiency is a key element in sustainable development because it contributes to reducing resource depletion rates and mitigating greenhouse gas emissions. In other words private benefits are achieved simultaneously with public ones.

Value based selling is primarily about creating, communicating, and delivering tangible financial business impacts. From organization's perspective, knowing what value really means to customer is one of the most important issues. Rather than trying to capitalize every benefit that Valmet's OCC system has to offer, should the company evaluate value-creating potential in each selling case and categorize and priorize those benefits that will have the greatest impact for potential customer's business using customer value model and then craft a value proposition around it. Communicating environmetal benefits effectively can also strengthten Valmet's competitive position.

2. *What are the key determinants that influence supplier selection decision in the Chinese market?*

The second research question aimed to deepen the understanding of supplier selection decision criteria made by recycled board producers. Supplier selection decision is one of the critical issues to help organizations to maintain its competitive position and typically numerious factors are considered and evaluated.

Unfortunately, low response rate of customer survey provided only a narrow view to elements of supplier evaluation among the Chinese producers.

According to the survey, initial investment costs were not found to be customers' main concern and customers are more and more buying value taking into account the total costs of ownership. Moreover, it was not surprise that tangible financial elements, especially securing process yield and low energy consumption were considered as the key performance related factors in the supplier selection. In addition, it was found that stock quality may play an important role when demand of high-quality graphic board is increased. From this perspective Valmet's OCC system should be a strong position. A lot of recognition was also given to reliability, process availability of after sales services and somewhat surprisingly also for the workplace safety.

However, environmental factors did not emerge as a significant supplier selection criterion. It seems that the Chinese recycled paperboard manufacturers have increased their environmental awareness, mainly due to regulatory pressures, but this awareness has not been widely adapted into purchasing practices. This may be due to a need to solve issues on their own rather than "outsource" environmetal management.

The other central finding was the importance of being able to present solid and credible Chinese reference cases to potential customers. A critical mass of successful installations in China is needed to prove supplier's ability to enhance customer's business and decrease buying risk. Even though there are several factors affecting buying decision, at the end it is a human decision, involving the individual, that matters. Thus, it is important be aware of all these buying incfluences.

3. *What are the potential key benefits that influence buying decisions in the future, considering the increasing environmental pressures and legislation in China?*

The third research question aimed to consider the theoretical and empirical findings in unison to understand how sustainability issues may affects the supplier selection decision in China in the future. Offering itself is a passive phrase in such an environment, and suppliers should be more proactive and even aggressive. This is important, but quite hard, because the supplier who is able to correctly distinguish these future customer needs creates a source of a strong competitive advantage.

Globalization results in both pressure and drivers for Chinese enterprises to improve their environmental performance. Among the conventional supplier selection research either environmental or social factors have not been widely emphasized. But with the relative scarcity of resources and pressure of green barriers to trade, both the Chinese government and companies have suggested to initiate industrial environmental management measures that may increasingly affect the supply practices.

It is still not clear how supplier selection decisions are influenced by the customer's external variables in the future. Even if tangible financial benefits are still the center of attention, environmental legislation, competitive pressures and citizens' pressure are clearly something that is central for the advancement in this area. All of these sustainability drivers influence Valmet's opportunities in the Chinese market. They can be the source of competitive advantage when producers are challenged by the rising costs of raw materials. Especially energy and water efficiency seems to capture the special attention in the future. In addition there still exists a necessity to incorporate other factors such as employee health and corporate social responsibility inititives in value proposition.

Table 18. Summary of the main findings of the study

Research question	Conclusion
1. What are the key benefits that Valmet´s OCC system provides in the Chinese market?	Monetary tangible benefits consist of low energy consumption, good process yield, process reliability, and stock quality. Intangible benefits such as integrated solution provider, comprehensive after sales services and workplace safety are harder to quantify in monetary terms but provide value for customers
2. What are the key determinants that influence supplier selection decision in the Chinese market?	Customers are more and more looking for total costs of ownership. This sets requirements especially for process yield and energy consumption, but also the role of after sales services is increasing. Role of stock quality is also increasing as higher-grade boards are coming. Societal factors, expect workplace safety, were not considered as significant.
3. What are the potential key benefits that influence buying decisions in the future, considering the increasing environmental pressures in China?	Especially water efficiency and energy consumption are in the focus from environmetal perspective in the future.

9.2 Managerial implications

These findings and research process also carry managerial implications. Since the actual findings of the study were not extremely tangible and unexpected, the managerial implications will focus on how to rethink customer value and its creation processes in Valmet's organization. *The high level challenge for Valmet is to get the technical features linked to customers business based issues and translate the OCC system's benefits into customer value*. To understand how organizations identify and respond to needs for value changes, the underlying of

organizational and managerial processes must be examined - but the question is, how it can be achieved.

The answer can be found in creating framework for the needed business processes and shaping investments that support those processes. Johnson, Christensen and Kagermann (2008) suggested that a successful business model has four components: 1) Customer value proposition, 2) profit formula, 3) key resources, and 4) key processes. In the framework presented in the Figure 22, two elements of these are considered from the customer value creation perspective in Valmet´s orgazation. Until proposed prerequisites are fulfilled, potential of value based selling cannot be fully exploited.

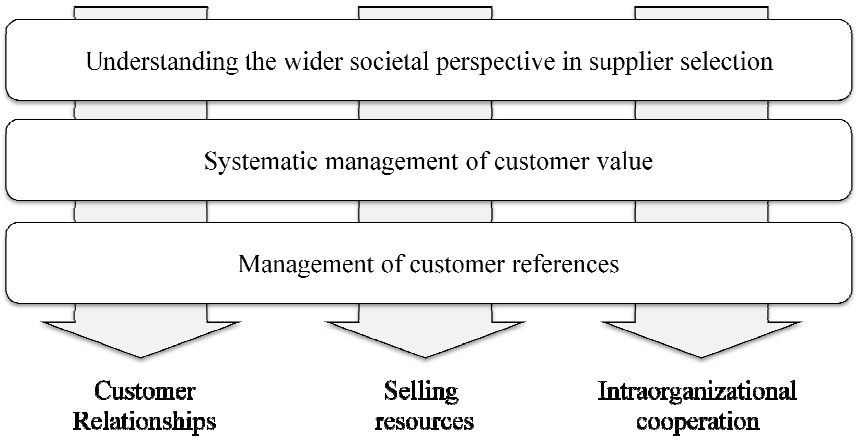

Figure 22. Processes and resource for rethinking customer value

Vertical processes describe actions that are needed to manage and thus deliver sustainable customer value. There processes can occur in various organizatioa levels or functions. Horizontal flows describe the cross-organizational investments that are necessary for supporting these processes. In other words, the organization needs to focus on improving value management level of any key business processes. One of the key problems in any large scale organizational change, like this, is to create a cultural transformation and make it permanent.

Process 1: Wider perspective for customer's stakeholder's needs

The first process focuses on indentification of stakeholder's needs and incorporating them into value proposition. As found, suppliers must be understood as a complex network mechanism linking customer value and the value of the firm for all of its stakeholders. Until suppliers look their customer´s operating environments as an ecosystem, all aspects of customer's buying decision cannot be achieved. External stakeholders such as customers and local communities are not the part of customers' business but have a keen interest in what it does and they may influence customer's decision making because they have to balance stakeholder's needs. Thus, focusing on customer's stakeholder's needs is effective mechanism for bringing new perspectives into developing the customer value propositions.

Process 2: Customer value management practices needed

The second process involves the organizational management of customer value. As Peter Drucker said: "To manage you must be able to control and you must be able to measure". Thus, developing credible customer value proposition is possible only when accurate and measured customer data is available for everyone who may need it. Value assessment is hard enough for own products and it can be close to impossible for the next best alternative but without assessment and quantifications the value proposition lacks persuasiveness and is likely to be quickly dismissed. Furthermore, more holistic perspective for value management is organizationally needed – it is not just the resposibility of the sales and marketing.

Process 3: Customer reference management needed

Last, but not least process as the basis of value based selling is the need for customer reference management. Customer references are a critical resource because they prove to the buyers that company really does deliver their promises

and claims. Customer reference management emphasizes leveraging and developing of customer references. As the findings demonstrate, customer references as marketing assets are strongly interlinked with other selling resources.

Investment 1: Investment in customer relationships

Value based selling is clearly about deep understanding of the customer's business and what they value, now and particularly in the future. Thus, the interaction and customer involvement are critical success factors of customer value management. Perspective of value co-creation influences the way of managing customer relations. Knowledge for developing offering and value proposition comes from relationships rather than transactional exchange and requires reflecting mutual loyalty, trust and commitment A cooperative approach to business-environment issues is also a key aspect of sustainable development.

Investment 2: Investments in selling resources

It is obvious that people are a key resource and the most valuable asset in the implementation of value based selling. Salespeople are not selling only products but consultancy how supplier provide value for customer's business. Thus, sales resources and practices must be modified and moved away from past and new systematic sales approach and tools need to be developed. While the global markets are inevitably declining, more aggressive sales efforts are needed to distiquish the company from competitors. This means that not only the advantages of the own offering but also the disadvantages of the competitive offerings should be demonstrated during sales process. In terms of Anderson et al. (2006), they could be described as some kind of negative and positive points of differences.

Invesment 3: Investments for intra-organizational collaboration

The essence of any organization is people working together to achieve common goals. Thus, departmentalization and a function focused structure are obvious barriers to a value based selling culture. Investments in links between organizational functions play a prominent role and all people and functions of the supplier should be involved in the customer value creation process.

As a summary, the following organizational actions should be carried out in developing successful value based selling strategies for Valmet's OCC system in the China as well as in other markets:

1. Delivered customer value should be measured, documented, protected and leveraged systematically.
2. Intra-organization collaboration, customer relationships and selling resources should be developed because they are key elements in value based selling.
3. Stakeholder perspective on customer value should be taken into account when developing especially sustainable customer value propositions.

1.2 Limitations of the study

As in research projects usually, the choices made during the research process imply limitations in the the findings and their interpretation. First, since the research approach used was single case study, the collected data cannot be generalized to wider population. But as Yin (2003) suggest, findings will be valuable in the analytical sense if they clarify understanding of existing theory.

Second, collected data was weighted heavily towards supplier's perspective and customer survey results were only used to confirm supplier's educated quesses. This was mainly due to chosen research design and low response rate. Thus, some

important customer insights may not have been achieved for customer value model.

Third, there are uncertainties both in economic and environmental life-cycle calculations. Economic analysis did not capture some types of benefits at all and some benefits have been captured incompletely. Also in LCA calculations high quality and representative data are critical for reliable results. Life-cycle inventory used for calculations was incomplete, largely because the resources necessary to gather high-quality data were not available. Thus, particularly results on environmental impact and their interpretation are extremely exploratory. These limitations should be kept in mind when considering results and their implications.

9.3 Future research directions

Research processes usually tends to leave some questions unanswered and numerous new questions are emerged. Thus, there are several ways to expand this study. As stated, benefits consisting integrated deliveries including stock preparation, automation system, board machine, water management systems and after sales services were not in the scope of this study. It is obviously clear that they should be assessed together to achieve solution based perspective for selling. For example, how Valmet's OCC system combined with Valmet's DNA automation improves availability, performance, and quality during in start-up and stopping-sequences.

In addition, customer value propositions may also be useful tool for commucating customer value in smaller scale applications such as unit operations rebuilds that are aimed at increasing the efficiency of particular process block. In such cases customer value can be compared to existing process or other well similar and well benchmarked processes.

Moreover, very interesting challenge is to better understand buying situations among the Chinese customers including decision making unit and decision making processes. It was recognized that in some cases decision making unit is very hierarchical and it is not clear what benefits shoud be communicated to whom. Collecting dyadic data from multiple actors within supplier and customer organizations could deepen the presented insights regarding this issue.

Finally, considering the potential of the Shared Value approach for sustainable development, there is a need to further develop and promote its application in the China's priority areas. While most of the environmetal performance indicators covered in this study were focused on carbon and energy management, there are plenty of gaps that need to be explored in terms of other environmental and human health indicators. It would be more useful from both economic and social value perspectives since benefits would be larger and better quantified.

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APPENDIX 1/4 Questionnaire form for supplier

Haastattelurunko - Metso Suomi

A. Haastateltavan taustatiedot

1. Kerro lyhyesti itsestäsi, taustoistasi ja nykyisistä tehtävistä Metsolla?
2. Miten tehtäväsi liittyvät OCC-kierrätyskuitulinjaan?

B. Metson OCC-kierrätyskuitulinjan hyödyt

3. Millaisia erilaisia hyötyjä Metson kierrätyskuitulinja tarjoaa asiakkaille?
    - Mitkä ovat keskeiset prosessiin liittyvät hyödyt?
    - Entä operointiin ja kunnossapitoon liittyvät hyödyt?
    - Onko esimerkiksi tehdassuunnitteluun liittyviä hyötyjä?
4. Mitä muita mahdollisia hyötyjä kierrätyskuitulinjalla on?
5. Minkälaisia ympäristöhyötyjä tunnistat Metson kierrätyskuitulinjalla olevan?

C. OCC-kierrätyskuitulinjojen markkinat Kiinassa?

6. Kertoisitko lyhyesti OCC-kierrätyskuitulinjojen markkinoista Kiinassa?
7. Ketkä ovat Metson pääkilpailijoita Kiinassa?
    - Miten arvioisit eri kilpailijoiden menestymistä Kiinassa?
8. Miten Metson tarjooma asemoituu hyödyiltään kilpailijoihin?
    - Millä osa-alueilla Metso on parempi, millä huonompi?
9. Millaiset tekijät vaikuttavat mielestäsi asiakkaiden ostopäätökseen Kiinassa?
10. Miten ympäristötekijät vaikuttavat ostopäätökseen tällä hetkellä?
11. Entä miten näet ympäristötekijöiden vaikuttavan ostopäätökseen tulevaisuudessa?
12. Mitkä ovat näkemyksesi mukaan keskeisimmät asiakkaan ostopäätökseen ja toimittajan valintaan vaikuttavat tekijät Kiinan markkinoilla?

D. OCC-kierrätyskuitulinjan myyntiprosessi Kiinassa

13. Voisitko kuvailla tyypillistä kierrätyskuitulinjan myynti- ja toimitusprosessia kiinalaiselle asiakkaalle?
14. Miten myyntiprosessi eroaa esimerkiksi Eurooppaan suuntautuvasta?
15. Millaisia erityishaasteita Kiinaan suuntautuvassa myyntiprosessissa on?

16. Mitkä ovat tärkeimmät myyntiargumentit, joilla kierrätyskuitulinjaa tällä hetkellä tarjotaan Kiinassa?
17. Kohdennetaanko myyntiargumentteja asiakaskohtaisesti vai pyritäänkö näyttämään kaikki kierrätyskuitulinjan tarjoamat hyödyt?
18. Miten käytetyt myyntiargumentit eroavat esimerkiksi Euroopassa käytetyistä?
19. Miten ympäristöargumentteja hyödynnetään myynnin tukena Kiinan markkinoilla?
20. Millä tavoin myyntiargumentit on näytetty toteen asiakkaalle?

E. Asiakassuhde ja sen hyödyntäminen Kiinan markkinoilla

21. Voitko kuvailla tyypillistä kiertokuitulinjan toimituksen jälkeistä asiakassuhdetta Kiinassa?
22. Dokumentoidaanko asiakkaille toimitettuja hyötyjä järjestelmällisesti?
23. Miten dokumentoitua tietoa toimitetusta hyödyistä hyödynnetään myyntitilanteessa?
24. Millainen merkitys asiakasreferensseillä on Kiinan markkinoilla?
25. Millaista muuta potentiaalista arvoa näet asiakassuhteella olevan Metsolle?

F. Hyötymallin rakentaminen kiinan markkinoille

26. Miten Metson kierrätyskuitulinjan tarjoamia hyötyjä voisi mielestäsi osoittaa paremmin asiakkaille?
27. Millaista hyötyä näet kierrätyskuitulinjan taloudelliset-, sosiaaliset ja ympäristöhyödyt yhdistävästä mallista olevan myyntitilanteessa?
28. Mitkä olisivat tärkeimmät tekijät, joita hyötymallissa tulisi huomioida?
29. Miten merkityksellisiksi näet sellaisten hyötyjen osoittamisen (esimerkiksi ympäristöhyödyt), joita ei voida suoraan mitata rahassa?
    - Mitkä olisivat tärkeimpiä tekijöitä ja voisiko niitä kvantifioida jotenkin?
30. Millaisia haasteita näet hyötymallin kehittämisessä ja hyödyntämisessä?

G. Muuta mieleen tulevaa ja jatkohaastattelut

31. Tuleeko mieleen asioita, jotka voisivat olla tutkimuksen kannalta tärkeitä ja joista ei ole vielä keskusteltu?
32. Entäpä muita henkilöitä Metsolla, joilla voisi olla tärkeää tietoa tutkimuksen tavoitteiden näkökulmasta

APPENDIX 2/4 Covering letter for customers

Dear Customer,

Metso Paper has traditionally compiled a benchmarking survey for paper and board machines worldwide. For now, we are interested in our OCC system.

The purpose for collecting the information is help us to understand our OCC system offering from customer perspective and find out what is valuable for customers in the future. The information and suggestions you provide will be used to evaluate and improve products and services related Metso's OCC system. We hope you agree to participate and contribute to the success of this survey.

Your personal information as well as answers will be kept as confidential. A limited number of our team members will have access to the data. Due to the nature of the survey, summary report is not available.

The questionnaire will require approximately 15 minutes to complete. We ask you kindly to pay attention to the schedule. We are looking forward to receiving your reply as soon as possible, however**, latest by September xx, 2013**.

We would much appreciate it if you could fill in the attached excel file and send it back to us by e-mail to address xxx.xxx@xxx. Please, remember to save the file after the form is completed.

It would be also a pleasure for us to receive your feedback concerning this questionnaire. New ideas of general interest would also be highly appreciated.

In case you have any questions, please feel free to contact me immediately.

Yours sincerely,

APPENDIX 3/4 Survey form for customer

metso

General information

Mill contact person and title

Date

Machine number and OCC line number

Main supplier of OCC line

Mill

Raw material / end product

Metso's OCC system offering

1 How familiar you are with Metso´s OCC system offering?

Not at all familiar	○
Slightly familiar	○
Somewhat familiar	○
Very familiar	○

2 How would you rank the following OCC system equipment suppliers in terms of their overall attractiveness?

Andritz	less attractive	○	○	○	○	○	more attractive
Voith Paper		○	○	○	○	○	
Metso Paper		○	○	○	○	○	
Kadant		○	○	○	○	○	
GL&V		○	○	○	○	○	

3 How would you rate Metso's OCC system offering against to the most attractive suppliers in the following areas?

(1 - worse, 2 - somewhat worse, 3 - about the same, 4 - somewhat better, 5 - better)

Performance and investment	1	2	3	4	5
Fiber loss	○	○	○	○	○
Energy consumption	○	○	○	○	○
Pulp quality	○	○	○	○	○
Fresh water consumption and steam consumption	○	○	○	○	○
Investment costs	○	○	○	○	○
Achieving performance guarantees	○	○	○	○	○

Equipment and process features	1	2	3	4	5
Process reliability	○	○	○	○	○
Usability of process	○	○	○	○	○
Equipments and processes maintenance needs	○	○	○	○	○
Equipments and processes maintainability	○	○	○	○	○

Capabilities	1	2	3	5	6
Technological advancement	○	○	○	○	○
Environmental advancement	○	○	○	○	○
Handling warranty issues	○	○	○	○	○
Spare parts and maintenance services	○	○	○	○	○

Supplier selection for OCC system

4 Rank the following performance related factors on their importance in a supplier selection for OCC system?

How do you feel about the role of these factors in the future?

								decrease	no change	increase
Fiber loss	less important	○	○	○	○	○	more important	○	○	○
Energy consumption		○	○	○	○	○		○	○	○
Pulp quality		○	○	○	○	○		○	○	○
Fresh water consumption and steam consumption		○	○	○	○	○		○	○	○
Investment costs		○	○	○	○	○		○	○	○

APPENDIX 3/4 Survey form for customer

5 Rank the following supplier related factors on their imporance in a supplier selection for OCC system?

How do you feel about the role of these factors in the future?

								decrease	no change	increase
Personal relationships	less important	○	○	○	○	○	more important	○	○	○
Business relationship		○	○	○	○	○		○	○	○
Supplier's customer references in China		○	○	○	○	○		○	○	○
Supplier's customer referenced in Europe		○	○	○	○	○		○	○	○
Supplier's safety standards		○	○	○	○	○		○	○	○
Supplier brand image		○	○	○	○	○		○	○	○
Supplier's ability to cooperate with a customer for environmental objectives		○	○	○	○	○		○	○	○
Supplier´s after sales services		○	○	○	○	○		○	○	○
Supplier's ability to deliver integrated solutions, for example stock preparation system and board machine		○	○	○	○	○		○	○	○
Supplier's social responsibility affairs in China		○	○	○	○	○		○	○	○
Supplier's integration in Chinese society		○	○	○	○	○		○	○	○
Supplier's ability to cooperate with a customer for process performance objectives after delivery		○	○	○	○	○		○	○	○

6 Rank the following environmental and social factors on their importance in your business?

How do you feel about the role of these factors in the future?

								decrease	no change	increase
Govermental environmental regulations	less important	○	○	○	○	○	more important	○	○	○
Regional environmental regulations		○	○	○	○	○		○	○	○
Environmental pressure from customers		○	○	○	○	○		○	○	○
Environmental pressure from local resident		○	○	○	○	○		○	○	○
Workplace safety pressure		○	○	○	○	○		○	○	○
Pressure to strengthen a company's environmental image		○	○	○	○	○		○	○	○

Metso's corporate identity and customer relationship management

7 How would you rate Metso Paper in following areas?
(1 - poor, 2 - fair, 3 - good, 4 - very good, 5 - excellent)

	1	2	3	4	5
Customer relationship management	○	○	○	○	○
Problem solving abilities	○	○	○	○	○
Technical knowledge	○	○	○	○	○
Ability to understand customer's business	○	○	○	○	○
Informing about products and services available	○	○	○	○	○
Salespeoples expertise	○	○	○	○	○
Service willingness	○	○	○	○	○
Staying on schelude	○	○	○	○	○
Overall supplier reliability	○	○	○	○	○

8 What kind of needs you might have and how Metso could serve you better for example related to investment decision, acquiring process and operating phase of OCC stock preparation line?

Please remember to save your answers before emailing the questinnaire.

Thank you very much for participating in this valuable survey.

Appendix 4/4 Reference OCC line