

KARELIA UNIVERSITY OF APPLIED SCIENCES
Degree Program in Design

Anna-Maija Kontturi

UTILIZATION OF THE LIFE CYCLE ANALYSIS IN THE PRODUCT
MARKETING: CASE KERO HIRSIRAKENNUS OY

Thesis
August 2016



Karelia
UNIVERSITY OF APPLIED SCIENCES

THESIS
August 2016
Degree Program in Design

Tikkarinne 9
80220 JOENSUU
FINLAND

Author (s)
Anna-Maija Kontturi

Title
Utilization of the life cycle analysis in the product marketing: Case Kero hirsirakennus Oy
Commissioned by Kero hirsirakennus Oy

Abstract

The purpose of this thesis is to find out if life cycle analysis (LCA) can be utilized in product marketing. The research problem was addressed with a case study methodology focusing on the product marketing in Kero hirsirakennus Oy. The subject was vast and required a multidisciplinary approach. The theoretical section consists of literature reviews on marketing, life cycle analysis and utilization of environmental knowledge in companies, as well as describing the operational environment for the case study company. The case study is based on the interview with the CEO of Kero hirsirakennus Oy, conducted in spring 2015.

In this thesis different ways to utilize LCA in product marketing were studied and the characteristics that influence on the utilization were described. The research problem was appointed by answering why it would be beneficial for Kero hirsirakennus Oy to conduct the LCA, and how the LCA results can be utilized in Kero thermal log marketing. Kero thermal log is positioned in a niche in the field of log buildings and is up against tough competition. The research will be utilized in developing the product marketing, building the brand and possibly give a competitive edge over the other log building manufacturers in the future.

Life cycle analysis can be utilized in the product marketing, and the only limiting factors are company goals and marketing ambitions. Additions to the typical usage of LCA, environmental knowledge should be incorporated in all company actions in order to gain a competitive advantage. Kero hirsirakennus Oy would benefit from conducting an LCA study in product marketing. Primary applications should be in building credibility and image, by the means of producing environmental product declaration and taking part to the Nordic Ecolabelling scheme. Because of the increased volume of production, Kero hirsirakennus Oy should consider adopting environmental knowledge as a part of all company actions in the future, in order to build and manage its environmental reputation and image. Utilizing LCA in product marketing would concretize product values and benefits, and therefore help in developing the market offering.

Language
English

Pages
89

Keywords
Life cycle analysis, product marketing, sustainable marketing, case study

CONTENT

1	INTRODUCTION	4
2	RESEARCH PROBLEM AND APPROACH	6
3	MARKETING	9
3.1	Competition.....	11
3.2	Marketing management and competitive tools	12
3.3	Product Marketing.....	13
3.4	Product development.....	16
3.5	Image and brand.....	16
4	THE DEVELOPMENT OF THE ENVIRONMENTALLY FRIENDLIER BUSINESSES AND PRODUCTS	18
4.1	The conduct of LCA.....	20
4.2	Various ways to utilize LCA.....	22
4.3	Applying LCA in marketing	24
4.3.1	Environmental marketing claim.....	25
4.3.2	Ecolabels	27
4.3.3	Environmental product declaration	29
4.4	Product design.....	30
4.5	Eco-design.....	33
5	ENVIRONMENTAL KNOWLEDGE AS A COMPETITIVE TOOL IN MARKETING	34
5.1	Environmentally conscious managing and environmental management schemas	35
5.2	Building environmental reputation	38
5.3	Environmental reputation as a part of the product image	41
5.4	Sustainable marketing	44
6	TRADITION MEETS MODERN REQUIREMENTS	47
6.1	Energy efficiency regulations for new buildings	49
6.2	Regulations for building insulation.....	51
6.3	Gradually greener building industry	52
7	CASE: KERO HIRSIRAKENNUS OY	55
7.1	Kero thermal log	56
7.2	Simple, back to basics structure attracts home builders.....	58
7.3	Marketing	59
7.4	Kero thermal log marketing	61
7.5	What good would LCA bring to the company?	62
8	RESULTS.....	63
8.1	Indirect utilization of LCA in product marketing	63
8.2	Direct utilization.....	64
8.3	Everything affects everything	66
8.4	Product differentiation by the ecological aspects.....	70
8.5	Choosing environmental arguments based on LCA.....	73
9	CASE STUDY CONCLUSIONS	76
9.1	Starting point for the product marketing	76
9.2	Recognition of the benefits	79
9.3	Suggestions for the utilization of an LCA study in the product marketing ...	81
9.4	Development should be continuous	84
9.5	Closing statement	85
10	REFERENCES	87

1 INTRODUCTION

Sustainable development is a basic necessity for economic continuation, because it is based on using natural resources. In order to have sustainable economics, the actions must be similar or corresponding with the circle of materials in the ecosystem. It is good to remember though, that environmental, economic and social development are intertwined, and one cannot be sustainable without the other. Sustainable development is environmentally, economically and socially sustainable development that satisfies the needs of current generations without compromising future generation's ability to meet their own needs (UNECE 2005).

People have awoken to the dangers and impacts of unsustainable consumerism. Markets and common attitudes respond more sensibly, and faster than ever before to the effects to the user's health or environmental detriment of a product. The impacts are now considered through the entire life cycle of a product, and not only from the time or place of use. The pressure is no longer only on producing a product that does not damage the environment, but also company actions influence how the product is perceived environmentally. Nowadays one cannot afford to risk the company image or reputation, by not considering environmental matters in the company actions. Environmental responsibility has become a factor when choosing a product.

The environmental awareness has been developing rapidly in the last several decades. Markets are gradually responding to the change, and the shift in attitude has brought a new term - environmentally friendly. The term is now commonly used, whether true or not, and it is not easy to tell which products are in fact better for the environment. (Zbicinski et al. 2006, 87) Marketing communications have a bigger responsibility than ever before to keep the product information and data straight. Using terms such as "environmentally friendly" lightly could damage a company and a product image. Digitization has brought many new marketing possibilities as well as risks, spreading information more efficiently than ever before.

All products and services have impacts on the environment and not only during the manufacturing, but through their whole life cycle. Usually most of the impacts are born

from the time of use and disposal. Environmental regulations are becoming tighter, which requires forethought and faster response from the companies to the changes in operational environment. In order to have a prosperous business, one has to have readiness for change and continuous product development.

The subject was chosen with previous studies in Environmental Technology and interests in Design Marketing in mind. The purpose of this thesis is to research if life cycle analysis (LCA) can be utilized in product marketing and what characteristics are included in the process. LCA is an analytical tool to produce comparable, quantitative data on environmental indicators. Personal assumptions were that utilizing LCA for marketing would be difficult and not necessarily recommended. A typical application of LCA for external use is to back up a marketing claim. Therefore, the goal of the thesis was to find out different methods to utilize LCA in product marketing.

A personal goal was to find a company that commissioned this research and would benefit from the research done. At first the research plan was straightforward, aiming to conduct a life cycle analysis and to utilize the LCA results in the product marketing for Kero hirsirakennus Oy. The goal would have been to exploit infographics to present the life cycle study results. However, after a good start, the study had to be given a new direction. Despite the delay, it was a good thing, and the reasons will be explained thoroughly in this thesis. It became obvious that at this time the results should not be used in producing a marketing claim.

While getting to know the Kero hirsirakennus Oy better, it became apparent that there would be a better way to conduct a final thesis that would be of significance to the company. This was also a good opportunity to learn more about marketing than was initially planned, and recognize the challenges of LCA utilization. The subject requires a multidisciplinary approach and a vast frame of reference, and this is why the case study method was chosen to be the research methodology.

Kero hirsirakennus Oy is a relatively young company still trying to penetrate the markets. The company is a family business, and most of the business operations are carried out by the family members, including the marketing. The product is relatively young in the building industry and is positioned in a niche in the field of log buildings. After brief

research, it became obvious that as good as the product is, it is up against prejudices and tough competition. The work that will be done for the thesis will be used in developing the product marketing by researching the best methods to utilize life cycle analysis in the product marketing. It will also help in product development, strengthening the brand and marketing, and possibly give a competitive edge over the other log building manufacturers in the future.

This thesis can be utilized by other companies too, since it explains characteristics of utilizing environmental knowledge in marketing in general and LCA applications in product marketing. There are many possibilities for further development, especially on a field of sustainable marketing applications in practise.

Environmental knowledge should not be considered only a tool, but a comprehensive approach that will include environmental matters to the decision making. Sustainable development challenges the current management view. Instead of only having great environmental visions and plans, it is important to adopt these plans in the operations throughout the whole company. Sustainable development should not be considered as something that is slowing down the economic activity. Quite the contrary, in a world of increasing environmental, social and cultural conscience, a sustainable business should be seen as an opportunity and a strength.

2 RESEARCH PROBLEM AND APPROACH

The starting point for this thesis was to combine marketing and LCA, and perform research that had significance for the commissioned company. Having an outside initiator for this study was essential. The final thesis process started with background mapping and an interview; how Kero hirsirakennus Oy was founded, what is its current state and how the marketing is handled within the company. It was also important to know if the company had previous knowledge about environmental matters and how they felt about the tightening regulations on the building industry. When choosing the emphasis of the study, it was a matter of what would benefit the company more. Based on the background

information and the literature review, concentrating on the marketing point of view became the obvious direction.

The research problem in this thesis is: “if the LCA can be utilized in the product marketing”.

The research problem is addressed with a case study methodology focusing on the product marketing in the company. The research problem will be appointed by answering the following:

1. Why it would be beneficial for Kero hirsirakennus Oy to conduct the LCA, and;
2. How the LCA results can be utilized in the product marketing for Kero hirsirakennus Oy.

The nature of the study is relevant for the choice of the study methodology; aiming to answer the questions “How?” and “Why?” The case study is explanatory, seeking to explain certain circumstance, and requires an in-depth description of some phenomenon. The goal is to expand and generalize theories and not to enumerate frequencies or statistical generalization. In short, the case study method allows retaining holistic characteristics of real life events and will have many more variables of interest than data points. (Yin 2009, 4, 15, 18.)

The in-depth focus on the case requires extensive coverage of the context and other complex circumstances. This produces a wider range of topics to be covered, too. In this sense, the research goes beyond the isolated variables study, because it takes into account environmental and social situations as well as connections. However, the context and other complex conditions must be integral to understanding the case. (Yin 2012, 4.)

When the study is emphasized within a real world context, the case study method favors collecting the data in the natural settings, compared with relying on derived data. Doing some original fieldwork alongside the context deepens the understanding of the phenomenon. However, even though a researcher is to collect data and decide if the topic is worthy of study and defines the boundaries for the study, in every case study one must report all evidence fairly, without any alterations. As in research in general, any alterations are forbidden. (Yin 2009, 14; 2012, 5.)

Because of the vastness and holistic nature of the subject, not only was a multidisciplinary approach required, but so was looking into the subject from different directions. The research consists of a literature review on marketing, a life cycle analysis and the utilization of environmental knowledge in companies. Results are based on the literature review, merging and describing characteristics that influence on utilization of an LCA study in product marketing. Another part of the thesis consists of describing the operational environment for the case study company, Kero hirsirakennus Oy. The case study is based on the interview with the CEO of Kero hirsirakennus Oy, conducted in spring 2015 as well as the numerous phone calls between. The interview was transcribed and asked for approval from Kero hirsirakennus Oy. The case study conclusions will be reviewed separately, applying the influential factors represented in the results.

The initial purpose of this study was instrumental in its nature; trying to find out the best ways to utilize LCA in product marketing. However, because of the vastness of the subject, the nature of the study is also exploratory, developing new illustrations to be utilized later (Figures 10 & 11). Although this was out of necessity to demonstrate the phenomenon understandably, without writing a book on the matter. The case study conclusions are also easier to comprehend with the illustrations. One could conclude that all in all the purpose of this thesis is developmental; outlined managing the product marketing and giving proposals for action, when environmental matters are in question.

The research plan changed according to Figure 1. The change came about naturally since the approach was multidisciplinary from the beginning and data was collected accordingly. One could conclude that the study boundaries sharpened, and the starting point for the study is now logical considering the significance for the company. As will be explained later in this thesis, environmental knowledge and LCA should be seen as a part of the company activities (as should marketing) instead of segmentation.

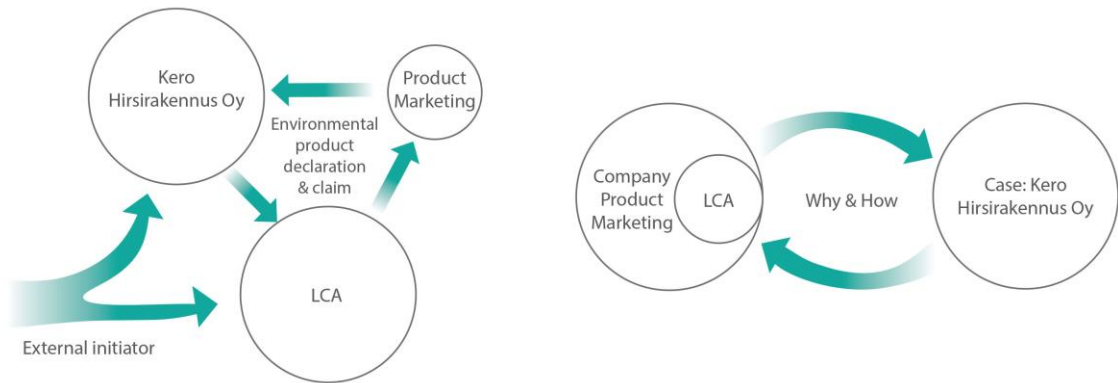


Figure 1. The study approach changed to be more logical for the company, instead of “forcing” results to the product marketing (left). Now the benefits are reviewed as a whole, explaining why it would be beneficial for Kero Hirsirakennus Oy to conduct the LCA study and how the study can be utilized.

3 MARKETING

There has been marketing as long as there has been the exchange of goods and communication between people. However, as an economics term it was first used in the USA at the beginning of 20th century. Marketing and its applications have evolved and the development is still continuing. Main phases can be identified in the marketing orientations, presented in the Figure 2. In reality marketing has not been developed through these phases in all companies.

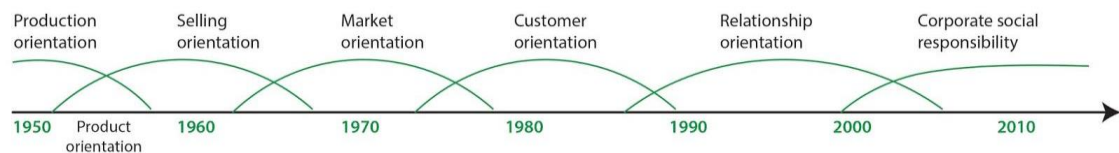


Figure 2. Development of marketing thinking. Adapted from Bergström & Leppänen 2011, 12.

Surely many mistakes were made when companies were first trying to find the best ways of marketing their products. At first there was more demand for the product than there was production, and essentially marketing was not needed (production orientated). Development of marketing started when the competition increased and customers had more choice. Companies had to invest in product quality (product orientation). Improvements were based on cost-efficient production and competitiveness such as

technical performance instead of customer needs. When this was not enough to attract customers, companies were forced to think of new ways to increase sales. Products stayed the same while reasons for bad sales were not studied; new customers were sought after aggressively by adding advertising. (Bergström & Leppänen 2011, 12-14) Although advertising (commercials, newspaper ads, email etc.) is important, nowadays it is only the tip of the marketing iceberg (Kotler, Armstrong, Wong, Saunders 2008, 6).

The most important lesson during the marketing development was to acknowledge the customers' needs and wishes. Companies started mapping the market demands; what customers actually needed, and if they were satisfied. Products and services were developed and improved by the received feedback and results. In this way companies got new customers. Cooperation between marketing and manufacturing were developed, and several competitive tools were used at the same time (product, price, availability, communication). (Bergström & Leppänen 2011, 12-14.)

Nowadays, market researches are increasingly more specific. Attitudes, values, motives, and lifestyles are studied, and this way customers are segmented to even smaller target groups. It has been noticed that different customer segments have different needs and purchasing habits. Marketing became customer centered, "gardening" the right customers for the right products, building a strong customer relationship instead of make-and-sell-once philosophy (Kotler et al. 2008, 17).

Nowadays, we are in a situation that we see marketing all around us. Marketing is everywhere, and is an essential part in business and an important factor for success. Marketing enables customers to obtain what they need and want, but also creates demand by communicating the offered products and services. It is a way to differentiate from competitors. The goal is to attract new customers but also keep current customers satisfied. All marketing is based on knowing customers' purchasing behavior and satisfying customer needs better than the competitor. Simplified, marketing is a process of managing long-lasting and profitable customer relationships. One can conclude that marketing has developed from "telling and selling" to satisfying customer needs to customer centered marketing. (Kotler et al. 2008, 6-7. Bergström & Leppänen, 2011, 10.)

3.1 Competition

Competition is one of the most important factors in a business environment. Even though there is demand in the markets, the business will not be feasible if it does not differentiate from its competitors somehow or finds advantages over competitors. One should not try to please everybody but to find one's own field of specialization and basis for building a competitive edge. When talking about a field of specialization, it usually refers to a niche. This means a specific customer group, which needs a company tries to fulfill. In the best scenario the other companies cannot respond to the clientele's needs. With successful solutions a company may gain a significant competitive advantage. (Bergström & Leppänen 2011, 81.)

However, the niche, or the difference compared to the competitors, may not be enough to create a competitive advantage. The points of differentiation can be the product, service, channels, people or image. An alert marketer is able to differentiate the company or the product in every customer contact point. One should think through the entire customer experience with the company and the product to find not only the points of differentiation, but also weaknesses. For example, the product can be differentiated by its features, performance, style and design. However, when the physical form of a product is not enough for differentiation, the other points of differentiation will make a greater meaning. (Kotler et al. 2008, 436.)

The prerequisite of successful marketing is that the product is made considering the target group's needs, values and wishes. The target group should find the product somehow better or more desirable than that of its competitors, so that the customers would buy the product. In order to gain a competitive advantage, the company should discover and choose which differentiations are to be used to build a positioning strategy for the company. The positioning strategy is based on the value an offering delivers and its price. However, positioning the company requires concrete actions and not just talk; what is promised for the customer must be delivered. Basically all the company's marketing mix efforts must support the positioning strategy. (Kotler et al. 2008, 436, 440-441, 444.)

Marketing and business ideas should support each other instead of being separate sectors. In order to have successful marketing, all sections within the company should be in

harmony: target groups, image, products as well as mode of operation. Knowledge is power, and a company should be well aware at all times what is happening in its own “backyard” or around it, and be ready to evolve and develop accordingly.

3.2 Marketing management and competitive tools

Modern day marketing is a strategy as well as tactic. At first marketing was seen as a separate sector in business. However, the meaning of the marketing for the business management was understood as the knowledge about the means grew. Nowadays, marketing leads most of the business decisions and solutions. In fact, marketing belongs to the whole organization; everything that is done in the company affects the success in the markets (Grönroos 2015, 270). Therefore, it is important to adopt a marketing strategy (long term strategy, about 3-5 years) as well as a marketing plan (operational, for a shorter period, about 1-2 years) as a part of company management. (Bergström & Leppänen 2011, 20-21.)

Marketing management designs strategies that will build profitable relationships with customers. The company should know the target markets as well as target groups, and then build profitable relationships with them. Once these factors are fully understood, marketing management can design a strategy for customer-driven marketing. The strategy must work in dialogue with the marketing plan, which is the actual plan to carry out the strategy (Kotler et al. 2008, 13-16, 130, 152). Among customer relationships it is equally important to sustain good relations with the interest groups.

After deciding the overall marketing strategy, the company is ready to begin planning the details of the marketing mix. Marketing is a whole bunch of tactical moves which require constant decision making. Marketers are required to manage and predict quick changes not only in the field of marketing, but in customer relationships and networks. Competing tools should be designed so that the customers feel they are receiving extra value than purchasing the product from the competitor. First of all, the company should have a product, service or a combination of those two that have not only demand, but also differ from the competitors' offerings. Among the product itself, other competing tools could be for example availability, price and marketing communications (make the offered

product known, but also information about the product features). Also overall visual image, personnel and service are important competitive tools. Different competitive tools together are known as the marketing mix. Chosen target groups define what kind of marketing mix is formed. (Kotler et al. 2008, 13-16, 157-158; Bergström & Leppänen, 2011, 20, 198)

3.3 Product Marketing

Product (tangible or intangible) is anything that can be offered to a market for consumption to satisfy needs, expectations or desires. The product is the key element in the overall market offering and the most essential competition tool in the marketing mix, because all the other solutions are built around the product. For the business idea one should define customer segments: whose needs are tried to fulfill, and how those needs would be answered. (Kotler et al. 2008, 500-501; Bergström & Leppänen 2011, 194.)

A product in marketing is understood as a layered ensemble, where the product itself creates the core and augmented product around the core. (Figure 3). An augmented product is additional benefits and services. Therefore, the product is more than just a set of tangible features, but in fact a bundle of benefits. Successful companies nowadays build their offering so that it will not only satisfy the need but so that it brings extra value and delight to the customer. It is worth remembering that some customers may be willing to pay extra compared to an equivalent product, because the customer appreciates the design, the service included or the brand is a guarantee for the quality. (Kotler et al. 2008, 501-502; Bergström & Leppänen 2011, 203-205.)

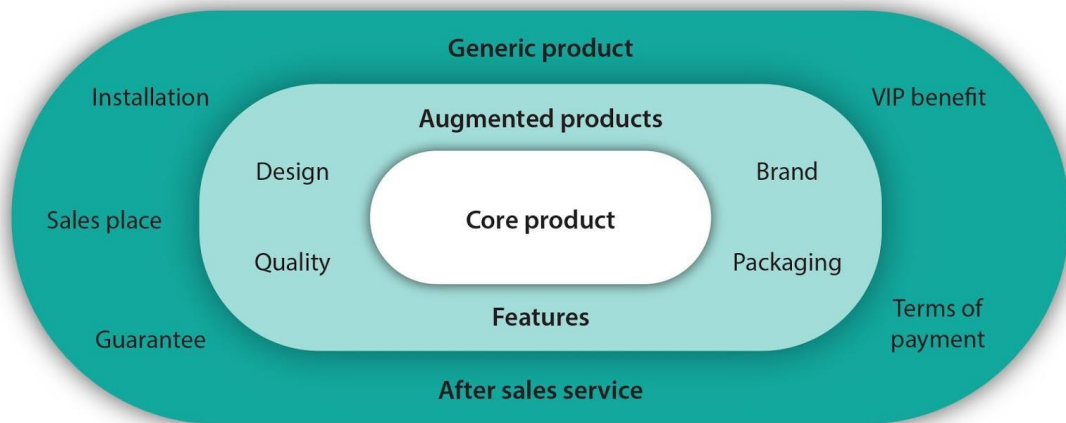


Figure 3. Product marketing should be a layered ensemble. Focusing on the core product marketing may not be enough to attract customers (Kotler et al. 2008, 501).

A product is a marketing entity; a product is an ensemble created by marketing that will bring value to the customer as a whole. For instance, if product communication is not done well, a customer may think the product lacks some features and he may choose a competitive option. Nowadays, it may not be enough to be a customer oriented company, but requires being a customer centered company, e.g. give options for customization. Definition of a product is therefore vast and using it as competitive tool requires thorough determination of business idea: what is offered and to whom. This defines the marketing means to be applied, and is the basis for designing the offering; what exactly is offered? Product development and productization (packaging, quality etc.) are part of the offering planning. (Bergström & Leppänen 2011, 194.)

The older, product marketing approach is a core product perspective (or orientation), which is a traditional scientific management-based approach (Taylor 1947, according to Grönroos 2015) where the quality of the core product is considered to be the main source of competitive advantage. The core product is supposed to be the only or major carrier of potential value for the customer. Services or singular service activities may be included as in necessary elements in customer relationships, but their role is not strategic. Additional services may be considered necessary, but on a low level of priority. Hidden services, especially non-billable ones, are not recognized as value enhancing services. The company aims to differentiate from the others by providing a superior core product. (Grönroos 2015, 19-20, 22.)

The product quality and improvements are important for most marketing strategies. However, concentrating only on the core product may lead to the obsession on the technological aspects, because the managers think that the product superiority is the key to success. (Kotler et al. 2008, 16.) Investing in the core product development in most cases will not be enough to gain a competitive advantage. In order to satisfy the clients' wishes and needs the company has to assimilate broader marketing viewpoints. (Bergström & Leppänen 2011, 205.) It is only fair to conclude that the core product approach/product orientation (compare to Figure 3) may not respond to the modern customer requirements; a competitor may offer the same function in a nicer package, with better design and customer service, via better marketing communication.

As mentioned previously, it is important to build a functional ensemble of a product; create an offering that will fulfill target group's needs and expectations and bring value. Customer relationship is on a strong base, if customers find value in the company's offering compared to the sacrifice one has made towards purchasing the product. Basically the company should be able to capture the kind of offering that the customer finds best in relation to the costs and other sacrifices. The marketer, on the other hand, should answer the different customer segments, why one product is better than a competitor's (value claim), and what benefit one would get from buying this certain product. (Bergström & Leppänen 2011, 31-32, 195.)

A good customer gains more than they invested into selling the product and maintaining the relationship (Bergström & Leppänen 2011, 16). If the product performs as promised and some more, including the whole purchasing process, the company may get loyal customers, which creates good word-of-mouth marketing. Loyal customers are committed to their products and would make great sacrifices to have it. After all, a house or a cottage is supposed to be lifelong investment and therefore it is important to maintain a good relationship with a customer even after purchasing; clients should feel important to the company. This means keeping up the product quality as well as marketing, such as after sales marketing and providing for instance corporate/product news. The company should aim to develop continuously, as should its products.

3.4 Product development

The goal for the product development is to create ensembles that would satisfy customer needs. It is important to stay up-to-date on target markets and follow trends, interpret customers' purchasing behaviour and invest in systematic research. Health, natural, safety and sustainable development are trends that must be responded to in the product development now and in the future. By product development a raw product idea is merchandised; the product is honed to satisfy customer needs better than the competitor. This includes "all layers of a product". Therefore, product development should be continuous. Product research and development is not only innovating new products but also improving them. (Bergström & Leppänen 2011, 205.)

The relationship between marketing and design is paramount; marketing provides information that designers use to develop products. Only by having a close relationship between these two, can developing products that conform customers' specifications and requirements be achieved. Otherwise the design of a product or service will not be effective and the customer would move to a competitor's products. (Zbicanski et al. 2006, 32.)

Depending on the goals, sometimes it would be beneficial to adapt the product ensemble to meet the local markets and wants. For example, if a company wants to introduce their product to a new country, it might be wise to consider adjusting the product ensemble. (Kotler et al. 2008, 967.)

3.5 Image and brand

A product, with all its layers, influences the potential customer's image of the product as well as the company image. Often these are mixed, especially if the product carries the company name. The image of a company and its products is a very important factor for competitiveness, and designing and implementing marketing acts is based on the desired image. (Bergström & Leppänen 2011, 21, 204-205.) This highlights the importance of integrating marketing as a part of all actions in the company, from the manufacturing to the customer touchpoints, as well as after purchasing. It is not enough to have great

intentions and customer centered strategy if the product and service does not deliver what is promised in the external marketing. One could conclude, even though marketing aims to create a certain image, that the perceived image of a company or product can in fact become negative.

Product branding is a basic necessity for merchandising the product; with branding, a product is made unique and distinguishable from the competitors. If a product is sold nameless and without brand, one could say that the product development is insufficient. Brand creates value for the product and makes it more desirable for the client. Brand means name, concept, symbol, picture or their combination. (Kotler et al. 2008, 511-512.) Brand is a sum of all information, experiences and images that a customer perceives of the product, and it is formed from all factors that are considered essential when choosing the product (Bergström & Leppänen, 2011, 223, 243).

Brands are powerful assets which must be developed and managed carefully. This is probably the most important task for a marketer. First of all, brand is more than names and symbols. The brand is born in the minds of the customers and not in the factory. In fact, it represents the consumer's perceptions and feelings of a product and its performance, basically everything that the product means to the customer. Brand relationship is more than a loyal customer relationship; it is a strong experience. The brand brings personal value, benefit and meaning. Therefore, the relationship between the company, the product and the brand has to be seamless. The compatibility of these defines how unique and rewarding the brand is, and therefore the brand is built together with the customers. The core product is the basis for the branding, but the brand is much more than a product. (Bergström & Leppänen 2011, 223, 243-244. Kotler et al. 2008, 512, 521.)

4 THE DEVELOPMENT OF THE ENVIRONMENTALLY FRIENDLIER BUSINESSES AND PRODUCTS

Companies of all sizes have defined the interactions between humanity and the environment since industrialisation. The development of technology has shaped and created market economies. However, it has not been considered that every industrial activity was linked to many other transactions and actions, and each of them has an environmental and social impact. In the modern world businesses as well as industries are global, and on this scale also has an impact on nature. Impacts are not limited to the procurement of raw materials, manufacturing and delivery, but continue through a product's whole lifecycle, including use and disposal. (Graedel & Allenby 2010, 30-31.)

It would have been impossible to forecast the impacts of industrialisation. Many of the solutions that were created were improvements compared to the practises they replaced. The problem was that the development was not sustainable. Consequences, especially long-term consequences, were not identified until the increased amount of analysis on environmental interactions in the beginning of the 1970s. (Graedel & Allenby 2010, 31.)

Public environmental consciousness increased, and this is when companies started focusing on manufacturing facilities, energy efficiency and emissions. This approach was narrow and was broadened to include resource requirements, emission loadings and generated waste. This is the first time when now recognized (partial) life cycle studies were conducted. In the 1990s the studies were expanded to consider the entire life cycle of products, the flows and impacts associated, known as life cycle assessment (LCA). (Graedel & Allenby 2010, 161.)

Life cycle assessment methods have developed relatively fast and new methods are still developing. The direction of LCA development is clear though, and is heading from an environmental point of view towards a more comprehensive scope, considering all aspects of sustainable development. Regardless of this direction, the commonly known description "from cradle to the grave" or "from cradle to cradle" still works as a description of LCA in all methods.

Life cycle analysis or assessment means the detection and evaluation of the environmental aspects and the potential environmental impacts of a product or a service from acquiring raw materials, manufacturing and use, as well as the disposal of the product or service (from cradle to grave). Simplified, LCA is a study on energy flows. In order to have a certain product, there have to be inputs (raw materials, energy) which are used in processes. The desired output from the process is obviously the product itself, but usually other outputs occur as well, such as wastes, emissions, etc. If wanted, the impacts of these outputs can be analyzed (this phase is referred as life cycle impact assessment, LCIA).

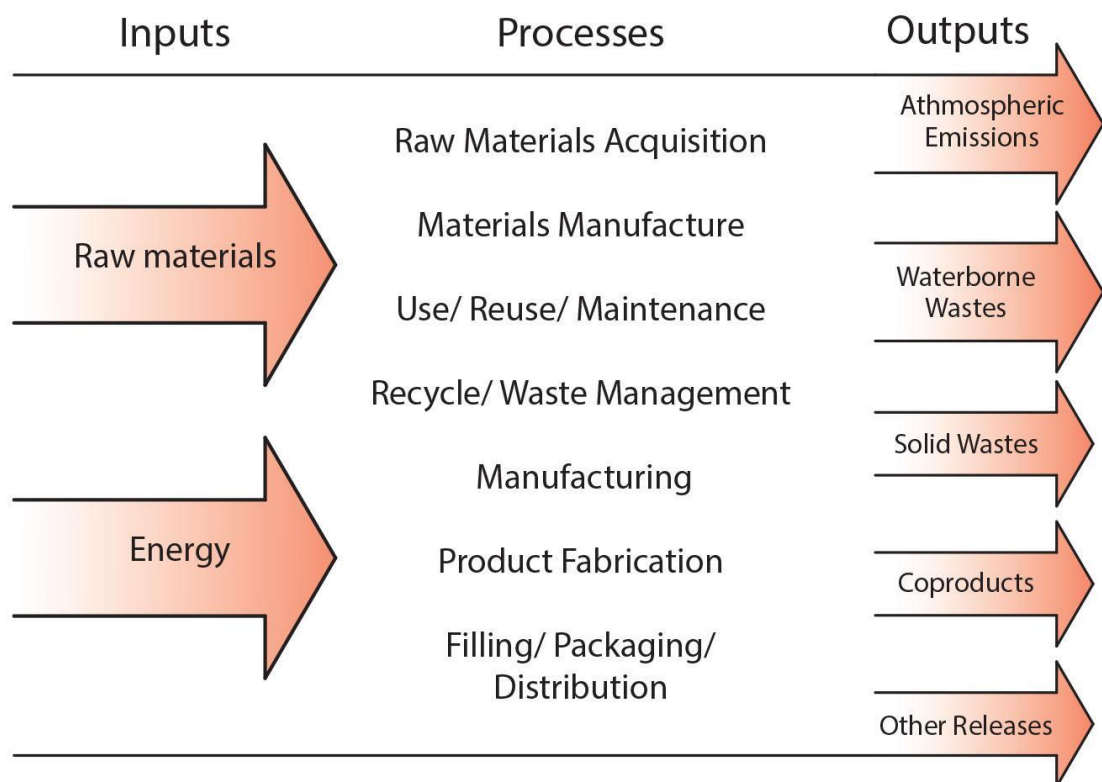


Figure 4. Life cycle stages. Adapted from Life cycle assessment: Inventory guidelines and principles (Vigon, Tolle, Cornaby, Latham, Harrison, Bokuski, Hunt & Sellers 1993, 17-18).

Fuller (1999) sums up the LCA function:

Overall, the life cycle representation of inbound and outbound flows and interrelated stages provides a basis for understanding the use of resources, the generation of waste, and the eco-costs associated with the total product system under study (1999, 48).

Unfortunately, there does not exist software that would do LCA without the user's input. LCA is therefore an instrument which does not answer how a company should handle its

environmental matters or product designing. It is up to the company how specific information is desired, how results are interpreted and how results are used. A life cycle study does not typically address the economic or social aspects of a product, but the life cycle approach and methodologies can be applied to the mentioned aspects as well (ISO 14040:2006, 10).

4.1 The conduct of LCA

Life cycle studies can be conducted for a product or a service. In order to avoid distorted or biased results, LCA should be made according to the guidelines. For practitioners, there are two ISO standards specifically designed for LCA application; ISO 14040 principles and framework, and ISO 14044 requirements and guidelines. One must remember that life cycle studies made with a certain software tool do not conform automatically to the standards. It is the user's responsibility to conform to the standards by adhering to the given principles. (PRé Consultants 2010, 6.)

There are four phases in an LCA study, represented in Figure 6. What is significant for the life cycle study is that each phase should be in “dialogue” with each other. In all phases one should reflect data to the goal and scope, and evaluate the quality of the data and results.

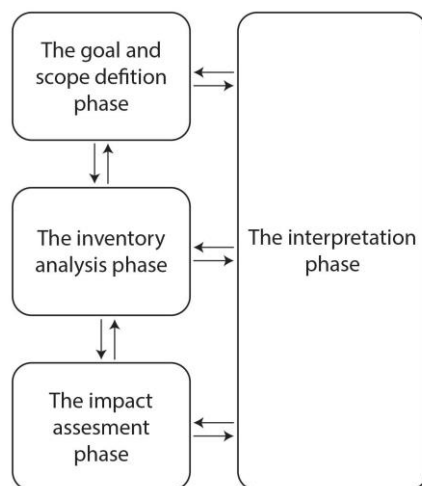


Figure 5. Main phases of life cycle assessment (ISO 14040:2006, 24).

The first phase in a life cycle study is to define the goal and scope of the study. One has to give a precise definition of the product which the study is made of, its life cycle and the function it fulfills. It is also important to describe the reason for conducting the study as well as intended use and audiences, since this affects not only to the structure of the study but also to the scope, including the system boundaries and level of details. Basically, the depth and breadth of a life cycle study can differ considerably depending on the goal. (PRé Consultants 2010, 9. ISO 14040:2006, 8, 30)

In order to conduct an LCA, a product must have clearly specified functions to be assessed, rather than a product itself. For instance, what are the minimum quality standards that the product should meet? The measure of performance which the system delivers is called a functional unit. When comparing different products, the functional unit provides a point of reference, e.g. one meter of wall structure. (Zbicinski et al. 2006, 92.)

The second phase of the LCA study is the inventory analysis (LCI). LCI is an inventory data of inputs and outputs with regard to the system being studied. The LCI phase involves identifying and collecting the necessary data to meet the goals of the defined study. (ISO 14040:2006, 8). In this phase the data is related to a chosen functional unit. The result of the inventory analysis phase is a detailed account (inventory table) of the studied product system's energy and raw material requirements as well as born emissions and wastes. In the LCI phase an illustrated process flow chart is constructed ("process tree") to describe the complex technical system from the entire life cycle. (Zbicinski et al. 2006, 94.) However, even this form of presentation is difficult to understand and cannot be used as is, but requires extensive explanation.

The third phase is the impact assessment phase (LCIA). The purpose of LCIA is to provide additional information to help assess the data from the inventory table by processing the data so as to better understand their environmental significance. This means ideally a single score. To achieve this, a four-step procedure is advisable: obligatory steps are the classification of impacts and the characterization (equivalence factors), and optional steps are normalization and weighting. (Zbicinski et al. 2006, 97.) There are several methods of how the impacts can be presented and compared. However, in order to have a comprehensive picture of the impacts, it is advisable to use several

methods side by side. It is good to remember that results may vary significantly between methods.

Life cycle interpretation is the final phase of the LCA procedure. In the interpretation phase the results from the inventory table and/or impact analysis are combined according to the defined goals and scope, and thus conclusions and recommendations can be made. Evaluating the quality of the results is an essential part of the life cycle assessment. All the definitions, assumptions and their impacts on results are looked through systematically. For instance, used and missing data and their quality and impacts on results are evaluated, and sensitivity analysis is performed. It is good to remember that comparing the results of different LCA or LCI studies is possible only when context and assumptions are equivalent. (ISO 14040:2006, 8, 38.)

Depending on the goal and scope, it is possible to conduct only an inventory analysis and an interpretation, therefore excluding the impact assessment phase. In this case the study is referred as LCI study, and it is not to be confused with an LCA study. LCI studies can be applied in examining or comparing options, for instance a product's life cycle or a phase of it, materials, processes etc. (ISO 14040:2006, 8) Simply said, LCI study describes environmentally relevant in- and outflows data of a defined model of a technical system (Zbicinski et al. 2006, 119).

4.2 Various ways to utilize LCA

As mentioned before, LCA is a tool but it is up to the company to decide the goals for the study; how it is used and utilized. Before executing a life cycle study, one should define what the reason for executing such study and what questions need to be answered. Are the results meant for internal or external purposes? Some of the purviews of LCA are shown in Figure 7.



Figure 6. Purviews of LCA results (adapted from Tonteri 1998, 6 & ISO 14040:2006, 8).

As seen Figure 7, there are many possibilities to utilize life cycle study. It is common for all applications that LCA is used as a tool in a decision-making process. However, determining goals and uses determines the particularity of the LCA. At its simplest it can be a narrow study of materials used in a product and processes included. For instance, only understanding all phases in a product's life cycle is a step towards better design choices and management. Especially when designing a new product, even simple life cycle examination would help to understand environmental consideration of benefits, disadvantages and uncertainties from the whole life cycle of the product. Whether it is only a preview on a product's life cycle, or a quantitative life cycle study, understanding the basics of LCA methodology is required.

Deciding the goals for executing an LCA study is crucial for the whole process. According to the PRÉ Consultants (2010) the biggest pitfall of the implementation of LCA turns out to be the lack of a clear definition of the purpose and application of LCA. It appears that the initiator for the assessment is often a marketing department, eager to show the environmental benefits of the product. However, it is often realized that the results are difficult to communicate for marketing purposes, and some other department

will take over the study. This can cause confusion regarding the exact purpose of the project. (PRé Consultants 2010, 6.)

PRé Consultants (2010) state that the learning attitude is often more important than the result of the first LCA. The most important goal is to learn what LCA is, what can be learned from it and how reliable the results are. After the first study one can adopt a more structured approach and pursue the full usefulness of LCA. (PRé Consultants 2010, 6.)

4.3 Applying LCA in marketing

LCA became popular in the early nineties as companies used LCA to substantiate market claims. However, according to the PRé Consultants (creators of SimaPro, LCA program), over the years it has become clear that marketing is not the best application for LCA. The reason for this was that the marketing people did not know how to “translate” the results so that they were in a usable form. (PRé Consultants 2010, 5.) If results are to be utilized in external use, results may need drastic simplifications, especially when the target group is consumers. Other reasons may have been the standardization, which gave the principles for conducting a life cycle study, which may have limited the external use. Also Fuller (1999) comments that the common attitude seems to support only the internal application of a life cycle study (Fuller 1999, 72).

Fuller states (1999) that the inability to utilize LCA in marketing might stem from a misunderstanding about the fundamental role of marketing within the organization. This seems to be the case especially when the LCA is used to back up green product claims in external promotion and environmental labelling programs. Alternatively, LCA applications could be used to provide meaningful information for the customers, and thus move toward LCA-based consumer information and ecolabelling systems. Following the up-to-date LCA protocols will ensure the validity and credibility of the published results. (Fuller 1999, 72.)

The debate whether LCA should be utilized in marketing or not highlights the need for interaction between marketers, LCA practitioners and the technical types. As explained in the marketing chapter, it is not beneficial for the company to keep the sectors apart

from each other. Simply put; failing to use LCA information in creating an ecological competitive edge represents the misuse of valuable marketing resources. For instance, the technical side of a company manages to cut down the costs of manufacturing waste or improve the product performance. This was done either with or without LCA. It would be a waste not to recognize and use this development in the marketing. Therefore, even if the LCA was made for the internal application, there is inevitable linkage to a marketing strategy especially in the area of product development. (Fuller 1999, 72-73.)

Following the same line of thought, basically all applications of LCA (seen in Figure 7) could be utilized in the marketing. Basically it is the matter of marketing ambition; using life cycle study results requires not only multidisciplinary knowledge in the company but also the whole company working towards the same goal. Key elements for success would be marketing communications and building a versatile marketing mix.

The reasons for conducting an LCA can be image-oriented even when LCA results are not utilized in external use. The pressure for conducting an LCA could come from stakeholders, whereas the company could for example provide reports to respond to the feedback. In many cases the LCA results are used indirectly to ascertain a certain image, for example when applying for an ecolabel.

4.3.1 Environmental marketing claim

As was briefly mentioned, LCA can indeed be utilized in producing environmental claims. Environmental or green claims are assertions about the environmentally beneficial qualities or features of a product or a service provided by companies. Environmental claims can be made at any phase of the product life cycle, including packaging, distribution, etc. Environmental claims are used in various ways in marketing materials, for example in advertisements, product labels, packaging, etc. Claims can be represented not only in the form of words, but also in symbols, logos, product brand names and so forth. Marketing channels are as vast. There can also be comparative assertion, proving the superiority or equivalence to a competing, equivalent product. (OECD 2011, 3.)

Self-declared environmental claims are increasing as a marketing tool, responding to the consumer desire to buy environmentally friendlier products. There are great variations in provided declarations; some are very general and use well-known terms; some are not defined clearly enough, and some are very vague and unsubstantiated, resulting in being referred to “greenwashing”. Consumers are growing more critical to the self-declared environmental claims so much so that in some cases it causes a reduction in purchasing eco products. (OECD 2011, 4.) The term greenwash basically describes environmental claims which are in conflict with reality.

Conducting an LCA is basically modelling the life cycle or a phase of a product or service. One must realize that models are simplifications of reality, and sometimes simplifications may distort reality. This is why claims should be used with careful consideration. Specific claims are very sensitive for critical evaluation. Therefore, when conducting an environmental claim based on LCA, one should decide carefully on not only goals and scope, but the quality of the study and used data. If compared to other products, the risks are higher. The European Environmental Agency noted in 1997 that realistically it is only possible to say, that one product performs better in a certain aspect of its performance than another, even when using a specific set of criteria (European Environment Agency 1997, 11). Obviously it would be a different matter if a company’s own products were compared; old vs. new and improved.

Many companies are tempted to exaggerate, which is basically “greenwashing”. When producing an environmental claim, it has to be not only relevant and understandable for the customer, but it should be in align with the company communications and supports the desired image (Harmaala & Jallinoja 2012, 169). One should also remember that providing one claim is not enough to gain a competitive advantage, but it requires continuous effort, as well as updated claims. One claim is not the same as marketing and it most certainly is not a long-lived solution. How long does it take for the competitor to make a better product, and a believable claim?

In the early 1990s, when LCA became popular, it was soon noticed that a lack of quality control caused not only biased information but also using data in comparative product marketing and exaggerating results (European Environment Agency 1997, 11). It became obvious that conducting an LCA as well as utilization of the data required standardization.

The International Organisation for Standardisation (ISO) provided a group of standards especially for the environmental labelling as part of ISO 14000 series of environmental standards. The ISO 14020 family of environmental labels and declarations includes three types of labelling and declaration schemes, of which Type II (ISO 14021) is for the producer developing its own label or a self-declared “green claim”. (OECD 2011, 3)

Following the given requirements in the ISO 14026 standard would prevent unintentional “greenwashing”. The standard includes making statements, symbols and graphics but also describes commonly used terms in environmental claims and when those can be used. However, a claim is credible only when it is verified. Therefore, the standard also describes a methodology for evaluating and verifying the environmental claims. (ISO 14021:2016.)

As will be explained later, consumers seem to trust the labels that are granted by a third party more. However, the varying labels confuse consumers; it is difficult to recognize verified labels from those that are self-declared. (OECD 2011, 4.) In self-declared environmental claims the reliability is essential. Therefore, in order to avoid a marketing backlash, it is important that the claim is based on a scientifically sound and documented study, but especially that the verification is made in a clear and transparent manner. (ISO 14021:2016.)

4.3.2 Ecolabels

The term “environmentally friendly” means an ecologically better option or one more efficient than an equivalent, regular product or a component. One way to differentiate an eco product from others is to get an ecolabel (certificate) from an accredited third-party. The purpose of the ecolabelling is to raise environmental awareness, but also to guide consumer behaviour toward better consumer choices. This way the industry is also guided to provide environmentally better products and solutions. (Harmaala & Jallinoja 2012, 136.) LCA as a tool can be utilized in achieving ecolabels for the product. Ecolabels are on a voluntary basis and they are utilized in the marketing.

There are several ecolabels. Some of them are official and granted by authorities, but most ecolabels are granted by some associations or even by the company itself. The multitude of ecolabels and especially varying contents cause a lack reliability. However, there are two official ecolabels in Finland, the EU Ecolabel and the most known the Nordic Ecolabel (the Swan logo). (Harmaala & Jallinoja 2012, 136-137) Joutsenmerkki (2015) states, that almost every Finn knows what the Swan logo is, that is fifth most well-known brand in Finland and the most respected label in general (Joutsenmerkki 2015).

The ecolabel is a guarantee of fulfilling certain criteria of reducing environmental load. In general, ecolabelled products are categorized by product groups and not by impacts on the environment. In order to achieve the label, the product or service should fulfill the given criteria. Both of the above-mentioned ecolabels advance sustainable development, and therefore criteria are tightened gradually every three to five years. This means that companies have to apply for a new certificate every time the criteria are revised. Criteria are based on the life cycle thinking, but also quality, health and security are taken into account. (Joutsenmerkki 2016) One could conclude, that out of many tools that show the environmental performance, official ecolabels are indeed showing the environmentally friendliest products and services.

The required level of environmental protection is higher for the EU Ecolabel. The purpose of the system is to advance the sale of the products and services that are the best in environmental performance. The goal is, that only 10-20% of applied companies would pass the criteria. (EU-ympäristömerkki 2016)

For those companies that are already paying attention to the environmental improvements of their products and services, and are utilizing LCA in the process, it is logical to look into ecolabelling schemes. However, for those companies that have no previous experience in improving environmental performance, taking part in an ecolabel scheme would be a chance to develop the company in general. For instance, acquiring the Swan logo is said to be a company development process, advancing product development, managing and marketing while reducing the environmental load (Joutsenmerkki 2015).

Ecolabelling answers to the demand of communication of the environmental performance for the customers. Firstly, to the growing, large group of consumers who want to know

more about the environmental profiles of the products, and secondly for the environmentally concerned customers. Providing more information not only keep concerned customers satisfied, but it also creates new customer groups by enhancing environmental awareness. It is good to remember though, that ecolabelling is not the only form of green marketing, but it would in fact help in branding the company as an environmentally concerned and responsible company. Marketing communications is the key element in utilizing ecolabelling in marketing as well as in branding. (Zbicinski et al. 2006, 189-190)

The Swan logo is the official ecolabel in Nordic countries (Finland, Sweden, Norway, Iceland and Denmark) and is a well-known and popular ecolabel in those countries, too. Joutsenmerkki (2015) claims that the Swan logo furthers exporting opportunities as well as faring well in the markets. The lack of the Swan logo in certain fields of business is an obstacle for entering the Swedish markets. In Sweden consumers are more aware of the Swan logo than average in Nordic countries. (Joutsenmerkki 2015.)

4.3.3 Environmental product declaration

Environmental product declaration (EPD) is basically a declaration of the LCA, where results are adapted for the marketing communications. Therefore, EPDs are strictly standardized and simplified; weighting is not used (weighting is a step in LCA study). The EPD is not a guarantee of environmental friendliness, but it provides detailed information for each life cycle phase and is more specific than an ecolabel. EPD is a relatively new tool. It was launched in Sweden in 1998. (Zbicinski et al. 2006, 193.)

EPDs are used mostly for business-to-business information, but utilizing it for business-to-consumer communication is not precluded. However, nowadays environmental declarations are considered as ISO type III ecolabels. Therefore, not only is the LCA process guided by international standards, but there are also given principles for the use of environmental information. Therefore, if a company wanted to make the EPD by the book (certify), one has to verify not only the LCA, but also the environmental declaration. EPDs that are done by the standards enable the comparisons between products that fulfill the same function by presenting quantified information on the life cycle of a product.

(ISO 14025:2006.) Environmental product declarations are based on Product Specific Requirements/ Product category rules. This means that certain product categories are given rules and requirements so that the comparison between products within the same category is possible. (The International EPD 2016.)

Similar to producing an environmental claim, using an unverified declaration in marketing may create a reputation risk. This depends on the target group, how specific and verified information is required. For example, in B-to-B business, does the customer have environmental requirements? Or is it enough to show that a company is showing interest in managing environmental matters? However, consumers may be more critical and demand well-known labels as proof. Providing such specific information in a form of EPD would be also useless. If there is no knowledge on the matter and no references, how would consumers form their own opinion of the harms?

4.4 Product design

All products and services have impacts on the environment and not only during the manufacturing, but through their whole life cycle. The best chance to reduce environmental impacts of a product is in the design phase. During the design phase a designer decides up to 80% of the impacts on the environment or costs for the whole life cycle by choosing materials, functionalities, structures or other features. Environmental impacts can be reduced by identifying different phases in a product life cycle (see Figure 5). With careful product design one can avoid unexpected impacts. When designing environmentally better products, one should pay attention for instance to the harmlessness of the materials, recyclability, weight and so forth. For measuring environmental impacts of a product or a service, LCA is the most well-known tool. (Harmaala & Jallinoja 2012, 121, 128.)

For identifying life cycle phases one does not need a separate program. At its simplest, mapping the phases of a product's lifecycle is as simple as drawing a mind map of processes. For example, a product is an ensemble of materials provided by subcontractors around the world. One could ask if there were the same materials provided nearby, and thereby reduce environmental impacts from the time of transportation. One could also

question if the subcontractors have acquired materials sustainably. However, one should remember that recognizing environmentally better options is not as easy and straightforward. The environmentally best option may differ from the customary materials or methods, and that can be found out only by conducting quantitative research. One simple option to have a greener product is to choose environmentally responsible subcontractors.

Product design could also “provide more for less”. This means both create value for the customer, but also the design itself. Perhaps it is possible to redesign the product and make it better in many ways. Surely in many cases the biggest motivators for developing products and services are economical, rather than environmental. Improvements typically include cost reduction through energy or material saving and reduction of the cost for the treatment of wastes and emissions. Waste management is as important as resource management in the life cycle study. In other cases, the cause for improvements has been the search for a distinctive feature, and perhaps in response to legal regulations (for example producer responsibility, avoiding a certain substance etc.) or to circumstantial pressures (for instance reputation risk). (Zbicinski et al. 2006, 73.) One should remember that even if environmental matters are not the main reason for redesign or product design, that company could gain significant savings with small changes.

Depending on the field of business, it is good to remember that customers seek benefits, and not products per se. Therefore, product transaction formats could be shifted from traditional ownership to “product as service”. According to Zbicinski et al. (2006) sometimes companies can increase profit and add value to a product when selling the service instead of product. This is obviously an environmentally better option (de-materialisation). (Zbicinski et al. 2006, 59)

If there is a possibility to conduct a quantitative life cycle study, in-depth redesign/product design is possible. Life cycle inventory (LCI) can help in identifying and replacing harmful materials, but also point out the positive choices. Instead of conducting a full scale LCA, a company could concentrate on examining a certain phase/process/material/output from a product life cycle. The scope of the study in this case should be informed very clearly instead of talking about the whole life cycle. Comparisons between different products, phases, processes, materials and outputs is also

possible, and this could help with identifying and developing the best product option for the markets.

In some cases, an impact assessment (LCIA) is in order when designing a product. This is especially when certain impacts on the environment are to be avoided. For instance, a product is found out to be highly polluting after use. The company could concentrate on finding and replacing those harmful substances. The pressure for creating better products throughout the whole life cycle can be brought up by authorities. In this case the life cycle studies could help not only in choosing better options, but to ensure authorities that another, newer option is better. Life cycle assessment is an established method of quantifying probable environmental impacts.

As it will be explained later, consumers nowadays have higher expectations for the ecologically preferable products in addition to the other product features. Ottman (2011) states that the environmentally better products are perceived as healthier and less toxic, with the possibility to create cost savings while contributing to a sustainable future. Environmental soundness is said to be the new dimension of quality, and customers are willing to pay a premium for green products. (Ottman 2011, 16-17.) One could conclude that designing environmentally better products is in fact a better option for people as well. LCA study is a useful tool when developing healthier products by avoiding and replacing harmful substances.

It is good to remember that the product design should fulfill or exceed customer needs, wants and wishes. Instead of designing the product based on ideology or being obsessed with the technology, customer needs and other aspects such as usability and user friendliness should be considered in order to have a feasible product and a chance to gain a competitive advantage. In light of this, the actual design should not be forgotten or diminished. Quite the contrary, designing for quality is now seen as a competitive weapon. Design of a product and the enhancing processes included will be more constructive in the long run, in terms of costs to the company and value for money to the customer. (Zbicinski et al. 2006, 33.)

Taking “a greener” design approach produces and enables innovations. No matter what phase of a product life cycle is in question, companies are looking for new business

opportunities and competitive advantages. New or improved products are developed, greener technologies invented, new business models and designs, and so forth. (Ottman 2011, 17.) Therefore, companies should embrace the fact that aiming towards environmentally better products is favourable, and not a burden.

4.5 Eco-design

There is a significant difference between designing a greener product and eco-design; eco-design is a holistic approach aimed at reducing the environmental impact of a product throughout its whole life cycle by the means of design. Eco-design requires not only a multidisciplinary approach but also corporate responsibility (management systems), hence involving all stakeholders as well. Eco-design answers the challenge of sustainable development; it aims to achieve a profitable balance between ecological and economical requirements without forgetting social and cultural aspects either. There are several kinds of tools for different purposes to help in eco-design, but the most comprehensive tool is LCA. (Zbicinski et al. 2006, 29-30, 53-54.)

Eco-design concentrates especially on the following factors:

- prolonging the product lifespan (e.g. increasing reparability)
- dematerialization (decreasing weight and volume)
- replacing dangerous or harmful substances and non-renewables
- reducing energy use in both production and use
- reducing waste generations, increasing recycling
- reducing transport needs. (Zbicinski et al. 2006, 56)

Eco-design is a knowledge intensive activity, and everything revolves around knowledge. It is not enough that a product is designed in a green manner, but all operations are transparent and thorough, including for example environmental reporting, management systems and auditing them. The responsibility is also reached to the stakeholders. (Zbicinski et al. 2006, 74.)

5 ENVIRONMENTAL KNOWLEDGE AS A COMPETITIVE TOOL IN MARKETING

Green thinking has become mainstream, and it is here to stay and grow. People are more worried than ever about sustainability, and the generic public is beginning to comprehend the impacts on nature. Since the 1960s generation by generation have become more environmentally conscious; now green is part of everyday life and becoming the norm. Mainstream consumer product giants have spotted the opportunities, now introducing new green brands and educating their own environmentally aware consumers about the benefits of their products. Sustainable development is no longer thought to be an obstacle for economic growth. (Ottman 2011 3-7, 11.)

Back in the 1960s the ideology was the main selling point for eco products, but in reality those products did not work and were not able to compete with regular ones. Situations have changed though. Ottman states (2011) that consumers nowadays have higher expectations for the products they buy and that the environmental performance is the new dimension of quality. Environmentally better products are expected to have value-added benefits while being healthier and safer. Consumer demand for greener products and services creates business opportunities, but also encourages to improve or create new products. Marketing is undergoing a change too, turning greener and enhancing the company image. Environmental knowledge is a growing common competitive tool for companies which belong to all employees. The environmental features of a product are an opportunity to differentiate themselves from their competitors by meeting or exceeding new customer expectations and enhancing the product image and abilities. (Ottman 2011 1, 15-16.)

Whether the inducement for developing environmentally friendlier products are authoritative regulations or economic benefits, it is without a doubt clear that consumers' environmental knowledge as well as skepticism towards marketing claims have increased. Therefore, it may not be enough, now or in the future, that the product is only said to be ecological. According to Harmaala & Jallinoja (2012) consumers are especially skeptical when the term "environmentally friendly" is used. Using different kind of claims between companies is much easier. (Harmaala & Jallinoja 2012, 165.) Also Ottman

(2011) points out that consumers ask more questions than ever before and are seeking additional information themselves, since there is much more information available. However, as much as modern consumers are educating themselves, there are still many issues that consumers do not comprehend. Also, not all information is consistent, which causes trouble in sorting out green from “greenwashed” products. (Ottman 2011, 36-37.)

The significance of the environmental knowledge in competing within an industry depends on the general nature and state of the field. If the products are similar, profiling as an environmentally friendlier company and a product may ease competition and price pressure. On many fields the environmentally friendlier product will replace the traditional product, so even with a new position the company cannot avoid the pressure for change and development towards environmentally friendlier products. (Linnanen, Markkanen & Ilmola 1997, 90.) Obviously, depending on the field, legislation and regulations may add pressure. However, as in marketing in general, predicting and managing changes as well as continuous development should be an essential part of the company.

Responsibility is the latest orientation in marketing. Responsibility is not only about marketing, but also the product development and company’s actions as well. Corporate social responsibility combines sustainable business with social and ecological perspectives. Some companies take more responsibility than legislation requires and publishes annual reports of their actions for society. These actions are part of the company’s reputation management. Responsible actions may improve competitiveness. (Bergström & Leppänen 2011, 16-17.)

5.1 Environmentally conscious managing and environmental management schemas

There are basically four inducements to practise corporate social responsibility: economic, regulations, interest groups and values. Most often business activities are based on economic values, one of the main reasons for operating in a responsible manner. It has been proven that investing in the environment and people has gained economic growth, either in cost savings or increased demand, or both. A minimum requirement for

businesses is to comply with regulations; therefore, legislation, taxation and sanctions are good motivators for operating responsibly. Interest group expectations are also considered when operating in a responsible manner. In addition to the economic and operational motivations, companies contribute to the common good by having ethical values as inducement for corporate social responsibility. (Harmaala & Jallinoja 2012, 58-59.)

Corporate environmental responsibility means trying to operate in the best possible way for the environment. The goal is to consider environmental points of view when designing or developing the product or in the manufacturing process with all the participants in the production chain. Therefore, it is not enough to consider only the company's own processes and immediate impacts on nature, but to reach requirements of environmental responsibility with the operating partners as well. Responsible companies are not only aware of the steering legislation or regulations, but are also aware of their operations' impacts on nature, strive to develop continuously and recognize the need for change. As in a responsible corporate concept in general, integrating social and environmental concerns in their business operations and in their interactions with their stakeholders is on a voluntary basis. Companies can carry out environmentally conscious managing in many ways; there are several strategies and methods to choose from. Usually companies realize the benefits little by little, implementing gradually a more structured approach. When responsibility is genuinely strategic, goals and results are measurable. (Harmaala & Jallinoja 2012, 16, 22, 74, 77.)

According to Harmaala & Jallinoja (2012) pecuniary advantages can be achieved by investing in a company's environmental responsibility, usually through cost saving and/or increased demand. Saving costs could be achieved for example by adding energy efficiency, reducing materials and amount of wastes, etc. Investing in less polluting technology could improve profitability and competitiveness in the long run, especially when it is a matter of predicting tightening environmental regulations. The company would avoid later improvement investments. (Harmaala & Jallinoja 2012, 59-60.)

Different kinds of managing schemes help in transferring responsible management into action (Harmaala & Jallinoja 2012, 107). Environmental management schemes (EMS) is referred to the company's structure for managing its processes that will produce a product.

Basically an EMS is a continuous cycle of planning, implementing, reviewing and improving a company's processes to achieve its environmental requirements and targets. The expected outcome is continuous improvement in environmental management. There are ISO standards for management systems which also require compliance with applicable legislation. EMAS (the Eco-Management and Audit Scheme) is a management instrument developed by the European Commission, which comprises ISO 14001 standards but also requires annual reporting. (Weiß & Bentlage 2006, 19-20.)

Those companies that design and establish their EMS are ensuring that the environmental responsibilities are managed in an organized and serious manner. However, developing an EMS that meets the standards and/or EMAS requirements is an ambitious goal and will take additional effort and costs. Those companies that achieve the EMAS certificate can utilize the EMAS logo in their marketing. Customers, governments, communities or other interested parties may ask for ISO 14001 or EMAS certificate to ensure responsible management. However, EMSs are said to be expensive, which is one of the main arguments against them. (Weiß & Bentlage 2006, 16, 20.)

Most organizations implementing environmental management schemas seek monetary benefits. One could say that nowadays a company cannot afford not to have some sort of environmental management, considering the tightening legislation and regulations as well as the risk of losing reputation if harm was caused to the environment. Either an EMS is an investment or just a cost, it depends on the taken approach and goals. Benefits and costs are tied to the environmental impacts of the company actions and the field of business. At best EMS can help in reducing operating costs as well as liabilities or gaining competitive advantages. Those companies that do not have significant environmental impacts themselves could focus on the environmental performance of suppliers. A company could also design an uncertified management scheme for internal use. (Weiß & Bentlage 2006, 16, 21, 24.)

Depending on the size of a company or field of business, environmental management may keep track of hundreds of items, the most important being resources, emissions, wastes and pollutants (Weiß & Bentlage 2006, 15-16). LCA is one of several environmental management tools, assisting for example in evaluating environmental performance, risk

assessment, environmental auditing and environmental impact assessment (ISO 14040:2006, 10).

It is good to remember that the compliance of standards or EMAS does not mean the same as being environmentally friendly - it means that the company has committed to improving its actions, hence certification. It is up to the company to take a step further than the standards and requirements are urging. This includes, for example innovative solutions, design, etc. This requires a different kind of mindset, approach and goals. After all, environmental management is basically all about transparency and continuous development, which could be utilized in marketing in many ways.

5.2 Building environmental reputation

Company image is a very important factor for business success. A reputation as a responsible company may add to the product or service demand but also may attract and engage employees and investors. As much as the corporate responsibility increases the profit expectations, it also risks the company's reputation. Risk would be fulfilled if the publicly expressed corporate responsibility is found in conflict with reality (more talk than deeds). Managing the reputation risks is an essential reason for many companies to pursue for corporate responsibility. Marketing has a vital role in communicating about the company responsibility. (Harmaala & Jallinoja 2012, 60, 71, 162.)

Many companies may offer environmentally better options and become guilty of “greenwashing”, intentional or not. The intentions might be good, but the idea and methods might not be thought through. As was mentioned earlier, consumers are nowadays more aware of environmental matters and would question product features and claims much more often. The internet is raising the stakes higher than ever before; news about a company spreading false information or lying would become costly for such a company, not to mention the direct hit on company trust and credibility. All in all, risks of backlash are high when claiming that a certain product is environmentally friendly. There can ever be a company or a product that is 100% green. (Ottman 2011, 131-133.)

One could ask what can be done then if nothing is enough and marketing could become risky. Everything starts with making sustainable marketing plans according to the target groups' needs. Only then one can concentrate on refining sustainable branding. This means that an entire company must adopt a thorough approach towards environmentally sound products. The brand is born in the minds of the customers, and therefore it is important that the environmental thinking reaches all the way from the CEO to all sectors, because the customer could be evaluating every phase of the product life cycle. Trust is gained through consistency. Corporate environmental responsibility strategies and EMS could help in structured managing. (Ottman 2011, 134-137.) More about sustainable marketing is coming later.

Environmental reputation requires time to build, and a reliable reputation is based on watertight facts, even when the customer is not interested in the facts behind the results. One of the key elements is transparency. Transparency means providing the information that consumers are seeking to evaluate a brand. In order to gain credibility in the eyes of a consumer, one should provide access to the product details, the company activity as well as progress reports, whether good or bad. Only through consistent reporting can progress be noted and comparisons made. (Ottman 2011, 137-138.) It is good to remember that even though the reputation may take years to build, losing it may happen in minutes.

All kinds of claims that are vague, missing proof, irrelevant or straight out lying most certainly do not help in building credibility. For example, claiming that a certain product feature is environmentally better, when in reality the improvement has been made to the cost of another unwanted compromise, e.g. toxic materials. Another mistake that can be done in marketing communications is worshipping misleading ecolabels, basically labels that have not been approved of by a third party (a company's own ecolabels) or that the requirements are unclear and vague. (Harmaala & Jallinoja 2012, 172-173.)

Ottman (2011) encourages speaking openly not only about the positives, but negative development as well. Bad news could in fact turn positive in the eyes of the customers if the communication is consistent. This includes for instance telling about the unwanted features of a product that the company is working hard to develop, telling about the progress and sharing research results. (Ottman 2011, 138-139.) According to Linnanen et

al. (1997) some business administrators find public conversation about environmental matters dangerous and risky in cases where some harmful factors about the company or product is brought up. If this is the starting point for building the environmental reputation, it is very unlikely that it would become a success factor in business. Environmental conversation should be seen as an opportunity which the most competitive companies are utilizing in their strategy, product development and in marketing. Public environmental conversations change fast, and this forces companies constantly to react to the new topics. Building an environmental reputation requires active monitoring of the environmental conversations. Linnanen et al. points out that Finnish companies lose their environmental reputation often in vain, only by being passive. (Linnanen et al. 1997, 132, 134-135, 137-138.)

Consumers have grown sceptical towards the reputation of “green”. After all, those who claim to be responsible companies and producing environmentally better products have not always been that way. Money is what motivates companies, now and before. This is why consumers think that retailers and manufacturers are unable to provide them credible information on environmental matters. Critical customers know what to look for, checking descriptors, green buzzwords and recognizable labels. Those could be the very factors that leads to business if the product otherwise meets the customer needs. (Ottman 2011, 33.) However, effective marketing-mix can be formed only by doing target group research; the right message for the right people.

Third parties, such as NGOs and governments however enjoy higher consumer trust on environmental matters. This is why third parties should be included in the company development. A third party could for example perform independent life cycle inventory or other researches. Third parties could also certify claims and grant labels. Including the third party in the company operations signals to the consumers that environmental matters are taken seriously without conjuring tricks. (Ottman 2011, 143.) Nevertheless, as was explained in a previous chapter, ecolabels are also under scrutiny and one should consider carefully if the intended label carries the sort of credibility that the company wants. When considering labels, one should consider what kind of criteria the label carries and how would it impact the perceived image.

It is important to be specific in the marketing communication, that there will not be unintended deception or incorrect interpretation. This means basically avoiding misleading customers, for instance by using commonly used terms when in reality there would be only partial truth behind, or just exaggeration on the matter. One way to avoid misleading is to consider the entire life cycle of a product, before making claims on particular features. An example of this claiming a whole product to be environmentally friendly, when in fact only one phase of a life cycle may be better in environmental performance. The used terms, no matter how well they are thought to be known, should be explained. (Ottman 2011, 139-142.)

As mentioned in the previous chapter, one should not forget subcontractors either. It is important to be aware of the environmental practises the subcontractors operate or if they do at all. A company as a paying customer has the right to set some requirements for the contractor. Whether it is a case of a component, product or a service, subcontractors affect the overall image of environmental operation of a company, and therefore represent a reputational risk if not considered.

Altogether building the environmental reputation should be considered as a holistic approach; everything influences everything, and credibility is gained through transparency. As mentioned in the previous chapter, an environmental management system is not same as being an environmentally considerate company. Therefore, one should not mistakenly think that building the reputation is as easy as complying with regulations and management schemas. It takes actual will and planning to become “green”.

5.3 Environmental reputation as a part of the product image

As it has become clear, building an environmental image as well as reputation is heavily based on marketing communications. Nevertheless, the process should begin from the product development so that there are grounds for the environmental marketing. Ottman (2011) accentuates the importance of life cycle approach when the product is developed environmentally better (Ottman 2011, 134). A company that claims to operate in an ecological way or provides an eco product should be aware of the phases in the product

life cycle and preferably consider the environmental loading a bit more than the requirements demand. If not, it is basically “turning a blind eye” to the facts that may wreck the desired eco-status. This may be e.g. ignoring subcontractors’ operating methods or the environmental impacts of acquiring the materials. Therefore, it is important for a company to know what is happening in all phases of a product life cycle and act accordingly. One should also consider, and choose subcontractors carefully, especially if the product is an ensemble.

It is often forgotten that a consumer is actually part of a product life cycle. It is one thing to design a product that is environmentally better considering all phases of life cycle, but one should make sure that people use and dispose the product as was meant, too. This means basically educating consumers. This does not mean only handing out manuals, but providing information on responsible consumerism in general. (Ottman 2011, 154.) This means also educating on the environmental matters of a certain field of business. The more a customer knows about the environmental matters, the better the chances of proving that this certain product really is a better option. This enables providing more specific information about the environmental benefits of the product, for instance how this product was developed better considering each life cycle phase, and differentiating from the competitors. Educating customers on the environmental benefits of the product builds the credibility, and therefore impacts the perceived image.

Environmentally responsible products can be an efficient way to differentiate a product from the competitors’ offerings but also create growth for the company. All companies do not have same prerequisites for the product development, but all companies can evaluate their current products and their features, and based on that decide a strategy for a product portfolio towards an environmentally conscious direction. (Harmaala & Jallinoja 2012, 119-120.)

Company and product images are often mixed. However, depending on the field of business, sometimes it would be beneficial to concentrate on one or the other, especially if the goal is to build a differentiating image. In the consumer markets the received product image is often more important. Focusing on the environmental arguments of certain phases of a product life cycle also affects the choice. When benefits are mainly in the beginning of the life cycle, the benefits are focused on neighbouring areas or society,

and therefore company image. If the environmental benefits are focused on the user end of the life cycle, basically product features, the benefits are part of the product or the product image. (Linnanen, Markkanen & Ilmola 1997, 141-143.)

Even though the company concentrates on building the product image, one cannot avoid building the company image either. Reasons for this are the previously mentioned need for credibility and critical consumers. One could ask if an eco product is really better for the environment if the company is neglecting the environment otherwise. The field of industry also affects the credibility of the environmental communication. A company that is noticeably greener than the industry in general, may face surprising resistance (Linnanen, Markkanen & Ilmola 1997, 143).

Image building has been successful when the company or the product differentiate from the competitors. Designing and implementing a marketing mix should be based on the desired image. The image will be more durable and long-lasting when it is based on actual facts. It is very important to stick to the truth and let the customers form their own opinions based on provided information, which should be widely available. A customer should feel that the environmental issues are taken seriously.

Reaching a certain image can be taken too far, though. When a company has an image perspective in the marketing, the company will use mostly marketing communications to create imaginary values in addition to the potential value of the core offering. The image strategy demands continuous heavy investments in marketing communication; the marketing becomes very dependent on the imaginary extras and without reinforcing they deteriorate. (Grönroos 2015, 19-20.) This kind of approach would deteriorate sooner or later anyway when environmental matters become the subject. The problem would be balancing between facts and irrelevant information, therefore holding the risk of being misleading.

Being specific in marketing communication is important, as is sticking to the relevant matters. However, providing extra information is like providing additional value for the product. It gets even better if there is a third party involved, ensuring consumers of the validity of the information.

5.4 Sustainable marketing

A marketing approach that aims at satisfying consumers through an ever increasing volume of goods without improving life quality is not sustainable development nor responsible. Marketing's role in the sustainable development is well recognized. After all, marketing aims to create needs and wants that are then fulfilled. Marketing is therefore sustainable only when it satisfies the needs and wants in a way that does not compromise the ability of the future generations to meet their own needs. (Sheth & Parvatiyar 1995, 6-7.) This approach is known as sustainable marketing, or sometimes called environmental marketing.

Fuller defines sustainable marketing as:

the process of planning, implementing, and controlling the development, pricing, promotion, and distribution of products in a manner that satisfies the following three criteria: (1) customer needs are met, (2) organizational goals are attained, and (3) the process is compatible with ecosystems. (Fuller 1999, 4.)

Making product systems that are compatible with ecosystems requires integrating pollution prevention and resource recovery to marketing decision making. This could be seen as a possibility; providing the same or improved benefits to customers by reinventing product systems to achieve "zero-waste" or "zero-discharge" outcome. (Fuller 1999, 3-4.)

Sustainable marketing can function in several ways. It may help with informing, educating and channeling the needs of current and potential customers towards ecologically benign products, services and activities. For instance, marketing a new product, that is better than the old and inefficient one, could indeed become a positive incentive and possibly change consumption patterns. This is done by providing comprehensive information about the new benefits or product development. Other ways to implement sustainable marketing include the ability to identify and develop consumption choices. This does not mean only providing products that do not cause damage to nature, but also developing such products that have positive impacts on the environment. However, it is good to remember that marketing such products cannot be based only on the ecological benefits but fulfilling the customer needs and wishes as well,

without compromising corporate profitability. One could conclude that sustainable marketing is promoting sustainable development while protecting our ecosystem. (Sheth & Parvatiyar 1995, 7-8.)

Sheth & Parvatiyar state (1995) that the strategy for sustainable marketing can be built through four efforts: promoting reconsumption, redirecting customer needs and wants, reorienting the marketing mix and reorganizing organizational efforts. Re-consumption is the ability to use or reuse goods or parts of them, over several use-cycles or generations. Basically this means life cycle responsibility; the company would consider the impact of their product on nature not only from the time of use, but also the processes included before and after use. Therefore, the company would minimize the risks and impacts throughout a product's life cycle. Reducing burdens on the ecosystem is achieved also by providing equivalent benefits with less resources used. Basically this means reducing the use of materials and energy in production as well as in packaging. Moving from "single-use" products to durable or recyclable products would also de-materialize. (Sheth & Parvatiyar 1995, 8-9; Fuller 1999, 81-82.)

Moving from conventional materials, features etc. towards environmentally improved products may mean deviating from the customary materials or processes, and would require additional convincing of the benefits of a new product or development. However, Sheth & Parvatiyar add that those companies that succeed in developing such product and convincing consumers about the benefits will have a competitive advantage over others, since consumers become more environmentally conscious. (Sheth & Parvatiyar 1995, 8-9.) One should remember that a product means an ensemble, which as a whole is the product. Pallari (2004) points out that productization of an environmentally sound product requires multidisciplinary understanding; which factors influence the formation of the product ensemble and how they are emphasized in the marketing as well as in the company operations (Pallari 2004, 8). It will not be enough to concentrate on the technical aspects of the product. The product should also fulfill the needs and wants as its competitors would, without forgetting augmented products. The key factor for success is the recognition and understanding of the environmental values as well as supporting the productization (Pallari 2004, 8).

In order to redirect customer needs and wants, one should perform market research and in-depth customer analysis. Only by identifying the current consumption options and understanding the purchase decision process, can a company form an appropriate marketing mix. Consumer attitude studies will help in forming proper communication messages for sustainable marketing. In regards to redirecting customer needs and wants, advertising and promotion cannot be understated. (Sheth & Parvatiyar 1995, 11) Linnanen, Markkanen & Ilmola (1997) reviewed that launching eco products has often failed because the marketing has been based mainly on idealism instead of commercial knowledge. The result has been that the market channels have not been reached. According to Linnanen et al. (1997, 89), if a customer were to choose between similar products, the environmental know-how would seal the deal. Consumer sensitivity with environmental issues does not always translate to the customer behaviour, which is why the marketer has the responsibility to convince the customer via marketing means.

Compared to the regular marketing, basically the entire marketing mix has to be orientated, from the product to packaging through positioning and promotion. As explained earlier, the marketer should be aware of the impacts of the product through its whole life cycle, this includes also augmented products such as packaging, labels etc. Beyond assessment, strategic opportunities can be identified and utilized in reoriented marketing mix. For instance, providing recycled packaging, additional product information or offering lifelong warranties can lead to shifts in customer needs. (Sheth & Parvatiyar 1995, 12-13.)

As explained in the marketing management and competitive tools chapter, it is crucial that not only the company management adopts marketing strategy and action plan, but also the company employees. The process starts from a committed CEO, who oversees the company operations as well as environmental compliance, but also creates a link between customers and employees. Therefore, employees also have to be educated. (Ottman 2011, 135-136.) Sustainable marketing requires proactive grip and strategies. The path toward sustainable development is hard, but doable, and therefore requires effort as well as ambition. This may in some cases mean reorganization, restructuring and redesigning processes and systems within a company. One should not be mistaken to think that only marketing people would be able to create a green company or marketing orientation. The company may have to provide training for environmentally sound

operations and to enhance motivation throughout the company. (Sheth & Parvatiyar 1995, 13-14.)

6 TRADITION MEETS MODERN REQUIREMENTS

Log buildings have been part of Finnish lives since the stone ages. One could say that using logs as building materials enabled the settling of Finns by giving much needed shelter from harsh conditions. Log buildings kept their position as a preferred building material until the two past centuries, when little by little the other building materials replaced it especially in the cities. However, in the countryside the log has kept its position in the scenery, and the number of log houses is still growing. A log is a popular material especially for holiday homes. (Vuolle-Apiala 2012, 6.)

Log buildings represent tradition in the building industry, and it is an international phenomenon. Local circumstances and available resources guided the development of log buildings and methods. There are as many log building types and building methods as there are craftsmen making them. The most significant differences in log buildings were and are joints, each country having their special characteristics. (Vuolle-Apiala 2012, 6, 16, 52, 91-92.) The most common wood species in log buildings are pine and spruce (Lauharo 2002, 75).

Producing log houses for export started as early as the 17th century in Finland, when log building methods spread from Eastern Finland to West Finland and to Sweden. Industrial manufacturing started in the 1950s. Nowadays, when talking about log houses, they are usually industrially manufactured, meaning industrially shaved and turned logs (see examples in Figure 7, round log or squared timber). Industrially handled logs and timber have uniform quality with a mortise for sealing the structure from air leakage, and the process is much faster than if crafted by hand. Also, the wood drying is controlled in industrial surroundings, which reduces color changes, molding and later cracking. (Lauharo 2002, 9-10.)



Figure 7. Differences between building log types. From left to right: round log, squared timber, and lamella log. In this case the lamella log has been assembled from three planks, creating two vertical glue layers.

A log as a product has not developed much over the years, but manufacturing methods have. Building regulations on insulation have tightened which encouraged producing thicker log walls. However, the availability of thicker timber as well as slow drying and cracking limits the use. In order to reduce and eliminate the above mentioned problems the lamella log manufacturing started. Lamella logs are made by gluing horizontally and/or vertically two or more pieces of woods (see Figure 7), which can be extended with finger joints. Cracking and twisting is minimised in the lamella logs (Lauharo 2002, 10-11). Nowadays, lamella logs are up to 270 mm wide.

It is said that log walls are “breathing” naturally. However, this does not mean air leakage from the joints or corners, but the ability to bind and diffuse water vapor. This feature ensures, that the indoor air moisture stays pleasant even during the dry summer. In traditionally built log houses there are no vapor barriers (plastic), like in the typical modern houses. Otherwise the same rules apply. Log houses should be airtight and ventilation arranged, otherwise they are poorly constructed. Natural materials should be used also in the joints and in additional insulation, because mineral and glass wools as well as plastics may change the functional principle. (Lauharo 2002, 17-18.)

Heat loss is greater in log buildings than in other building types, because the log wall is a solid material without insulation. In general, log houses have been seen as weaker options in heat energy saving than regular skeleton wall structures. However, log houses can reach

given energy efficiency requirements by compensating with additional insulation. (Lauharo 2002, 22.)

Log houses are considered environmentally friendlier options compared to other building materials. Wood is a natural and a renewable building material which absorbs and binds carbon dioxide from the atmosphere during its entire lifespan. Manufacturing logs are also considered to be very energy efficient compared to other building materials. All in all, log houses are said to have lower impacts on the environment than other materials. Impacts are lessened if wood is harvested from certified forests and delivered from a reasonable distance. When log houses are planned, built and maintained properly, it is not only a healthy and ecological option to live in, but also long-lasting. Even if the house is not usable anymore, the wood can be reused elsewhere or recycled.

6.1 Energy efficiency regulations for new buildings

Finnish building regulations were changed in 2012 due to the European Union Climate and Energy strategy 2020, given in 2008. This strategy is also known as the 20-20-20 package, which is a set of binding legislation to ensure that the EU will meet its targets for the year 2020. Key targets are to cut greenhouse gas emissions by 20% (from 1990 levels), increase the use of renewable energy by 20% and improve energy efficiency by 20%. More specific national targets were set for the member countries. (European Commission 2016.)

Finland set its own target to stop the increase of the final energy consumption and reduce it so the final energy consumption would be on the level of 2008's consumption in 2020 (TEM 2008). The buildings' share of the final energy consumption is about 40% in Finland. Renewed building regulations are part of the implementation of the directive on energy efficiency as well as meeting the national goals for improving energy efficiency. With these regulations new buildings' energy efficiency will be improved by an average of 20% compared to the previous regulations. (Kalliomäki 2011, 1.) Energy efficiency regulations for new buildings have been valid since July 2012. Regulations will be renewed in every five years and by the year 2018, in accordance with the Land Use and Building Act (Edilex 2016).

Houses are designed and built to be long-lasting, and therefore houses that are built now will have decades of lasting impacts on energy consumption and emissions. New buildings which use energy for heating or cooling, were set a limit for the annual total energy consumption, instead of previous requirements only on heat loss. Now regulations also include the heating method, preferring district heating and using renewable energy sources. Regulations also apply for example, to ventilation, warm water and lightning. (Kalliomäki 2011, 1.) This is a more wholesome approach compared to the previous regulations, and encourages or should be said it “guides” people to choose environmentally better options.

In order to simplify the regulation compliance, a unified calculation method for the annual energy consumption, and the use of natural resources was created. A buildings total energy consumption (E-luku) can be calculated by multiplying bought energy (theoretical needed energy in standard use) with the unit given for the used energy source, and by dividing the result with the heated area. There are maximum energy consumption limits (kWh/m²) for different building types (classes). E-luku must be calculated for the new buildings and it is shown by an energy certificate in a classification scale (see the example in Figure 8). Certification enables comparison between buildings’ annual total energy consumption. A certificate is needed for the building permission. (Laki rakennusten energiatodistuksesta 50/2013: 1,5,9 §. D3 Suomen rakentamismääräyskokoelma 2011: 2.1.1.)

Vähän kuluttava	E-luokka
A	
B	
C Uudisrakennus 2012	
D	
E	E
F	
G	
Paljon kuluttava	

Figure 8. Energy certificate scale. E-luku is very useful for consumers, because it simplifies comparison between houses. Basically smaller E-luku equals smaller running energy costs.

E-luku limits have been given for nine classes, of which the first class is for detached and semidetached houses and apartment complexes. Regular houses and log houses have been given their own limits, divided in four groups which are based on heated net m^2 (D3 Suomen rakentamismääräyskokoelma 2011: 2.1.4). E-luku limits for log houses are 25 kWh/m^2 higher than in similar, regular detached houses. Higher E-luku limits are reasoned by securing the traditional log buildings as a part of Finland's infrastructure as well as lesser impacts on nature during a log buildings life cycle. (Kalliomäki 2011, 6.) In other words, log buildings are pardoned to have slightly higher energy consumption.

6.2 Regulations for building insulation

Even though regulations changed in 2012 to consider the annual total energy consumption, this does not remove the requirements on the heat loss of the shell (all the building parts that separate indoors from the outdoors), air infiltration or ventilation of a house. In order to achieve the energy efficiency goals, the above mentioned technical aspects were set limits as well. (D3 Suomen rakentamismääräyskokoelma 2011: 2.5.1.) The data on the heat loss of a house (the shell, air infiltration or ventilation) is used when calculating E-luku.

The heat loss in a building shell is a summation of the heat loss in separate building elements. For each building element, a reference value, thermal transmittance (U-value, $W/(m^2 K)$), has been given and the building element should fulfill it. However, since the heat loss is calculated by considering all building elements, which are all given different values, the compensation is possible between the elements. The total thermal transmittance of a building shell can be at most $0.60 W/(m^2 K)$. Thermal transmittance indicates the heat flow density, which permeates a building component in steady-state when the temperature difference between environments on different sides of the building component is one unit of temperature. (D3 Suomen rakentamismääräyskokoelma 2011: 1.3.1, 2.4.1, 2.5.1-2.5.3).

Walls in “regular houses” and log houses are given separate U-values. A regular wall has been given $0.17 W/(m^2 K)$, and a log wall $0.40 W/(m^2 K)$ when average thickness is minimum of 180 mm. In reality the thermal transmittance in 180 mm thick log wall is

0.60 W/ (m² K), but is allowed to use U-value of 0.40 W/ (m² K) in the heat loss calculations. Basically this means that log houses are pardoned to have weaker ability to retain heat. (D3 Suomen rakentamismääräyskokoelma 2011: 2.5.4.) (Hirsitaloteollisuus 2012) In reality, log houses that are less than 280 mm in thickness do not reach the U-value limit of 0.40 W/ (m² K) (Marttinen 2016).

6.3 Gradually greener building industry

Comparing environmental performance of houses during their life cycle does not seem to be common. However, renewed building requirements on energy efficiency and energy certificates for the new buildings is responding to the need for instrumentation for comparing houses during the use, basically the energy consumption. Before this the comparison was difficult, and only certain technical aspects were used in comparison. However, one could only assume that the comparison was done mainly because the building regulations required e.g. better insulation, or that it would bring savings in running costs. For a regular consumer comparison would have been quite difficult. Now comparison is as easy as in house appliances.

Using environmental performance as a marketing tool has not been the preferred approach in the housing industry. However, environmental performances of new houses have improved little by little. For example, Sweden is guiding people towards energy efficient buildings, but pushes also existing buildings towards energy efficiency. Sweden aims to increase not only common knowledge, but also construction and installation workers' knowledge of low-energy building but also construction materials and wastes. Significantly, environmental impacts are no longer viewed only from the time of use but through the whole life cycle, considering used resources and generated pollutants and wastes. All in all, Sweden has taken a more sustainable direction, preferring natural materials and recycling, and this way reducing the emissions of hazardous substances in the environment. (Sveriges byggindustrier 2016.)

Finland's focus is on restricting energy consumption, greenhouse gas emissions, as well as life cycle costs. The Confederation of Finnish Construction Industries (2016) points out the importance of considering the impacts through the entire life cycle of a house and

how the planning phase is crucial for restricting the impacts. It was also noted how the building industry needs a common tool for evaluating environmental impacts and other points of a sustainable building. It is important to get more information regarding environmental impacts through life cycles to support decision making but also for consumers. (Rakennusteollisuus RT 2016.)

Different kinds of tools and indicators have been developed to measure and compare environmental impacts, emissions as well as the overall performance of buildings. However, so far they are meant for professionals. Indicators help in planning, comparing or for setting criteria. Life cycle studies help in achieving sustainable building goals. Indicators for environmental performance are most likely introduced to the consumers eventually, perhaps in a similar form as the energy certificate scale. At the moment such indicators are not commonly used in the marketing. When eventually indicators on environmental impacts are topical, presenting the data in an easily understandable form would help consumers make better purchase choices. For example, informing the amount of carbon dioxide emissions per house per square meter. Perhaps in the future, even more detailed impacts would be represented.

At the moment some of the internationally known certifications/ indicators are the British BREEAM (Building Research Establishment's Environmental Assessment Method) and American LEED (Leadership in Energy and Environmental Design). PromisE is developed for Finnish conditions, evaluating the most significant environmental impacts. (Rakennusteollisuus RT 2016.) Originally PromisE was created for marketing purposes as well as consumers by several public players (Rakennusteollisuus RT ry 2005, 32); however, the program was switched to be developed and maintained by Rakennustieto Oy in 2007 (Rakennustieto Oy 2016). After this PromisE has been only in professionals' use.

Green Building Council Finland (GBC Finland) was founded to bring together knowledge and professionals, but also to encourage and advance the use of practises and methods that support sustainable development in the building environment. GBC Finland has published several building performance indicators, as well as calculation guides for phases of design and use, for instance the Life-cycle carbon footprint indicator and Life-cycle cost indicator. GBC Finland provides education for its members. GBC Finland is

part of the international Green Building Council-network, and as other councils, is also an NGO. (Green Building Council Finland 2016.)

The Nordic Ecolabel can be applied for a building. Buildings are assessed on the life cycle basis, requirements being for the building's energy use, chemicals, used building products and several indoor environmental factors that are relevant to health and to the environment. However, the updated Swan logo requirements include also quality management in the construction process, since the environment and quality often go hand in hand. Joutsenmerkki (2016) states that the Swan logo can also be seen as a mark of quality. As in general, the Swan logo can be utilized in the marketing also for buildings. (Joutsenmerkki 2016.)

Environmental product declaration for a building product is a specified form, quantifying the most significant environmental impacts of a product. The Finnish EPD for a building product (RT-environmental declaration) describes the used resources and the born harmful emissions from the entire life cycle, including installing and building, maintenance and disposal and/or reuse. Information on building life plans and recyclability are also given. The data would be given in numerical value per functional unit and/or weight unit. All building product types are represented in the same, verified declaration form, basically in a table. The RT-environmental declaration is applied and granted from The Building Information Group. The RT-environmental declaration is based on a life cycle study that is done according to the ISO standards. The RT-environmental declaration is valid for three years, if any changes does not occur. (Rakennustietosäätiö RTS 2016.)

As EPD in general, also RT-environmental declaration does not give criteria for the product nor take a stand if the product is better for environment or not. However, RT-environmental declaration may help in planning, setting limits or comparing to other options. However, comparing environmental impacts cannot be based on EPDs, since weighting is not used (weighting is a step in LCA study in which impact categories are weighted so, that they are comparable, basically a single score). For example, emissions to the air may be divided differently, which raises a question: what emissions are the worst? (Rakennustietosäätiö RTS 2016.)

The goal is that the RT-environmental declaration would promote the generalization of building products that have less of a burden on the environment, than other equivalent products (Rakennustietosäätiö RTS 2016). This is in theory. However, further information about RT- environmental declaration, as well as published RT-environmental declarations were scarcely available. In general, information about producing an EPD for building products in Finland is very little.

7 CASE: KERO HIRSIRAKENNUS OY

Kero hirsitalo Oy was established in 2008 and operates in Kuusamo, Finland, as a family business. In the beginning the company operated as a small scale sawmill, producing timber and plank boards. Kero hirsitalo Oy also built different kinds of log buildings. Log joints were made by hand.

Kero hirsirakennus Oy searched for ways to develop their business and created a product called thermal log which is now design protected. Kero thermal log resembles a solid log, but carries a unique structure: a breathable and plastic free configuration with high insulation capacity. The local Centre for Economic Development, Transport and the Environment supported the company in its early stages and enabled the procurement of the machines for producing the thermal log. Machines were purchased second-hand from a Finnish company, which had not succeeded in breaking through the business idea of a thermal log. According to the CEO of Kero hirsirakennus Oy, Jorma Mursu (3.3.2015 interview) one reason for the failure could have been that the product design was not thought through and back then the insulation regulations were not as strict. Jorma Mursu states that tightening insulation regulations were one of the most important reasons for developing the Kero thermal log. For Kero hirsirakennus Oy the insulation regulations are a business opportunity. Consultant services were employed in the design process.

Kero hirsirakennus Oy have a selection of house and cottage designs, but usually plans are tailored for the customers or designed from the scratch with the customers. House or cottage planning is done by using the company's own log wall/structure program. There are different log thicknesses which are chosen according to the customers' needs and

insulation regulations. Customers can install the house or cottage themselves if they so desire, or have them constructed by the company. Kero thermal log houses and cottages are provided with installation and maintenance instructions especially made for Kero thermal log products. Kero hirsirakennus Oy also produces smaller buildings, shelters etc. mainly from the byproducts of house and cottage production.

There are three full time contracted employees, and during the time of high volume orders there is a total of seven employees. Orders have been placed from all over Finland as well as abroad. Building sites that are near Kuusamo are dealt with by their own team, but elsewhere in Finland the construction is contracted out if the customers do not install the house or cottage on their own.

7.1 Kero thermal log

Kero thermal log houses and cottages resemble traditional log buildings, but embody a unique structure. The product design was value based, leaning strongly on the traditional log building methods and qualities. However, technically Kero thermal log is an upgraded version of traditional or laminated log. In the design the company wanted to use natural materials as much as possible to ensure structural breathability and good indoor air.

Kero thermal log hold significant benefits compared to the squared timber or laminated log houses: insulation. Timber or laminated log houses do not fulfil the insulation regulations without supplementary insulation or compensating for the heat loss in other ways. Kero thermal log fulfills the insulation requirement of a regular wall, $0,17 \text{ W}/(\text{m}^2 \text{ K})$, when used 290mm wide thermal log. More about regulations can be found in Chapter 6. To clarify the differences between different types of logs, traditional logs are presented in Figure 8.



Figure 9. Kero thermal log structure, represented in the corner.

There are four components in the Kero thermal log: inner and outer laminated wood, connecting pieces, insulation and wood fiber strand to finish each log. See more specific structure in Figure 9. The insulation is chosen by the customer between wood fibre and recycled paper insulation. So far, according to Jorma Mursu, recycled paper insulation proved not to be aesthetically appealing for the customers, and the company decided to recommend primarily the wood fibre insulation. Insulating with recycled paper is weaker compared to the wood fibre insulation.

Inner and outer wood boards are horizontally laminated wood. Laminating the wood prevents later changes in the wood structure, such as cracking, twisting or bending, which are common sight in the traditional timber log houses. However, the key feature compared to the laminated log is that there is no vertical gluing in the Kero thermal log. The company wanted to minimize the amount of chemicals in the structure as much as possible, and to ensure not only good and healthy indoor air but also structural breathability.

7.2 Simple, back to basics structure attracts home builders

Consumer suspicion about the breathability and the chemicals of the lamella log has a role to play in the log house markets. Therefore, Kero thermal log responds to this niche with simple yet efficient structure. With the earlier mentioned structure, it is ensured that the Kero thermal log is structurally breathable and enables good indoor air quality. Kero thermal log has a plastic free configuration, unlike in the traditional skeletal structured houses which embodies vapor barriers. Plastic free configuration is one of the most important selling arguments for Kero hirsirakennus Oy.

According to the CEO, there are also other companies who sell thermal log named products. However, usually these are completely different products, and are most often an element wall structure. Structurally these are completely different from the Kero thermal log, and resembles traditional log only from the outside (paneling and solid wood corners). Mr. Mursu reminds that in those cases a customer should know and remember themselves to request the plastic free configuration (if the company is willing to comply). This “quasi-thermal log” with plastic in its configuration may indeed be a stain in the thermal log reputation in general. Traditional log buildings have a strong image, and complex configuration with plastics does not sit well to that image. Another example of one thermal log is a “layered wall”, basically building a lamella log shell, then insulating it and finishing with thin panel.

In other words, one can conclude that thermal log-name has no established trade name with technical requirements. This is causing a situation that all companies with a product that have even remotely the appearance of a log can call their product as a thermal log. In order to differentiate themselves from the “bad fruits in the basket”, Kero hirsirakennus Oy owns and uses the domain called muovitontalo.fi (plastic free house). To quote Mr. Mursu: “Kero thermal log is the only real thermal log in the markets.”

Two of the Kero thermal log sizes fulfill even the strictest insulation requirements without additional insulation. Ever tightening regulations do not worry this family company; quite the contrary, it may benefit the company compared to the lamella log house manufacturers. The CEO of Kero hirsirakennus Oy estimates that customers in the future want simplification for wall structures, energy efficiency, plastic free configuration and structural breathability. Especially those customers who have been involved with houses

with mould or other indoor air quality problems make up the most interested individual group of Kero thermal log houses. Kero hirsirakennus Oy offers even “an organic-house” option, where the air ventilation is gravitational. The demand for “the organic option” came from the customers; people wanted to break away from the mechanical ventilation and have an alternative solution, that would not fail to a technical mishap.

7.3 Marketing

Kero hirsirakennus Oy’s target market is on all-season detached houses or cottages. The Kero thermal log is able to compete in in all-seasons housing market because of the tighter building regulations. Price wise the thermal log is advantageous to the equivalent lamella house (290 mm thermal log vs. 275 mm lamella). Competitiveness turns down when less regulations are applied, for instance in summer cottages where insulation is not required (most often timber or laminated logs).

Target group mapping has not been done. In cases where the customer has chosen a lamella house company for their house delivery, the reason has been simply honouring the traditional, solid log. This reason overrules rational benefits, such as energy efficiency (saving in operating costs) or more inexpensive purchase price. This example highlights the need for branding. It is important to break prejudices and to make the Kero thermal log as a new, modern way to build log house.

Competitor analysis has not been done. However, the company is well aware of competitors and their products in the log house industry. Kero hirsirakennus Oy’s thermal log is unique and design protected. However, in Finland there are a few companies which, due to the lack of standardization, offer products with the same name which do not carry this unique structure. The problem is that these products have a negative impact on already sensitive field of log building traditions. Some operators even add plastic to their log structures and therefore are misleading customers. Differentiating from the rest of these same name products is very important because of the negative impacts on the thermal log image. In order to separate the company from the misleading crowd, the company owns and uses the domain name muovitalo.fi. The need for

branding and marketing plan has been recognized in the company but is pending due to the lack of resources.

A separate marketing plan has not been made for the business. At the moment marketing is based on presentations on trade fairs and exhibitions, internet site and social media. Internet, Facebook and twitter are actively maintained by the family. At fairs and exhibitions there is a wall structure model presented. The model represents the most important features (log structure, long wall) and competitive edge over traditional or lamella logs; corner structure. In the future new buildings or building sites are planned to be represented in open house shows. The goal is that the company will participate in the Housing Fair Finland in summer 2017 as one of the target area builders.

The company lacks after-sales marketing at the moment, but it is considered one of the most important investments in the future for the company. So far Kero thermal logs have received nothing but positive feedback. Feedback is sporadic at the moment and is not recorded in any way. According to the CEO Jorma Mursu, positive feedback has proven to be good sales talk at the fairs and exhibitions. Some of the customers have given their contact information so that interested shoppers could contact them directly and ask their experiences of the house and service. Jorma Mursu adds that this is the best way for marketing the product: straight from the customer's mouth. In this way customers would receive a trustworthy critique of the company and the product. The most frequently asked questions are about the heating consumption in the house as well as the indoor air quality. The indoor air quality has especially raised enquiries from the people with allergies and asthma. There have been preliminary negotiations with Organisation for Respiratory Health in Finland about testing the air quality in Kero thermal log house. These results could be utilized in the marketing; however, applying the certificate and having the right to use it in the marketing would cost a significant amount of money.

In general, the most sensible subject that can cause negative feedback is from the construction phase, and especially if there are building contractors involved. So far this has not been a problem for the company.

It is acknowledged in the company that they should invest in marketing in general. At the moment, developing the marketing is thought to be time wise too challenging with the same staff. When it is possible, marketing personnel will be hired for the company.

7.4 Kero thermal log marketing

As discussed previously in this chapter, marketing is leaning strongly towards the technical aspects of the product. There are three main selling arguments for the Kero thermal logs over their competitors:

1. Kero thermal log houses fulfill heating consumption requirements without supplementary insulation or compensating for heat loss in other ways. This means lower heating consumption and saving in heating costs.
2. Overall building costs are less than that of lamella houses. One factor that affects to the overall costs is the lightness of the Kero thermal log (15 kg/m). The cost of hiring a crane is negated altogether a maximum of 1.5 story houses. This is good news especially for customers who wish to install the house themselves. Lamella houses cannot be installed without a crane. Kero thermal log structural settling is also minimal compared to the lamella house.
3. Structural breathability and indoor air quality is claimed to be better than in lamella log houses. This argument is based on a minimized number of chemicals used in the structure and lack of vertical glued lines. The structure is also plastic free. The company believe in their product so much that they have a house model with natural ventilation, meaning that the forced/mechanical ventilation is not needed.

The claim of the ecological product is based on the savings in the heating energy consumption, and plastic free and natural structure. The savings in heating energy consumption have been presented in an example calculation as a part of the marketing, compared to a lamella log house. What it comes to the healthiness of the structure, it is assumed, that the customer would recognize “a healthier option vs. regular”. At the moment the claim of ecological and healthy structure (excluding heating energy saving) is not proved. However, the company is planning to test the air quality in the Kero thermal log house by the Organisation for Respiratory Health in Finland.

7.5 What good would LCA bring to the company?

It was acknowledged in Kero hirsirakennus Oy that the public environmental consciousness is ever growing, and this was the main reason why conducting LCA was viewed positively. The basis for the LCA was that the comparison product for the Kero thermal log options was a competing product, lamella log.

Life cycle assessment was not familiar for the company from before. When it was told that the results from the LCA may be something else than expected, it did not arouse concerns in the company. If indeed the results were negative, they were said to be used in product development. According to the CEO, company operations and results should be transparent. However, the CEO is confident of the environmental performance of the Kero thermal log. Positive results would be utilized in marketing as much as possible. Representing results in figures and charts was thought to be the best method. Environmental product declaration would have been represented for foreign customers and bigger scale players, such as other companies (travel business etc.).

At the time of the interview, there were ongoing negotiations for bigger sales and export to Sweden and Germany. In both cases ecological factors were emphasized, and for example in this kind of situations the environmental product declaration would be beneficial for the company.

8 RESULTS

The goal for this thesis was to find out if LCA study could be utilized in product marketing. As is the nature of a case study, the result is indeed more comprehensive than a simple “yes, LCA can be utilized in product marketing”. There is more than one way to utilize LCA in product marketing, as there are many factors influencing the utilization. One could conclude that the utilization of an LCA depends on the company goals and marketing ambition.

First of all, what has been learned so far is the fact that consumers are getting smarter and more critical on environmental issues. Consumers are aware of the dangers and the consequences of unsustainable living. Marketing is reacting to this, while understanding gradually the risks of different variations of “greenwashing”. Legislation is changing, challenging businesses to improve not just business operations but also products throughout their life cycle. Sustainable development has entered into the legislation but also in the business world. Life cycle assessment is a tool for sustainability; it can be utilized in developing, designing or innovating products that consider all aspects of sustainable development.

8.1 Indirect utilization of LCA in product marketing

LCA can be utilized in backing up ecolabelling that requires a life cycle approach. All ecolabels have their own criteria to fulfill, and companies can choose which one to pursue. If the ecolabel is granted, a company can utilize the label in the product marketing. This is an indirect utilization of LCA in product marketing. Consumers recognize the ecolabel which promises environmentally friendlier products. The labels, which are granted by a third party, are trusted more than the ones that are self-declared (Ottman 2011, 143-144, OECD 2011, 4). Consumers may not even be aware that LCA has been a requirement for the label, but the respect on the label may be enough to persuade the customer of the environmental performance of the product. Essentially, the labelled product is better than the equivalent without a label. It would be most beneficial to choose an ecolabel that was recognized and valued by the consumers. In some cases, an ecolabel is the key element

in building an eco-image around the product as well as the company. Ecolabels can be considered also as a sign of quality that the company is operating in a structured manner. (Joutsenmerkki 2016).

The second indirect utilization of an LCA study in product marketing is actually organizational marketing in the form of environmental management. Some ecolabels require management schemes to be granted, and therefore LCA is involved. In some cases, there are no ecolabels involved, but environmental management is required for some other reasons, for example restricting resources or emissions. LCA is a tool to keep track of in- and outbound energy flows. The incentive for environmental management could be economic, regulations, values or company image (Harmaala & Jallinoja 2012, 58-59). However, the key term here is the image. By the environmental management one is aiming to achieve credibility, hence building a desirable company image. Credible management requires not only structured operations, but also watertight facts and transparency. Either the goal is to manage the company or the product image, they both have an influence over each other. Therefore, organizational marketing can be seen indirectly as product marketing.

8.2 Direct utilization

Probably the first option that comes to mind when talking about an LCA in marketing, is producing a marketing claim. LCA is an analytical tool to produce comparable, quantitative data on environmental indicators to support environmental claims. However, when producing such a claim for marketing purposes, it is recommended not only to do the study according to the ISO requirements, but also have it verified by a third party (ISO 14021:2016). An increasing number of consumers will not believe everything that they are told in marketing communications, and many believe that a company is only claiming to be “environmentally friendly” in order to increase sales and raise prices by the means of greenwashing (OECD 2011, 4). If claims are misleading, exaggerated or false, the company will feel it as part of a marketing backlash and a hit on its environmental reputation and image (Ottman 2011, 131-133).

Nevertheless, as risky as it sounds to produce an environmental claim, companies can and should utilize LCA. Especially in a case of a new product that tries to penetrate the markets, it is important to showcase the benefits that the product offers. However, when environmental claims are used in product marketing, the produced claims should be according, and part of the marketing strategy (Harmaala & Jallinoja 2012, 169) and not the only marketing tool. Surely well-made and documented studies and claims will influence the perceived image for the consumer, but the traditional marketing methods should not be forgotten. If a company concentrates only on providing product claims, it is most likely too obsessed with the technical aspects of the product and counts on the superiority of the product to bring in the success. As mentioned in the product marketing chapter, a product is a layered ensemble; the overall product experience will seal the deal and not necessarily the core product.

Another direct way to utilize a LCA study, is to produce an environmental declaration. However, depending on the field of business, basically how complicated systems are included in the product, the target groups are most often other companies (Zbicinski et al. 2006, 193). The inducement for the EPD could come from the B-to-B business, whereas other companies request environmental declaration either for their own environmental management, marketing purposes or to use the received information in their own product development. In some cases, the EPD may prove to be more popular, because it includes more information than a regular product caption.

EPDs represent the most significant environmental impact indicators through the product life cycle. The reason why EPDs are not used for public marketing is because the data itself would be too complex for most consumers, if it is represented in a table form without additional information. Another reason is that a customer would not have a reference for the information; does it really give extra value to the product to know numerical values of the impacts? The product might as well be the worst option in the markets, if there is no reference available. What is good to remember is that EPDs are not a sign of an environmentally better product but rather only a declaration of the impacts (Zbicinski et al. 2006, 193). Therefore, if a company wants to highlight the environmental benefits of the product for the consumers, one should consider methods other than producing a typical EPD.

Nevertheless, it is possible to produce an EPD and utilize it for the product marketing, consumers being the target group. This requires a holistic, environmental marketing approach, whereby the EPD would be part of it, and not separate. However, even though EPD would be part of the marketing strategy, one should not mistakenly think that the marketing could be built around the EPD. The nature of the EPD will not be changed by the marketing means; EPD would still be only a declaration of impacts. One can conclude, that the role of EPD is at best supporting the marketing; building the image of an environmentally conscious company by the means of transparent communication etc. However, in B-to-B business the EPD could bring extra value, if it is not the minimum requirement for the bargain.

One should remember that there are also requirements for producing an EPD, such as when producing environmental claims. Especially if the EPD data is transformed into a customer friendly version, one should be careful not to change information. This becomes misleading, gives wrong impressions or completely changes the meaning altogether. (ISO 14025:2006.) However, there are very good examples of well “translated” EPDs that are both educating but also interesting to read and look at. If one is to explore the full capability of product marketing utilization of an EPD, one should engage the multidisciplinary approach in marketing.

8.3 Everything affects everything

The above mentioned product marketing methods are what are usually expected from the LCA study. However, as Fuller (1999, 72) pointed out, the inability to utilize LCA otherwise, may hint that the fundamentals of marketing have been misunderstood. As one can imagine, there would be many ways to do marketing badly. However, in this context, the first mistake would be to keep the company sectors separate (Grönroos 2015, 270). The full capacity of the LCA study can be achieved if the whole company is aiming at the same goal, and using the LCA together as a tool to achieve this. This mentioned goal is the image of an environmentally friendly product and company (See Figure 10). All the previously mentioned methods are aimed toward the same end; however, the methods being very superficial; LCA is essentially considered to back up the desired image and not actively be developing it. To gain the full benefit of the LCA, the company should

adopt a sustainable marketing approach as part of the company. That is, after all, the only way to achieve and live up to the reputation of an environmentally friendly product and company. Fuller describes sustainable marketing as an extension of traditional marketing management practise (Fuller 1999, 77). In order to create a competitive advantage, the environmental image of a company and a product should be complete.

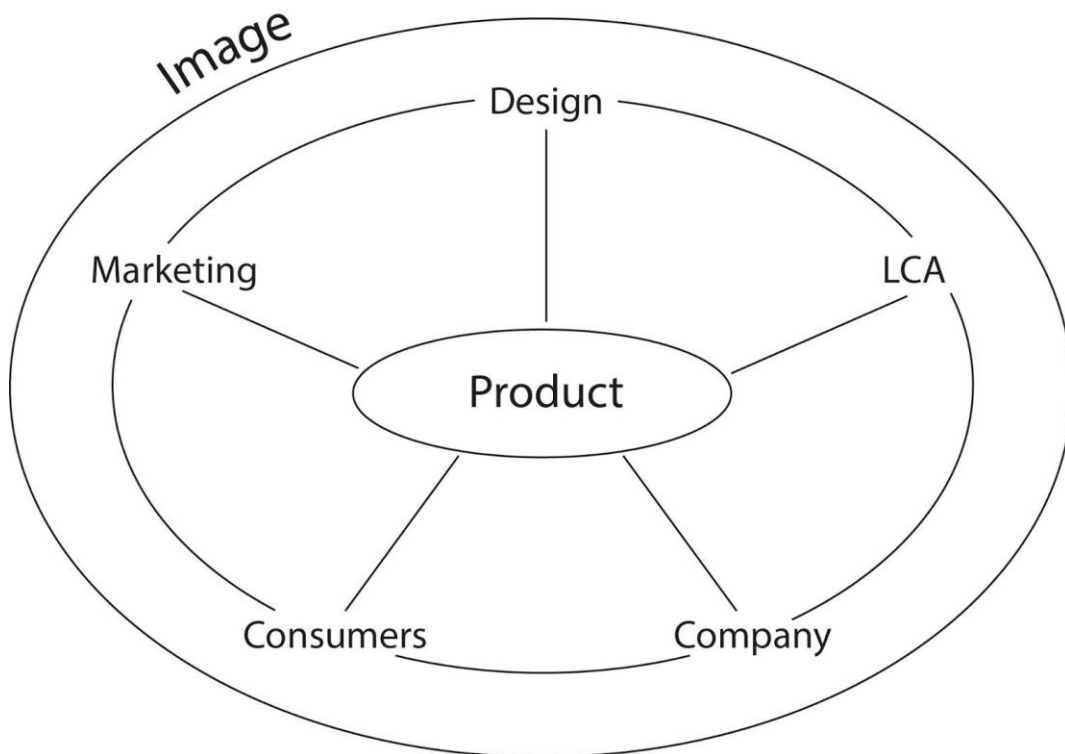


Figure 10. "The sustainable marketing wheel". Everything affects everything; LCA as a part of company activities.

The image of a company and its products are very important factors for competitiveness, and designing and implementing marketing is based on the desired company image. Either the company holds the environmental matters important or not; one cannot afford to neglect it now or in the future. Therefore, environmental knowledge has become one factor to achieve success for a business, and it should be a factor to be considered when planning marketing. As intriguing as it would be to claim a company's own products to be environmentally friendly, whether it is true or not, there are risks involved. Consumers have become wiser and are skeptical, and one should not try greenwashing. The image of an environmentally friendly company and its product is built by marketing communication; by providing watertight facts in a transparent and consistent manner over the entire product life cycle.

There is still the problem of credibility. One should ask if the environmental knowledge has been really adopted as a part of the marketing (and building image) or is it considered only as the compulsory evil that has to be mentioned in the marketing materials, which may easily turn into greenwashing, or perhaps something that has been performed at the very bare minimum. Therefore, in order to avoid greenwashing and take the full benefit of the environmental knowledge and LCA, one should integrate LCA in all company actions (see Figure 10). This means that LCA is not used only for a certain end result (ecolabel, EPD, EMS or product development) but is adopted in all sectors, in different ways and together. Only in that way can a company achieve a durable image of an environmentally better product and company. This kind of approach requires structured managing, reorganizing the company and cooperation between company sectors. Cooperation is the key for the success not only in creating successful marketing but in offering as well. In order to achieve this, a multidisciplinary attitude is required from the whole company. This would require educating the staff.

The product is the most essential competition tool in the marketing mix, because all the other solutions are built around the product. The product development should be based on the customer needs and wishes, and in this marketing has the vital role of researching what it is that consumers want, feedback on the product, etc. Marketing and design sectors should work together in order to be able to respond to the demand in the right way. So far this is basic marketing, but here comes the part where the multidisciplinary approach is required: environmental values as a part of a product, but also as a differentiating factor in the marketing. Technical-geeks, designers and marketers should be working together and still stay on the same page. By utilizing LCA, a company can:

- achieve cost savings in accelerating processes and in materials
- compare materials and impacts on environment, improving the product, removing harmful substances
- promote sustainable design by enabling innovations, providing more for less, improve reparability, reuse and recyclability, but also lengthen the product lifespan
- design for customers; natural, healthy, safe
- credibility; transparent and consistent marketing communication
- Influencing the markets, regulations and legislation by providing reliable research data, better methods and products.

When a company creates an environmentally better product, as mentioned before, the success depends on the marketing communication, either in the case of entering the markets or improving existing products. Marketing communication is needed for;

- educating consumers about the environmental matters in general
- providing truthful product information, including on environmental matters
- providing information on improvements and their effects
- informing about the benefits of the product; differentiating from the competitors.

As an example, a company improved a product so that during the manufacturing phase there were no environmentally harmful chemicals used, as in other similar products. However, if the customer does not know how these substances impact nature or the product performance, does the product improvement really give any extra value for the product? The importance of providing information should not be belittled, nor should the quality and source of information. Basically every argument has to have a reliable argumentation chain in the environmental communication. Environmental communication should be based on facts, which are preferably the result of a research or other information delivered by a third party.

Environmental knowledge becomes a competitive tool only when the marketing communication is transparent and continuous. By means of communication (educating, providing additional information, finding out customer needs) can a company secure itself an operational environment, where the company can develop innovations required by sustainable development; this means basically new or improved products that perform the same function as well or better than existing products with significantly less impact on the environment (Ottman 2011, 89, 108-109). The cooperation with interest groups can also be strengthened by the communication. All in all, sustainable development means communicational challenge for the businesses, but when harnessed, it would provide a competitive advantage if not today, then in the future.

As mentioned previously, a product should be built by cooperation, and this requires a multidisciplinary approach; this affects the formation of the product ensemble but also affects the overall customer experience and the product image. One should consider the product as a bundle of benefits instead of just a set of tangible features. A product is a layered ensemble, where the product itself creates the core (or core benefits) and

augmented products around the core. It is a mistake to think that the core product is so good that it will sell itself. Augmented products are what bring additional value and benefits to the customer, and one should understand that effective marketing must be customer based. (Kotler et al. 2008, 501-502.) Depending on the target group as well as customer needs and wishes, the environmental values or benefits might be either a part of the core product feature or as an augmented product. The target group defines how the environmental benefits are emphasized in the product marketing as well as in the company operations. The key factor for success, for starters, is to recognize and understand the environmental values in productization (Pallari 2004, 8). All in all, an LCA study should be considered as a possibility to enhance the company and the product image as an environmentally better option to differentiate from its competitors.

It seems that all of the purviews of LCA (Figure 6) can be utilized in the marketing; it is simply a question of marketing communications, and therefore company goals. In order to gain a competitive advantage by utilizing LCA, it requires not only a multidisciplinary approach, but forgetting completely the compartmentalizing of the LCA purviews. One should consider all actions made with LCA as marketing worthy information, whether it was positive or not. This kind of approach requires complete company reorientation; building a marketing strategy and a mix that defines and supports achieving the desired company and a product image but also redirects customer needs and wants (Sheth & Parvatiyar 1995, 8).

8.4 Product differentiation by the ecological aspects

The best chance to reduce environmental impacts of a product is in the design phase. Nevertheless, it may not be possible for all companies to create new products or solutions. Reasons might be, for example that the competence is not strong enough or there are not enough resources. In this case a company could aim to improve the existing product, or choose the strategy of highlighting. In highlighting an existing product is basically seen as a new product, and bringing out the existing qualities in a new light for example as a result of a research; the product itself could even stay the same (Harmaala & Jallinoja 2012, 119-120). In all methods, the LCA study is an excellent tool.

Differentiating a product with the ecological aspects from the competitors is done by reorienting marketing and marketing mix so, that it will respond to the target groups need and wishes or by redirecting them. The same rules apply as in marketing in general; planning and research are essential, as well as engaging the whole company to the cause. All in all, promotion is the key for differentiation. Successful marketing communication requires a systematic approach and it should be based on a marketing strategy. Environmental communication must be based on facts that are the result of a research, an environmental scheme or a result of an authority inspection, etc. Basically something that has a third party involved somehow or verifying the data. This could be considered more of a fact providing than advertising. One could conclude that the differentiation in environmental matters is done by managing the overall image of the company and the product, and not by one individual task.

So what to tell to the consumers then? It depends on a product, company goals and how the product and the company is positioned at that the moment (how “green or brown” are they). It should be remembered that the target groups influence as well: how important environmental values are held or what kind of information is needed. One could divide the company as following (see Figure 11);

- Pro-Eco: Environmental principles are the starting point for the company, and products have been designed for the environment or according to eco-design principles. The main concerns are to convince “regular” consumers of the product features and performance: ideology will not sell.
- Developed: A company that considers environmental features important, be it for the marketing purposes or product performance, and products are environmentally better or equal than a competitor’s, even though this may have not been the primary goal. Developed companies may have already well-structured management, gained concrete cost savings and credibility.
- Enlightened: A company could have invested in improving the environmental qualities of a product, aiming to gain a competitive advantage over the competitors. Inducements could be image-oriented and/or a product feature.
- Awakened: A product could be improved, and it has been recognized in the company that environmental matters should be considered more. Inducements could be complying regulations, business requirements (B-to-B), cost savings or image.

- **Obliged:** Because of the overall market atmosphere a company feels obliged to inform about the environmental performance of a product or how the company is taking environmental matters into account. However, the true interest to take environmental matters as a part of company actions is missing.

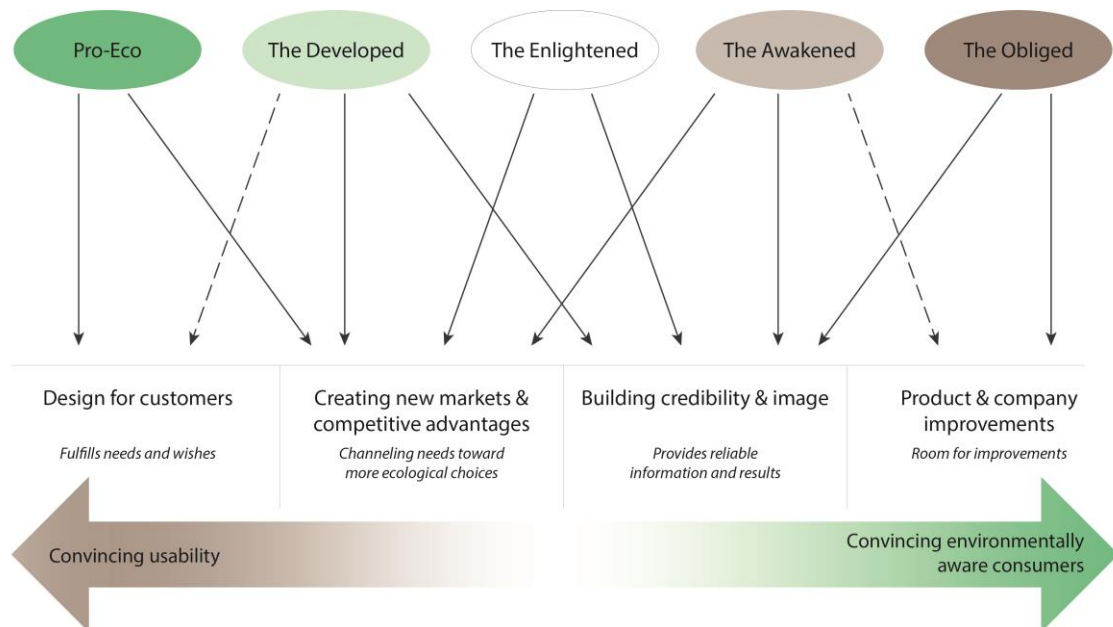


Figure 11. Company divisions and their place within environmental marketing.

As can be seen in Figure 11, not all methods are for all companies. It is not feasible nor practical. However, as is the case in conscious managing, companies usually realize the benefits little by little, implementing gradually more a structured approach and effort. For business people it would be difficult to justify expenses in product development to “greener” or marketing reorientation, if at that moment there are no benefits to be seen, or demand for the change at the markets (Ottman 2011, 16). However, the goals and results become measurable when the approach becomes genuinely strategic.

One should ask also, that whom are you trying to appeal to? Seen in the figure 11, is shown that extremities are trying to convince consumers differently. A truly green company would try to convince a regular consumer of the overall superiority of the product, for example that the product is not only based on ideologies but in fact competes with the “brown counterpart” in performance. A brown company on the other hand tries to convince those who are more aware of the environmental matters. A company is in a good place if a product fulfills not just customer needs and wishes in performance, but also manages to bring extra value and credibly.

8.5 Choosing environmental arguments based on LCA

As mentioned previously, not all companies are ready, nor would it be according to their goals to start educating people about environmental issues so that they could provide more specific product information about their new, environmentally better products. These companies could be described as ambitious companies to say the least. Those companies that are left could either concentrate on providing the bare minimum to keep up their image, or try the transparent “we’re learning and doing” attitude.

Those companies that prefer keeping up with the expectations (customers, including B-to-B), taking care of the company image might be more important than becoming a pioneer. These companies are basically somewhat conscious about the environmental matters, but which are not considered the primary goal for business. In this case for example, environmental management schemes could produce cost savings while bringing environmental value, but at the same time gives an impression of quality and well-structured management. Their products per se may not be environmentally the best option, but not the worst either. EPDs would serve well in B-to-B business. Ecolabel schemes would benefit in the product marketing, if a product is somewhat better than the competitors.

Then there are those companies that consider environmentally better products as an opportunity, and environmental communications as a way to differentiate from the competitors. When choosing environmental arguments, obviously one has to know all the benefits that are included with the product. However, one should be aware of competitors’ offerings and arguments as well. There is no point in advertising that a product does not include a certain harmful substance, when in reality no one else's product include such a substance either. One should remember that all kinds of vague, misleading claims are causing a risk of greenwashing, and a loss of credibility. All presented benefits must be supported by a solid argument chain.

How can LCA studies be utilized in marketing arguments then? Instead of producing an environmental claim per se, one could tell how a product came to be, what influenced the choices, how it has been developed, what are the goals and so forth. It is essential to know the customer purchasing criteria as well as to know what influences the purchasing

decision. When environmental matters are sought to be utilized in creating a competitive edge, one should be aware of the environmental values and indicators that customers look into when choosing a product. This is what rules what kind of information is used in marketing argumentation, or one could say how ready the markets are for environmental additions. Basically, an environmental marketing argumentation could be transparent communication about the path toward a better product and a company (Ottman 2011, 138-139).

In this “learning and doing” approach one could concentrate for instance on a certain life cycle phase (but not neglecting other phases), or review the product in a light of its entire life cycle. As it has been brought up, comparison to competitors’ products is not recommendable. However, nothing prevents from utilizing products as a point of reference when improving products environmentally better. One example is to compare environmental product profiles (see Figure 12). To be able to create a reliable environmental profile, one has to conduct a comprehensive life cycle assessment.

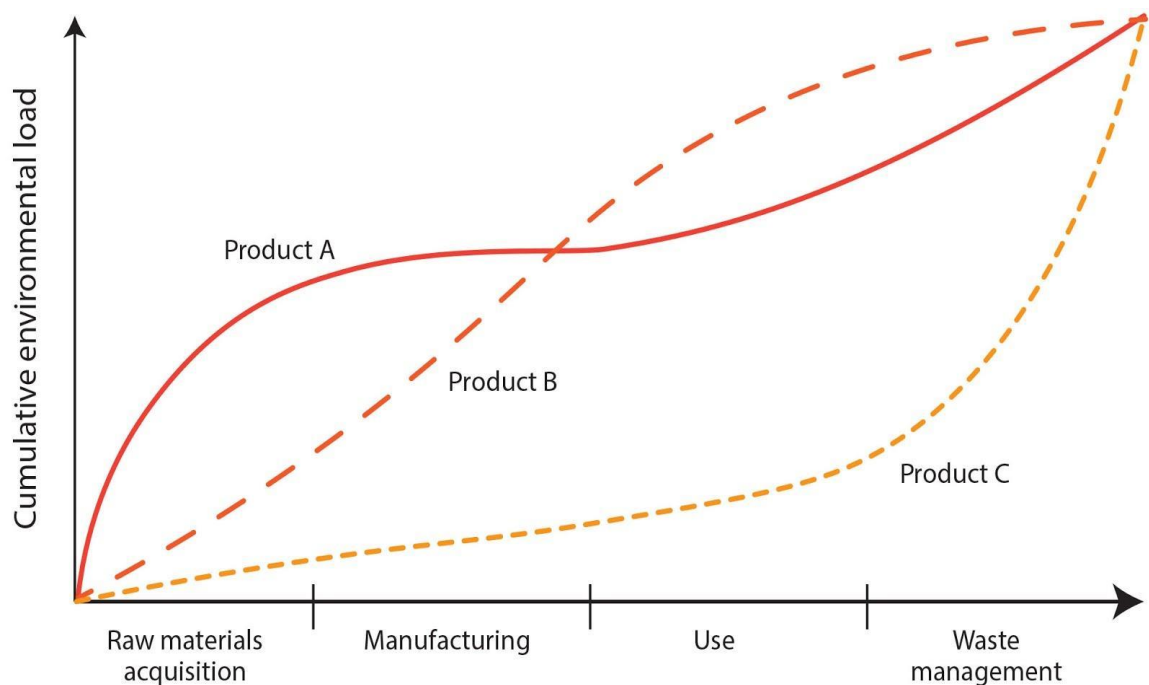


Figure 12. Products’ environmental profiles compared. Environmental profile is a base for differentiation. Adapted from Linnanen et al. 1997, 88.

As seen in Figure 12, differentiation is based on different phases of a product life cycle. Most of the environmental impacts of product A are born during the raw materials acquisitions, with product B during the manufacturing and use, and product C after the

use. An environmental profile is basically an effect score, given for one or more impact categories, for example resource depletion, global warming, acidification, toxicity, etc. Different substances from the inventory analysis contribute differently to each impact category, and each substance is evaluated and quantified to find out the contribution to the unwanted impact, essentially calculating a common unit.

One can also inform about the environmental impacts without a comparison (see Figure 13, for example). In the left side graph, four different impacts from the entire life cycle of a product are presented. On the right side graph there are four different impacts divided in different life cycle phases.

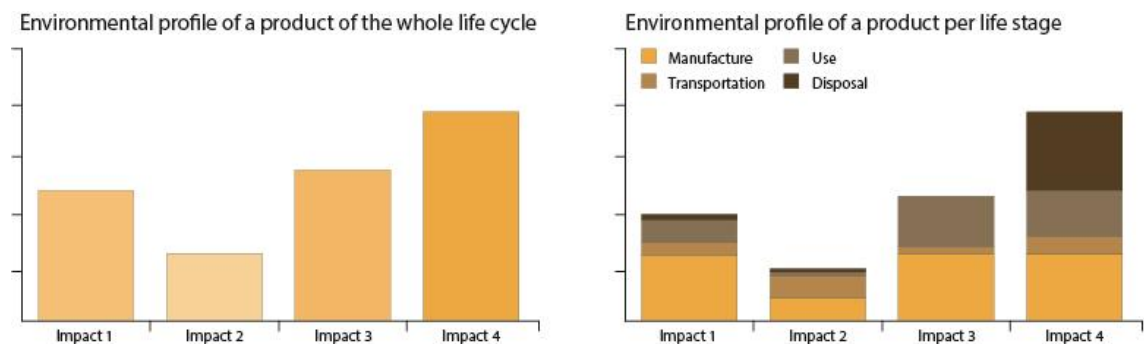


Figure 13. A product's environmental profiles. (Adapted from Zbicinski et al. 2006, 99).

As one can imagine, the above graphs may not work in all marketing situations, if any, and one should consider personalizing by choosing what kind of approach their company wants to take. In some cases, it would work best to talk about the impacts on a broader scale, however, in that case it is assumed that the target group understands a little about general impacts the product may have on the environment. It would be nice to educate people about the impacts; however, it would not work in all cases. It might be, that a company itself is not ready, nor the markets. It is important that a company has a learning attitude in order to succeed instead of rushing into things.

9 CASE STUDY CONCLUSIONS

As it has become clear, LCA as a tool can be utilized in various ways, and the only limiting factor is the level of company ambition. The research was addressed with the case study method, focusing on the product marketing in Kero hirsirakennus Oy. The goal was to answer why it would be beneficial for Kero hirsirakennus Oy to conduct the LCA and how the results could be utilized in the product marketing.

Kero hirsirakennus Oy is not an exception; LCA can be utilized in various ways. Due to the change of the study emphasis, learning became the necessity and enabled to avoid the typical pitfalls of LCA utilization in marketing. Marketing basics had to be included, since they create the basis for the versatile LCA utilization but also helps form the overall picture of the phenomenon. As one can expect in a case study, there are unique circumstances to be considered. In this case the most significant result is that the LCA can be utilized in developing product marketing, and not only use it for product marketing.

9.1 Starting point for the product marketing

First of all, before answering to the research questions why and how Kero hirsirakennus Oy should utilize LCA in the product marketing, one must understand that the utilization is not a black and white, straightforward approach. It is important to understand the starting point, such as seen in Figure 11, so that the methods would support the overall company goals.

Kero hirsirakennus Oy is a family business, and most of the business operations are run by the family members. Also marketing is run by family members, and even though in some areas the marketing is active, the overall marketing strategy and plans are missing. As was explained in the product marketing chapter, the product marketing should be understood as a layered ensemble (Figure 3). However, when comparing Kero thermal log marketing to Figure 3, one can conclude that there are not many layers at the moment. The company concentrates on the technical aspects compared to the lamella log houses,

customization as well as installation option for customers. All in all, the product marketing is leaning, perhaps too much, on the technical aspects of the product, and in other words, the full potential of the product marketing is yet to be reached.

The product development was value based, respecting the old log house building traditions while improving the heat insulation significantly. Among insulating qualities, ensuring the indoor air quality was the requirement for the design; choosing natural materials, plastic free structures and reducing the amount of used chemicals in the structure was the primary aim for the design. These factors are the main product features and selling arguments.

The claim of ecological and healthy structure is based on the material choices, and how the insulation is sealed in each log with the wood fiber strand. There is no vertical glue “films” or plastic vapor barriers, just like houses used to be; simple but healthy structure. The structure is breathing naturally, which ensures the good indoor air quality. So far the claim is based on house owners’ feedback and the material choices. However, as in general, claims need data to be backed up. Negotiations with the Organisation for Respiratory Health in Finland about testing the air quality in Kero thermal log house are on-going. Although applying the certificate and having the right to use it in the marketing would cost a significant amount of money, it would support the main selling argument of the thermal log. In the selling situation probably all house companies claim exactly the same, but not many, if any, have proof or an opportunity to utilize the label in the product marketing.

In use, Kero thermal log is an undeniably more ecological choice compared to lamella log, and equal for some regular house structures. During the use, the environmental impacts are due to the energy consumption. There is no question of the insulating features of Kero thermal log. However, when claiming a product environmentally friendly, one should be specific what is it meant by it and how it is proved.

All given ecological marketing claims of are about the product; natural material choices and the benefits during the use. However, the overall company and product image is still missing and forming, as one can imagine from the lack of marketing strategy and plan. Branding is desperately needed; other thermal log manufacturers are impacting

considerably the first impression of their products, and additional reassuring is needed. The situation is even more challenging for Kero hirsirakennus Oy as well as other thermal log manufacturers, because thermal logs break rules of what are considered as “traditional log buildings”. As it was told, log building has a long history in Finland. The image of the traditional log building is so strong, that energy efficiency has been completely overlooked. Offering a product that not only carries unique features but also differs from competitors’ offers is a huge challenge for a marketer. Basically the marketer has to be able to convince consumers of the product benefits. Convincing is done by providing proofs. There are undeniable proofs of energy efficiency, but the lack of brand, image and marketing strategy in general is an obstacle.

Most often the biggest problem for SMEs is marketing communication; the company does not have skills or resources to advertise, and there is not courage to bring forth one’s own know-how. For small companies it is especially difficult to compete with pricing and cost-effectiveness, and therefore products and services should be better than those of competitors or otherwise more attractive. (Bergström & Leppänen 2011, 22.) The situation is that Kero hirsirakennus Oy has a good product, but one should not cut corners in marketing. The goals of the external communication are defined in the company’s environmental goals as well as in marketing. The core product is not enough to differentiate from the competitors, as the core product is not the only value factor. Product is an ensemble, and there are other value enhancing factors to be utilized. One should also treat the non-billable services as product value enhancing activities.

Since no marketing research has been made, one can only estimate what factors influence the purchasing decision. Buying a custom made house or cottage is a great investment (capital merchandise), and a decision to buy one is considered. The decision making may take years because it is a long term investment. In the worst scenario a consumer may end up losing money if the resale value is not comparable with the investment, or other sacrifices that has occurred during the planning, purchasing, building and use. For the company this would mean a bad reputation, if the product does not fulfill the given promises or mistakes are made on the service side. Therefore, it is crucial, that the marketing is structured, customer-centered and utilizes consumer feedback, in product development as well as in the product marketing. Therefore, considering all the

previously mentioned points, it is highly recommended, that Kero hirsirakennus Oy would hire a marketer to build and manage the marketing operations in the company.

9.2 Recognition of the benefits

There are many reasons why Kero hirsirakennus Oy should utilize an LCA study in Kero thermal log marketing. First of all, Kero hirsirakennus Oy has a good product which could be called an ecological option even without an LCA study. However, since the product deviates from the other traditional log buildings, one should provide reliable proof on the matter, and not only about the insulating qualities. When producing and marketing an ecological product, one should provide proof. By proof, one is able to build credibility and an image of an ecological company and a product. And by providing additional information and educating consumers one is able to create demand. For this purpose, the LCA study is an excellent tool.

Nevertheless, without a structured marketing plan to utilize the LCA, the methods would remain superficial and results would not be very long-lasting. Therefore, in this case, LCA can be utilized also in developing the product marketing. Even though values guided the development of the Kero thermal log, it is still a little bit unclear if Kero thermal log is desired to be profiled as an eco product that is healthy and safe, or if ecological features are to be considered as value enhancing benefits. This is important to decide when building product marketing or in productization. At the moment marketing communication is undeveloped on the environmental matters.

When productizing, it is important that a company has concretized the values that company want to represent. An LCA study can be utilized in enhancing these values, or used as part of the core product development. It is important to understand that a customer should feel like receiving extra value when purchasing a product, compared to the competing option. Adding “eco-value” to the product, or as a part of the product and company image would indeed be considered value enhancing activity. Therefore, it would be important to consider environmental matters as a positive possibility when planning the marketing. All in all, an LCA study would help in confirming “eco-values” and

branding Kero thermal log as environmentally better option to build a house, and this way differentiate from the competitors.

Kero hirsirakennus Oy should embrace “a product as service” thinking as soon as possible, because the core product marketing will not be enough. What this basically means is that Kero hirsirakennus Oy would not be selling a building product or a house per se, but in fact benefits that Kero thermal log offers. This is why proofs and credibility are needed. At the moment Kero hirsirakennus Oy is selling houses that does not carry plastic in the structure, therefore enabling natural wall structure “breathing”. However, if Kero thermal log is granted with the label of the Organisation for Respiratory Health in Finland, Kero hirsirakennus Oy would be able to sell houses with good indoor air and perhaps better living conditions.

The same applies when one takes environmental benefits as a selling argument. One must prove that Kero thermal log is genuinely an ecological house option; after this Kero hirsirakennus Oy can sell houses that does not only respect the old log building traditions, but which are environmentally better than regular or lamella log houses. However, when claiming to be ecologically better, one should remember to be specific about the claims. This may include the issue if the benefits are during use, or if the overall environmental performance is better. All in all, recognizing all the benefits that a product carries, is a basis for a successful productization and creating an offering. Kero hirsirakennus Oy has a lot of unused potential in what an LCA study could be useful.

Nevertheless, environmental knowledge becomes a competitive advantage only when all company actions are joint (see Figure 10). This approach requires learning and gradual implementing, and would take time; neither this nor traditional marketing is something that is done once and then forgotten. Marketing as well as environmental knowledge in general should be considered essential parts of the company, and not as separate sections. As a conclusion, before utilizing LCA in anything, Kero hirsirakennus Oy must decide on its goals and marketing strategy, find out all the benefits that Kero thermal log offers and what values are desired to highlight in the marketing.

9.3 Suggestions for the utilization of an LCA study in the product marketing

As has become clear, in order to utilize an LCA study in product marketing, the marketing should be planned and executed properly regardless of how the LCA study is to be utilized. When marketing is well founded, the risks of miscommunicating and greenwashing would decrease. However, if looked at where Kero hirsirakennus Oy is right now and compared to Figure 11, one can conclude that even though Kero thermal log is a good product, Pro-Eco even, the company itself is not ready to be Pro-Eco but more of Awakened instead. The main reason for this is that marketing-wise the company has not solved the puzzle yet, and would not be ready to start educating consumers about the ecological benefits of the product nor it is ready to worry about developing the design of Kero thermal log. The base line is that Kero hirsirakennus should concentrate on building credibility and the image of the product and the company first.

Log buildings are considered to be ecological; made of natural and long lasting materials, even though it is not the most ecological during the use. Kero thermal log is up against old traditions and an image of the most ecological building material, but also trying to separate from the “bad eggs in the basket”. Also, the overall impression of the Finnish building industry is that the markets are not entirely ready for the truly ecological options. These points highlight not only the need for a structured marketing approach, but perhaps reconsidering the company goals. Instead of considering lamella log house manufacturers as the biggest competition, Kero hirsirakennus Oy should concentrate on becoming the leading thermal log manufacturer, and building the image of “the only real thermal log” manufacturer. For this purpose, the LCA study would be an invaluable tool to create a reliable and strong product image. Also, one should consider if Finland should be the target market, since Swedish markets seems to be more ready.

In June 2016 Kero hirsirakennus Oy made a five-year contract with the Swedish mining corporation LKAB, manufacturing approximately 40 houses per year in Northern Sweden. Over 70 house manufacturers all over the world took part in the tender, of which 18 were from Finland. According to Mr. Mursu, ecological aspects were one of the most important factors of why Kero hirsirakennus Oy won the deal. Inspired by this, Mr. Mursu felt that an LCA study should be conducted in the future. (Mursu 2016.) In an interview with Suomen Yrittäjät (2016), Mr. Mursu relayed, that Kero thermal log demand for

exports has increased, and the company has hired more employees to carry out the increased demand. At the moment, 80-90% of the production is exported. (Suomen Yrittäjät 2016.)

Based on the previously mentioned factors in this chapter, it is recommendable that Kero hirsirakennus Oy would utilize an LCA study in Kero thermal log marketing. The first step would be to produce an EPD that is verified; this would build credibility in especially B-to-B business, and towards the company's currently most important customers. This would be considered as value enhancing factor of the product's environmental benefits but also as "a non-billable service". A lot is at stake: by pulling through successfully the trade in North Sweden would create more business.

Nevertheless, it is obvious that in the long run EPD will not be enough and development is necessary. So far manufacturing Kero thermal logs has been carried out by the family members. The manufacturing process is relatively simple and easy to manage, including the byproducts and wastes. Kero thermal logs are basically made by hand, and the quality of individual logs is ensured. In this scale environmental management would have been a bit of a waste of time and resources. However, even in those cases, when developed environmental management is not required. The company has to build an environmental reputation for the authorities and sponsors, and in some cases for the cooperating partners.

Now the production volume increased significantly, and one should reconsider adopting some sort of management system, which does not necessarily have to be verified. The main reason for adopting a management system would be risk and reputation management. By planning and implementing a management system, one could ensure that the product quality would not get weaker and there would not be problems that would impact the environmental image. With the current volume of production, there are more energy and material flows to be considered than ever before. An LCA study would be beneficial for inspecting the flows, and possibly make the processes more efficient and create cost savings. Especially the number of byproducts has increased, and one should consider that usable materials could be still utilized in the future, and not become waste because of the sheer volume. Adopting some sort of management system would also build the reliability of the company, and therefore impact positively on the company but also on Kero thermal log's image.

As previously mentioned, the Nordic Ecolabel can be applied for a building, but not for a building product per se. Therefore, the Swan logo requirements include also quality management in the construction process. This could be a very good chance to differentiate from the rest of the house companies in the building industry, but also a great opportunity to develop as a company. The previously mentioned contract with the Swedish LKAB, is basically about relocating two cities, Kiruna and Gällivare, out of the way of mines. During this five-year contract, Kero hirsirakennus Oy would build about 200 houses into these relocated cities. Considering the number of built houses, and the possible extension to the contract, it would give quite of an impression if all of them were ecolabelled with the Swan logo! This kind of ecolabelling would reach a completely new level in the product marketing and in building the company and the product image, compared to the typical usage of an ecolabel.

Applying for the Nordic Ecolabel for the buildings would be “a soft landing” to a structured environmental management, and would help Kero hirsitalo Oy to develop and learn to gradually become a more environmentally aware company. At this point some guidelines for the company operations and a third party as a verifier would be beneficial. This would create also a good stepping board to develop as a market leader and a pioneer; eventually becoming truly Pro-Eco and channeling consumer needs toward ecologically better choices. Also, one should not belittle the importance of self-confidence, which would grow while learning, and utilizing the environmental knowledge in the future. Over time Kero hirsitalo Oy could provide more specific EPDs and information for the consumers. Perhaps in the future environmental indicators for the building industry would have developed so much so, that information is presented for consumers in a scale (similar to E-luku) or in carbon footprints. For this reason, it would be beneficial for Kero hirsitalo Oy to be prepared, and perhaps even influence and further this change by the means of environmental marketing.

Even if the Nordic Ecolabel scheme would not be utilized, one should consider marketing the whole building with a turnkey principle. This would utilize the current energy efficiency regulations and scale; this way Kero hirsirakennus Oy would enable house comparison reliably in the marketing.

9.4 Development should be continuous

Health qualities and ecological features and values seem entwined at Kero hirsirakennus Oy. Claims of a healthy product are partially based on the amount of used chemicals, compared to lamella log, focusing on the glues and gluing lines. However, so far it has been only a public debate if lamella log gluing impacts indoor air quality or not. An LCA cannot be used to determine a product's effect on human health and therefore cannot be used as a marketing claim. However, LCA could be utilized in a product development by comparing and choosing environmentally better options (indirect impacts on human health) and influence on the choice and the amount of a glue. Kero hirsirakennus Oy could even cooperate and consult with the Organisation for Respiratory Health in Finland about the product development and LCA research. Perhaps the utilization of LCA could even improve the chances of receiving the label of the Organisation for Respiratory Health in Finland. This would serve not only in product marketing, but also in building the company image of a responsible company.

It would be beneficial to include the life cycle thinking not only in product marketing, but in the product development as well. Utilizing LCA in the product development would ensure that the harmful substances are replaced, the best available materials are used, and possibly qualify the amount of material that is used and gives the overall picture of how environmentally friendly building material is in question and how it would be improved. Improvements should also be considered in the other phases of the life cycle; in building and waste management.

One could also consider adopting the sustainable design, basically eco-design methods as a part of a product development. In addition to the life cycle thinking and reducing material and energy use, one should consider design as a value enhancing tool as well. By design, one could prolong the lifespan of a product, improve reparability and reuse. These factors would most certainly influence the house buyer's purchase decision, if the implementation and communication are successful.

LCA studies should be utilized together with the technical requirements to develop the Kero thermal log technically even better. However, this requires including also marketing in the equation. When developing a product, one must consider the consumer needs and

wishes and other received information as well, and therefore marketing research is crucial for the process. Markets are changing, regulations are tightened and also competitors are developing. Therefore, it will not be enough to produce one good product and invest in marketing communication. The product development should be continuous. Providing data to back up the product development should be utilized in the marketing. This means that the company should work as a whole toward the common goal and adopt the learning and communicating attitude.

By the time this thesis was at finishing lines, Kero hirsirakennus Oy had removed the thermal log option with recycled paper insulation from the company offering. The reason was that there was no demand for the recycled paper option. As Mr. Mursu commented in the interview (2015), the looks of recycled paper insulation was perceived less appealing than wood fibre, as the insulating capability is weaker. Now that the recycled paper option is unavailable, that leaves only one product with different widths in the company offering. Kero hirsirakennus Oy should reconsider leaving out the recycled paper insulation option from the company offering, until there are data to support the decision. LCA could be utilized in finding out if recycled paper insulation is an environmentally better option when the entire life cycle is considered. If the recycled paper is an environmentally better option, Kero hirsirakennus Oy could have two products in its offering; Kero thermal log with recycled paper could be branded as an eco product and marketing would be targeted to those whose purchasing decision is based on environmental matters.

9.5 Closing statement

All in all, an LCA is a tool for planning and developing products in a better manner for the environment. Either the reason for product development is complying with the future regulations, or because of changing consumer demands, LCA offers a quantitative approach to support design. However, one should not belittle the possibilities of utilizing an LCA study also in product marketing. By conducting an LCA study one can enhance product values, produce data to backup claims on benefits and concretize product marketing. Utilizing life cycle analysis is not restricted to the internal use, but can be utilized also in external marketing communication. Granted, efficient external use

requires more from the company, but it is nothing more than optimizing company actions as efficiently as possible.

The challenge in utilizing LCA in product marketing is that conducting an LCA and utilizing LCA results are two completely different things: it requires not only a multidisciplinary approach and knowledge, but also a well-founded marketing strategy. A learning attitude is the most important factor for success, followed by transparency.

The maturity of the markets defines how strongly environmental knowledge influences the purchasing decisions. It is worth noting that the current attitudes, even though they do not influence purchasing behaviors today, may affect conclusively on tomorrow's markets.

10 REFERENCES

- Bergström, S. & Leppänen, A. 2011. Yrityksen asiakasmarkkinointi. Helsinki: Edita.
D3 Suomen rakentamismääräyskokoelma. 2011. Rakennusten energiatehokkuus.
Määräykset ja ohjeet 2012. Ympäristöministeriö.
www.finlex.fi/data/normit/37188-D3-2012_Suomi.pdf. 31.8.2015
- Edilex. 2016. Rakentamismääräykset. <https://www.edilex.fi/rakentamismaaraykset>
16.6.2016
- European Commission. 2016. Eco-Management and Audit Scheme. Key benefits.
http://ec.europa.eu/environment/emas/emas_for_you/premium_benefits_through_emas/key_benefits_en.htm. 18.6.2016
- European Commission. 2016. 2020 climate and energy package. European Commission.
http://ec.europa.eu/clima/policies/strategies/2020/index_en.htm. 31.8.2015
- European Environment Agency. 1997. Environmental Issues Series, no.6. Life cycle assessment. A guide to approaches, experiences and information sources.
www.eea.europa.eu/publications/GH-07-97-595-EN-C/Issue-report-No-6.pdf 5.8.2016
- EU-ympäristömerkki. 2016. EU-ympäristömerkki. <http://eu-ymparistomerkki.fi/eu-ymparistomerkki/> 27.7.2016.
- Fuller, D.A. 1999. Sustainable marketing, managerial-ecological issues. California: SAGE Publications.
- Graedel, T.E. & Allenby, B.R. 2010. Industrial Ecology and Sustainable Engineering. New Jersey: Prentice Hall.
- Green Building Council Finland. 2016. <http://figbc.fi/gbc-finland/> 3.8.2016
- Grönroos, C. 2015. Service management and marketing. Managing the service Profit logic. Chichester: John Wiley & Sons Ltd.
- Harmaala, M-M. & Jallinoja, N. 2012. Yritysvastuu ja menestyvä liiketoiminta. Helsinki: Sanoma Pro.
- Hirsitaloteollisuus ry. 2012. Tietopaketti hirsitaloja koskevista vuoden 2012 energiatehokkuusmääräyksistä.
http://www.hirsikoti.fi/assets/images/HTT_standardit/Energiatehokkuusmaaraykset/Energiatehokkuusmaaraykset_2012.pdf 16.6.2016
- ISO 14021:2016. Environmental labels and declarations - Self-declared environmental claims (Type II environmental labelling).
<https://www.iso.org/obp/ui/#iso:std:iso:14021:ed-2:v1:en> 5.8.2016
- ISO 14025:2006. 2015. Environmental labels and declarations. Type III environmental declarations. Principles and procedures. International Organization for Standardization. <https://www.iso.org/obp/ui/#iso:std:iso:14025:ed-1:v1:en>
28.7.2016
- ISO 14040:2006. Ympäristöasioiden hallinta. Elinkaariarviointi. Periaatteet ja pääpiirteet. International Organization for Standardization. 2006. Helsinki: Suomen Standardisoimisliitto.
- Joutsenmerkki. 2016. Kriteerit. Motiva Services Oy. <http://joutsenmerkki.fi/tuotteet-palvelut/kriteerit-sivu/> 27.7.2016
- Joutsenmerkki. 2015. Tutkittua tietoa Joutsenmerkistä. <http://joutsenmerkki.fi/wp-content/uploads/ladattavat-materiaalit/Tutkittua-tietoa-Joutsenmerkista.pdf>
27.7.2016
- Kalliomäki, P. 2011. Muistio ympäristöministeriön asetus rakennusten energiatehokkuudesta. Ympäristöministeriö.

- http://www.motiva.fi/files/4147/Muistio_rakentamismaaraysten_osasta_D3.pdf. 31.8.2015
- Kotler, P., Armstrong, G., Wong, V. & Saunders, J. 2008. Principles of marketing. Harlow: Pearson Education.
- Laki rakennusten energiatodistuksesta 50/2013.
- Lauharo, K. 2002. Hirsi rakennusaineena ja teollinen hirsitalo. Kuopio: Oy UNIpressAb
- Linnanen, L., Markkanen, E. & Ilmola, L. 1997. Ympäristöosaaminen, kestävän kehityksen haaste johdolle. Helsinki: Otaniemi Consulting Group.
- Marttinen, T. 2016. Kelon energiamääräykset. Huliswood Oy.
<http://www.huliswood.fi/fi/kelo/kelon-energiamaar%C3%A4%C3%A4r%C3%A4ykset> 16.6.2016
- Mursu, J. 2015. CEO of Kero hirsirakennus Oy. Interview 3.3.2015.
- Mursu, J. 2016. CEO of Kero hirsirakennus Oy. Phone conversation 22.6.2016.
- Nygren, J. & Antikainen, R. 2010. Use of life cycle assessment (LCA) in global companies. Reports of the Finnish Environment Institute 16 | 2010. SYKE.
https://helda.helsinki.fi/bitstream/handle/10138/39723/SYKEre_16_2010.pdf?sequence=1 29.7.2016
- OECD. 2011. Environmental Claims. Findings and Conclusions of the OECD Committee on Consumer Policy.
<https://www.oecd.org/sti/consumer/48127506.pdf> 5.8.2016
- Pallari, M. 2004. Ekotuotteistamisen vihreä markkinointimalli - pienyritysten mahdollisuudet ja keinot. MTT:n selvityksiä 76. MTT.
- PRé Consultants: De Roest, D., De Schryver, A., Durksz, S., Goedkoop, M. & Oele, M. 2010.
- Introduction to LCA with SimaPro 7. California, USA: PRé Consultants.
- Rakennusteollisuus RT ry. 2005. Rakennus- ja kiinteistöalan ympäristö- ja elinkaarimittarit. Helsinki: Rakennusteollisuuden Kustannus Oy.
- Rakennusteollisuus RT. 2016. Ympäristö ja energia. Rakennusteollisuus RT.
<https://www.rakennusteollisuus.fi/Tietoa-alasta/Ilmasto-ymparisto-ja-energia/> 28.7.2016
- Rakennustieto Oy. 2016. Rakennusten ympäristöluokitus promise.
<https://www.rakennustieto.fi/Downloads/RK/RK080301.pdf> 29.7.2016
- Rakennustietosäätiö RTS. 2016. Rakennustuotteiden ja -tarvikkeiden ympäristöselosteet.
<https://www.rakennustieto.fi/Downloads/RK/RK010401.pdf> 6.8.2016
- Sheth, J.N. & Parvatiyar, A. 1995. Ecological imperatives and the role of marketing. Environmental marketing, strategies, practise, theory and research. Polonsky, M.J. & Mintu-Wimsatt, A.T. (editors). New York: The Haworth Press, 3-20.
- Suomen Yrittäjät. 16.8.2016. Rakentamisaamiselle vientikysyntää – ”Ekologisuus ja hengittävyys ovat Ruotsissa kovassa huudossa”. Uutiset.
<https://www.yrittajat.fi/yrittajat/a/uutiset/539610-rakentamisaamiselle-vientikysyntaa-ekologisuus-ja-hengittavyys-ovat-ruotsissa> 18.8.2016
- Sveriges byggindustrier. 2016. Byggmateriel och avfall. Sveriges byggindustrier.
https://www.sverigesbyggindustrier.se/energi--miljo/byggmateriel-och-avfall_2033 27.7.2016
- The International EPD. 2016. What are PCRs? EPD International AB.
<http://environdec.com/en/PCR/What-are-product-category-rules/> 28.7.2016
- Tonteri, H. 1998. Metallituotteiden elinkaariarviointi. Tekninen tiedotus, MET-julkaisuja nro 7/98. Helsinki: Metalliteollisuuden Kustannus Oy.

- Työ- ja elinkeinoministeriö. 2008. Tiedotearkisto 300/2008. Työ- ja elinkeinoministeriö. http://www.tem.fi/ajankohtaista/tiedotteet/tiedotearkisto/vuosi_2008?96107_m=93162 31.8.2015
- UNECE. 2005. Sustainable development -concept and action. UNECE. http://www.unece.org/oes/nutshell/2004-2005/focus_sustainable_development.html 10.9.2015
- Vigon, B.W., Tolle, D.A., Cornaby, B.W., Latham, H.C., Harrison, C.L., Bokuski, T.L., Hunt, R.G. & Sellers, J.D. 1993. Life cycle assessment: Inventory guidelines and principles. By Battelle Memorial In & Curran, M.A. (authors). Ohio: U.S. Environmental Protection Agency.
- Vuolle-Apiala, R. 2012. Hirsitalo ennen ja nyt. Porvoo: Kustannusosakeyhtiö Moreeni.
- Weiß, P. & Bentlage, J. 2006. Environmental management systems and certification. Book 4 in a series on environmental management. Uppsala: The Baltic University Press.
- Yin, R. K. 2012. Applications of case study research. California: SAGE Publications.
- Yin, R. K. 2009. Case study research. Design and methods. Applied social research methods series, volume 5. California: SAGE Publications.
- Zbicinski, I., Stavenuiter, J., Kozłowska, B. & van de Coevering, H.P.M. 2006. Product design and life cycle assessment. Book 3 in a series on environmental management. Uppsala: The Baltic University Press.