Tampere University of Applied Sciences

Cost Leadership or Differentiation: Strategies for a Finnish Lighting Small Enterprise

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ABSTRACT

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Cost Leadership or Differentiation: Strategies for a Finnish Small Lighting Enterprise

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Business strategy is important to the success of any firm. The strategic management process aims to help firms identify what resources and capabilities they can focus on to create competitive advantages in future decision-making based on their current business environment. It provides the tools, for example, if a firm decides whether they want to differentiate or become cost-leaders in a particular industry. The key to formulating a good business strategy is understanding the external business environment and a firm's internal resources and capabilities. This will help decide if a business should focus on business level strategies like cost leadership or differentiation.

This thesis is commissioned by Cerbelux Oy, a small lighting enterprise in Hämeenlinna, Finland. They sell lighting components, luminaires, and lighting designs. The aim is to give guidance to Cerbelux Oy in future strategic decision making as the firm transitions from outdated component sales to modern LEDs, luminaires, and lighting design sales.

The research was based on interviews with employees at Cerbelux Oy. The initial interview was to find information for further research on the company's external opportunities and threats, incorporating the information from interviews in the PESTEL analysis to understand the external factors that are affecting the firm. The second interview was based on Porter's value chain analysis to build an understanding of the resources and capabilities of the firm as this is the basis for the internal analysis. The thesis uses a value chain analysis as the internal analysis. It looks at the primary and support activities involved in the firm when sell lighting designs and components. Both analyses were then used to find Cerbelux Oy's strengths, weaknesses, opportunities, and threats, forming a SWOT matrix.

Finally, based on the SWOT matrix the thesis determines what business level strategies to recommend, such as cost leadership or differentiation. The thesis recommends the company differentiate their offering via utilization of new technology in their lighting business because it best matches their strength as an agile company and meets a clear technological opportunity in the business environment. However, the thesis provides focused cost leadership as an alternative business level strategy if the company finds differentiation to be too costly.

Key words: strategic management, PESTEL, value chain, lighting industry, cost leadership, differentiation

CONTENTS

1 Introduction

The goal of this thesis is to provide Cerbelux Oy recommendations on strategic decision-making, particularly business level strategic decision making. The thesis is especially focused on recommending business level strategies to Cerbelux Oy in navigating their transition away from selling older lighting components and assisting the company in their shift to modern sustainable LED luminaires and components sales.

The strategic management process consists of a set of analyses that are used to guide a firm in making the right strategic choices to generate competitive advantages. It uses external analyses to identify critical opportunities and threats to the firm in the competitive environment and provides firms with strategic choices in how to gain a competitive advantage in that environment (Barney & Hesterly 2019, 5-7). The efficacy of those strategic choices is determined by the internal resources and capabilities of the firm, and how the firm can leverage those internal strengths and weaknesses to match the external opportunities and threats presented to them (Hitt, Ireland, & Hoskisson 2016, 118).

A PESTEL analysis provides a macro picture of the industry environment, standing for political, economic, social, technological, legal, and environmental factors that affect a firm (University of Sydney, 2008). Porter's value chain is an internal analysis that breaks down a firm's activities to understand the costs of each activity and finds sources for competitive advantages (Porter, 1998). These two analyses are be used to gain an understanding of the external opportunities and threats and internal strengths and weaknesses of a firm to then formulate strategies based on cost leadership or differentiation to gain competitive advantages in business.

Cerbelux Oy is a small Finnish lighting enterprise that was established in 2019. It is based in Hämeenlinna, Finland and distributes lighting components and luminaires to wholesalers around Europe and lighting designs to businesses in Finland. This thesis will use a PESTEL analysis and Porter's value chain analysis to identify Cerbelux's strengths, weaknesses, opportunities, and threats and create a SWOT matrix. Based off these analyses the thesis will then provide

recommendations on future business level strategies based on cost leadership or differentiation as the business transitions from outdated component sales to strategies that drive their modern LED lighting design, luminaire, and component sales.

2 Thesis objectives, concepts, and theories

This section will outline the topic of the thesis, what the issues currently facing Cerbelux Oy are, the thesis objective and research questions, strategic management as a theoretical framework, as well as the concepts used in the thesis. These concepts include the what the aim of a strategy in the strategic management process, as well as two the two main business-level strategies in the thesis, cost leadership and differentiation. Additionally, this section outlines the purpose of the thesis, outlines the thesis process, and provides information on the research and data used in the thesis.

2.1 Thesis topic

This thesis will use the strategic management process to provide recommendations to Cerbelux Oy in their decision making when growing their Finnish lighting small enterprise. The strategic management process's aim is to achieve strategic competitiveness and above-average returns by developing a full set of commitments, decisions and actions required to reach competitiveness. Initially by analyzing the external business environment and internal organization leading to the formulation of the optimal strategy. (Hitt, Ireland & Hoskisson 2016, 6.)

The strategy recommendations are formulated first through an analysis of the external environment in which Cerbelux Oy operates to identify opportunities and threats. Then an analysis of the internal capabilities of Cerbelux Oy is used to identify the firm's strengths and weaknesses via their internal resources and capabilities. The thesis will use both the external and internal analyses via the strategic management process to recommend the company strategies that provide a sustained competitive advantage. Sustained competitive advantages are when a company can create more economic value than rival firms that over an extended period (Barney & Hesterly 2019, 8).

Two topical strategy decisions Cerbelux Oy faces are that component sales face an existential threat from environmental regulation in the European Union and

supply chain disruptions that can potentially impact their business. These threats will be the basis of the analysis in this thesis, but ultimately the recommendations can be applicable to other future strategic decisions that Cerbelux Oy will make.

The lighting industry in which Cerbelux Oy operates is currently undergoing changes to adapt to the climate goals set out by the European Union's 2030 Climate Target Plan, which is targeting cuts of at least 55% of greenhouse gas emissions by 2030 (European Commission, N.d.). European Union eco-design regulation on lighting took place in September of 2021, and the European Union will be publishing multiple proposals on sustainable products in 2022. The 2022 European Union proposals include topics such as circular product design, repair & reuse, material, and substance declarations, as well as substantiating green claims (Lighting Europe, N.d.). This will impact Cerbelux Oy's business as they are directly affected by these external industry proposals and regulations and can provide strategic opportunities for the company to fully shift their focus from components to fully EU compliant lighting solutions.

The COVID-19 pandemic has reshaped supply-chains around the world and is impacting Cerbelux Oy's business. According to a survey done by Mckinsey & Company in the second quarter of 2021, a year after the start of the COVID-19 pandemic, many sectors "remain vulnerable to [supply chain] shocks and disruptions, with many sectors currently wrestling to overcome supply-side shortages and logistics capacity constraints." (Alicke, Barriball & Trautwein, 2021.)

Cerbelux Oy sources their products from manufacturers globally, including China, and supply-chain disruptions and vulnerabilities have and will have a great impact on how they purchase and store inventory and where they source it from. China's zero-tolerance approach to Covid-19, as recently as their response to the Omicron variant in April of 2022, has led to disruptions to global supply chains (Yan & Horwitz, 2022). Strategic decisions can be made by Cerbelux Oy to address these external supply chain issues, such as regionalization or of building inventory to weather these disruptions. Recognizing Cerbelux Oy's agility as a small enterprise and utilizing techniques for supply chain management, can provide strategic opportunities for the company.

2.2 Thesis objective, purpose, and research questions

The objective of this thesis is to recommend strategies to the commissioning company to overcome challenges to the viability of their new business while generating opportunities for business growth via the strategic management process. The thesis does this via an understanding of the business environment the company operates in, an internal analysis of the company, and finally recommending business level strategies from strategic management that fit the challenges in the business environment to the company's internal strengths.

The objective of the thesis can be summarized into this main research question:

"Can cost leadership or differentiation be used in strategies recommended to Cerbelux Oy when pivoting their business towards primarily LED luminaire, component, and design sales?"

To answer the main question these sub-questions are used:

"What are opportunities and threats in the general business environment that influence Cerbelux Oy's business position?"

"What are Cerbelux Oy's internal capabilities or strengths and weaknesses when creating lighting designs and selling components?"

2.3 Concepts

Concepts in this section include a brief introduction to lighting terminology and European Union "eco-design" regulation which is relevant to the current problem that Cerbelux Oy faces in their business environment. Also, concepts like "strategy" in strategic management and specific business level strategies such as "cost leadership" or "differentiation", which will be recommended to Cerbelux Oy, are explained as well.

2.3.1 Lighting terminology and eco-design

“Lighting products” as defined by the European Commission include both light sources which are light bulbs, LED modules and lamps, as well as control gears used to connect the light sources to the electrical main, which include ballasts, electronic components, and drivers (European Commission, 2022). A luminaire is a complete lighting unit, which includes the light source as well as control gears. A luminaire directs, diffuses, or modifies the source of illumination to make the light more economical, effective, or safe to the eye (Croft, Summers & Hartwell 2009, 10.86).

Cerbelux Oy currently wholesales some luminaires, but mainly is a wholesaler of electronic components such as lamp holders, as well as control gears like LED drivers and ballasts. Cerbelux Oy is a Northern European distributor partner with CU-power, a Shenzhen, China based LED driver manufacturer, which offers more than 200 different standard types of LED drivers (CU-power, N.d.).

The sale of lighting components currently represents the majority of Cerbelux Oy’s revenue, but due to Eco-design regulation, as well as advancements in lighting technology, the company needs to adapt their business strategy. This means the company needs to shift to selling designs that incorporate or lighting components and luminaires that meet minimum efficiency standards and adhere to the regulatory environment in the European Union, as well as to meet the technological demands of the marketplace to remain competitive.

Eco-design regulation was adopted by the European Commission in 2019 and can be summarized as regulation to reduce the energy consumption of lighting products via the establishment of minimum efficiency requirements and other performance criteria (EUR-Lex, 2022). The regulation is compulsory from September of 2021 and is the first European Union regulation to cover efficiency requirements for LED control gears. It defines new energy efficiency classes, requires product registration, and removes energy labels from luminaires that can have light sources and control gears removed non-destructively from the luminaires or

light housing, meaning the labels must be on the light source or control gear itself. (OSRAM Digital Systems, 2022.)

2.3.2 Strategy

The goal of the strategic management process and the goal of this thesis is to make recommendations via the strategic management process that Cerbelux Oy can use as guidance in future strategic decision making. A strategy in strategic management is defined as an “integrated and coordinated set of commitments and actions designed to exploit core competencies and gain a competitive advantage”(Hitt et al. 2016, 4).

According to Barney and Hesterly (2019, 4), an optimal strategy is theoretical in that it can be difficult to predict, as the competition is constantly evolving, but in strategic management the strategy is about how the industry’s evolution can be exploited for competitive advantage. To identify this competitive advantage two different analyses are used in this thesis, an external analysis, and an internal analysis. Two business level strategies commonly based on the strategic management process are cost leadership and differentiation.

2.3.3 Business level strategies

Two factors that influence Cerbelux Oy’s strategic decision making and are business level strategies that the company can potentially implement are cost leadership and product differentiation. Cost leadership is when an incumbent firm has lower costs than potential competitors, creating a cost-based barrier to entry, meaning entrants will have to reduce their costs or use another strategy such as differentiation to enter the marketplace (Barney & Hesterly 2019, 109).

Differentiation occurs when a firm provides something unique beyond low prices, allowing the firm to get a price premium higher than the costs to create the unique product. This can also lead to greater buyer loyalty during cyclical downturns.

(Porter 1998, 120.) The thesis focuses on the how these two business level strategies fit into Cerbelux Oy's current internal and external business position.

2.3.4 Outsourcing

Outsourcing is the purchasing of a support or primary activity from external suppliers, it can increase a firm's flexibility and reduce risk and capital expenditures. This is used when compared to their competition a firm cannot create value or are at a substantial disadvantage in creating value with that activity. This is because most organizations do have the resources or capabilities to be competitive in each value chain activity. (Hitt et al. 2016, 96.) Cerbelux Oy currently outsources research and development and manufacturing to either partners like CUpower or to suppliers and wholesalers of their luminaires and components, but they do provide their own lighting designs and solutions to clients, composed of those outsourced components.

2.4 Theoretical framework

This section outlines the applicable theories that the thesis uses, building a framework for the analysis via the strategic management process. First through external analysis, then internal analysis, and then the development of a SWOT matrix, or strengths, weaknesses, opportunities, and strengths matrix, that will form the basis of the recommendation to use cost leadership or differentiation in the strategy the thesis develops for Cerbelux Oy.

The aim of the research was to collect primary data from Cerbelux Oy within the strategic management framework that would be guide the PESTEL Analysis and be the basis for the value chain analysis. These are combined to be the basis for the SWOT matrix. The SWOT matrix forms the basis of recommendations to use cost leadership or differentiation in Cerbelux Oy's strategic decision making.

Research focused initially on books about Strategic Management to guide the data collection and analysis. These include Michael Porter's "Competitive

advantage: Creating and Sustaining Superior Performance" (1998), "Strategic Management: Concepts and Cases: Competitiveness and Globalization" (2016), and "Strategic Management and Competitive Advantage: Concepts and Cases" (2019). These texts on strategic management were used as the basis for the theoretical framework for strategy recommendations to Cerbelux Oy, as well as the basis of the creation of the interviews for primary data collection. When creating the external analysis secondary sources were mostly found online via search engines as this provides the most current information needed for the PESTEL.

2.5 External analysis framework

In the strategic management process before the formulation of a strategy there must be concise identification of the organization's strengths, weaknesses, opportunities, and threats. Initially, an external analysis is used to identify opportunities and threats to Cerbelux Oy. In the framework used in this thesis, opportunities are a condition in the general environment that can help a company reach strategic competitiveness, while threats are a condition in the general environment that may hinder a company's strategic competitiveness. (Hitt et al. 2016, 43.)

This thesis utilizes external analysis to determine the competitive evolution of the lighting industry for Cerbelux Oy, using an external analysis which identifies the critical threats and opportunities to a firm in its competitive environment (Barney & Hesterly 2019, 7). The external analysis used in the thesis will be a PESTEL analysis, this is an analysis of the general environment that Cerbelux Oy operates in. It looks at the political, economic, societal, legal, and environmental factors that impact Cerebelux Oy.

In the PESTEL analysis sources of information from the European Commission were the basis for building an understanding of the EU directives on environmental regulations in the lighting industry but also supported by information gathered from trade associations. Documentation from companies in the industry like Lumitronix and Osram was also used to find information on regulation. Information

was found on trends in the LED lighting industry from trade associations and industry magazines, then were investigated using a search engine to find more information to compile the analysis. Economic data was compiled from the latest information on economic conditions in the European Union, utilizing business news sites as they provide the latest relevant information on European monetary policy and economic conditions. The PESTEL analysis has been used when looking at the lighting industry in market reports that identify market-drivers, opportunities, trends, and forecasts and provide key insights in the domestic lighting industry of India (PR Newswire, 2016a), Turkey (PR Newswire 3, 2016c) and Thailand (PR Newswire 2, 2016b).

2.6 Internal analysis framework

After the completion of the external analysis, the thesis uses an internal analysis to identify Cerbelux Oy's ability to take advantage of the opportunities and limit the threats found in the external analysis. In strategic management theory, value is created when a firm leverages their capabilities and core competencies to increase a product's performance characteristics and attributes for which customers are willing to pay (Hitt et al. 2016, 81). According to Porter (1998, 39) an analysis of the value chain is an appropriate way to examine a company's competitive advantage.

A Value Chain Analysis, as seen in (Figure 1), looks at the support and primary activities that contribute to the profit margin of goods sold. To identify Cerbelux Oy's capabilities and core competencies, which are Cerbelux Oy's strengths or potential competitive advantages, a value chain analysis of the company is used as an internal analysis in the thesis.

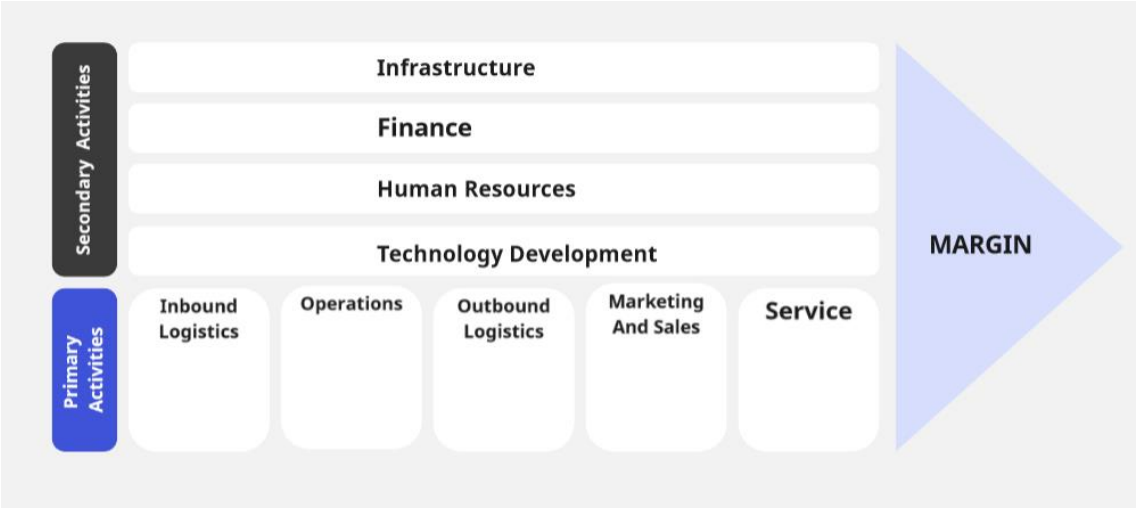

FIGURE 1. Adapted from Porter's value chain analysis (Porter, 1998)

The value chain looks at the secondary or support activities of the company including the infrastructure, finance, human resources, and technology development. Then the primary activities which are the inbound logistics, operations, outbound logistics, marketing and sales, and services. All these activities contribute to value creation for the customer, or profit margin.

Finally, a strengths, weaknesses, opportunities, and threats matrix or SWOT matrix will be used to concisely organize the findings of the PESTEL and value chain analysis. This will form an understanding of the inputs to the formulation of recommendations on business level strategy, whether the company should focus on cost leadership or differentiation for their company.

2.7 Working methods and data

The thesis uses applied research to assist Cerbelux Oy. Applied research collects data to further our understanding of a real-world problem (Guest, Namey & Mitchell 2013, 21). The real-world problem in this case is to recommend Cerbelux Oy business strategies via the strategic management process, as they focus their business away from outdated component sales and into other revenue streams.

2.7.1 Primary data

The primary data for this thesis will be two qualitative interviews conducted with employees at Cerbelux Oy, with one interview focusing on the general information on the company which is needed for both analyses and found in (Appendix 1) and the other interview focusing on exact information needed for the value chain analysis and is seen in (Appendix 2).

The basis for all the interview questions will be from scientific publications and literature on strategic management and analyses, as well as questions based on the different elements of the PESTEL analysis and Porter's value chain. The questions on the PESTEL analysis incorporated information found on the industry in preliminary research before conducting the interview.

2.7.2 Preliminary interview

The first interview conducted was with one of the co-founders of the company and included general information on the company, including their main customers, relationships with customers and suppliers, needs and opportunities of Cerbelux Oy, and their main competitors. It also focused on Cerbelux Oy's role as an importer, the impact of EU regulation on the company's sales, economic and supply chain factors, and technological questions. The interview was designed to build an understanding of Cerbelux Oy's external opportunities and threats as well as resources, capabilities, and core competencies of the firm. This was used

in the external analysis and as the basis for formulating questions in the interview for the internal analysis.

Key findings from the initial interview were that international wholesalers represent the largest percentage of sales, but do not represent potential for growing demand, as “an industrial company will ask for plans, the designer will then go to the wholesaler, and the wholesaler will come to us for components.” The co-founder emphasized that growth for Cerbelux Oy must come from LED lighting or components as opposed to older component sales. However, older components are high margin and create “short term revenue growth” but the real value of providing those components is “building a reputation for having certain parts that may be difficult to find.”

The future of the company was another focus in the interview. A question was asked about the biggest needs for Cerbelux Oy currently, which is hiring employees for the warehouse and the office, so the founders focus could be growing the business. Another point mentioned was the potential close collaboration with local manufacturers for in-house designs, the ideal luminaire sale, and the importance of developing plans for export from Finland.

When asked about the external environment the co-founder was asked if they import or plan to import new products to the EU market. He answered that they currently “do import control gears with CU-power, and plan to import other components in the future.” When asked about the percentage of sales that face phasing out by the European Union regulations on minimum efficiency, the answer was about half of the component sales they currently have will be affected.

The highest concern the company has when it comes to economic factors is supply chain disruptions and that they have noticed a 50% cost increase in their transport costs when importing goods, and increased lead times from all suppliers. Finally, the highest technological interest in the marketplace comes from wireless LED control, with intelligent lighting, power over ethernet, and human-centric lighting having a medium interest in the marketplace.

2.7.3 Secondary interview

The second interview was conducted with the other co-founder of the company who has expertise in lighting design. It is the primary data source for the internal analysis, which is Porter's value chain analysis. The questions were formulated on Porter's value chain analysis and were designed to find out more information on inputs to primary and support activities involved in component sales and light design sales in the firm.

Questions on support activities focused on the role of Netvisor and other technologies that support the firm's activities such as email provider and cloud storage. The bulk of the questions were related to primary activities at the firm in lighting design. These questions focused on inputs from partners and logistics as well as clients. When asked "In regard to inbound logistics, what are the major companies you use? What is the form of transport for deliveries from EU and then from China?" The interviewee provided information on inbound logistic companies like UPS for Chinese deliveries and Varova or DB Schenker for European Union deliveries but noted on how relationships with suppliers and enabled Cerbelux Oy to use their supply chain networks can lead to cheaper in bound logistics for Cerbelux Oy.

When asked about inputs around lighting solutions, the co-founder spoke about customer requirements being merely budget and space requirements. This gives Cerbelux Oy the agility to design unique lighting solutions using a limited number of suppliers and their own luminaires and components. Also of note from the interview was how revenue to Cerbelux Oy comes from wholesalers as opposed to clients themselves, so Cerbelux provides the lighting design as a free service, ensuring the client's wholesaler buys from them by using unique luminaires and components.

2.8 Thesis process

The thesis process, depicted in (Figure 2), begins with the external analysis of Cerbelux Oy, in this case a PESTEL analysis to determine the general business environment Cerbelux Oy operates in and the opportunities and threats in that environment. Then the thesis continues with an internal analysis, in this case a value chain analysis to determine the company's internal resources and capabilities.

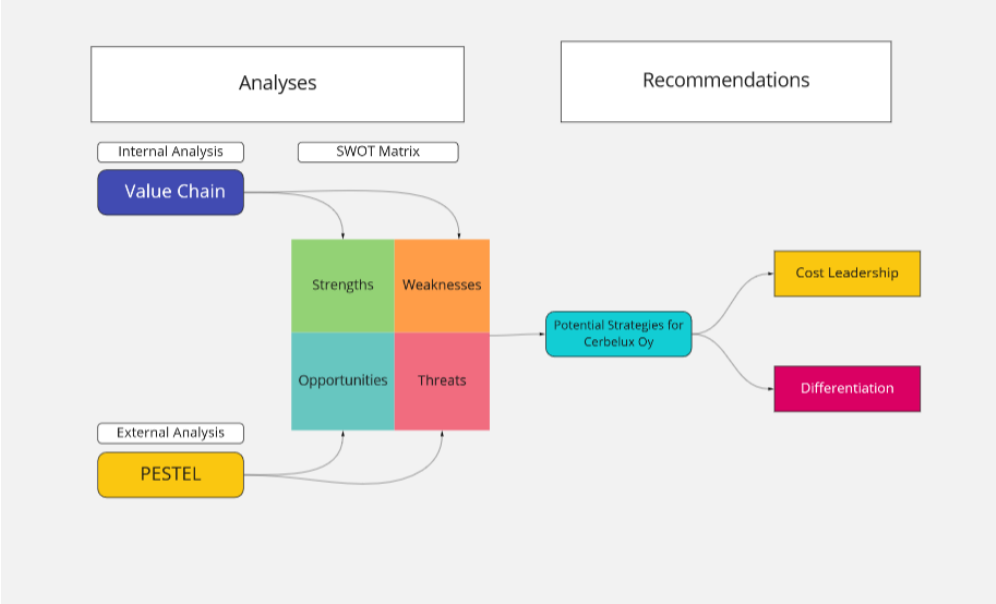

FIGURE 2. Diagram of the thesis process from analyses to recommendations

The thesis finishes with recommendations on optimal business level strategies based on a SWOT matrix, or strengths, weaknesses, opportunities, and strengths matrix. This will be the basis for deciding if Cerbelux Oy should focus on cost leadership or differentiation when transitioning from outdated component sales to exclusively LED luminaire, component, and designs.

3 External environment analysis

The goal of the external analysis in this thesis is to identify potential threats and opportunities to Cereblux Oy's business from the business environment in which the company operates. In the general business environment opportunities lead to strategic competitiveness, while threats hinder a firm's strategic competitiveness (Hitt et al. 2016, 43). According to Barney and Hesterly (2019, 34), an environmental threat is any individual, group or organization that will increase a firm's cost, decrease a firm's revenues, or reduce a firm's performance. The goal of the PESTEL analysis in the context of this thesis is to briefly outline the external factors impacting Cerbelux Oy's business.

3.1 Political

3.1.1 Environmental legislation

The European Union has created "New Approach" directives and legislation to increase harmonization within the bloc's internal market. CE markings are included in this legislation to indicate "that a product has been assessed by the manufacturer and deemed to meet EU safety, health, and environmental protection requirements" (Europa.eu, 2021). These CE markings are included in most of the luminaires and lighting components that Cerbelux Oy, however some components such as Magnetic Ballasts that Cerbelux Oy sells do not carry this marking.

The European Union has updated environmental regulation and adopted the Ecodesign Directive as a framework to set environmental parameters for manufacturers that carry CE markings with the goal of reducing overall environmental impact via reduction of energy consumption by products generate, transfer, or measure energy (European Commission: Manufacturers, N.d.). In 2009 European Union Ecodesign legislation was passed to phase out inefficient non-directional household lamps, replacing inefficient incandescent and halogen light sources with more efficient Compact Fluorescent Lights (CFL) and LED light sources (Lumitronix.com, 2022).

In 2019 Eco-design legislation was updated by the commission on products that Cerbelux Oy wholesales including light sources and lighting control gears to go into effect September 1, 2021. The legislation sets functional requirements and a minimum energy efficiency of non-directional and directional light sources, as well control gears. The legislation also sets standards for “Product information”, including information visibly displayed on the packaging and access to a website with further technical information via link or QR code (Osram Digital Systems, 2019). The development of European Union Directives that impact the lighting industry are shown for reference on a timeline in (Figure 3).

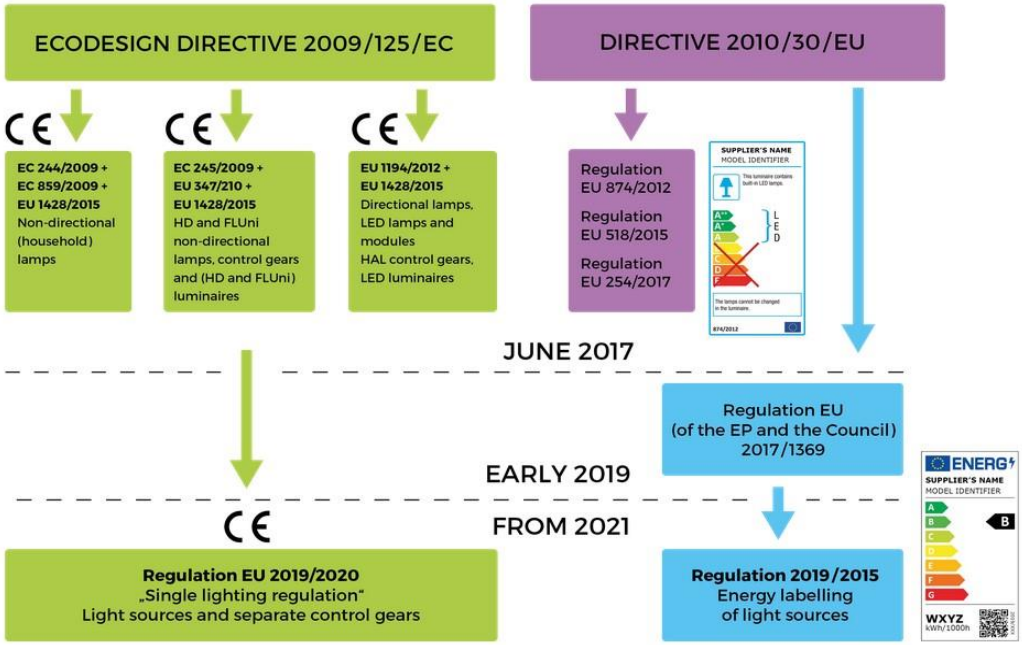

FIGURE 3. Timeline European Union Directives (Lumitronix.com, 2022)

Cerbelux Oy would be considered a supplier under the EU directive and if Cerbelux imports products from abroad and places them into the EU marketplace for the first time. Importers must ensure the compliance of the product to the regulation before importation and sale on the EU market or risk heavy fines and recall. Information and parameters on lighting sources and control gears can be inputted into the European Product Database (EPREL), a European Union wide registry of all energy labelled products and models, which can then be used to generate the required energy efficiency labels from May 1st, 2021. The new directive requiring the input of information went into effect on September 1st, 2021, and by

March 1st, 2023, the sales ban goes into effect on light sources with old energy consumption labelling and is the deadline for relabeling of inventory if the light sources meet the requirements outlined in the directive. (Ogden, 2021.)

The threat to Cerbelux Oy is that they have inventory that is going to be banned by 2023 if the inventory does not meet minimum efficiency requirements so they cannot re-label it. The co-founder of the company stated in the first interview that up to half of their current sales face a threat from the European Union regulation. Also, the company has and, in the future, will import new goods to the EU market. Cerbelux Oy must be aware that if they are the first to bring a control gear or light source to the European Union, they must enter the technical details into the ER-PEL database to generate the Eco-design label.

3.1.2 Trade restrictions

Due to the war in Ukraine in 2022, European Union sanctions have impacted rail service from Russia. This impact can be seen in transit logistics from China, as Russian rail is one of the main ways that goods from China arrive to the European Union. The impact of these sanctions is expected to last for much of 2022 and 2023 (Devonshire-Ellis, 2022).

Trade restrictions are relevant to Cerbelux Oy as they source some goods from China, including LED drivers with their partner company CU-power, the impact from sanctions on trade with Russia will be increased alternative transportation costs and delays in the arrival of goods from their suppliers. This threat represents increased costs in inbound logistics for Cerbelux Oy.

3.2 Economic outlook

3.2.1 Inflation

According to the Finnish Ministry of Finance, due to the economic impact of the ongoing conflict in Ukraine, Finland’s growth forecast has been downgraded from

3.0 to 1.5 percent for 2022 and the Ministry sees inflation, or the cost of goods and services for Finnish consumers, increasing anywhere from 4 to 7 percent in 2022 (Teivainen, 2022). As seen in (Figure 4) which shows month over month inflation rates from April 2021 to March 2022 inflation in Finland has recently spiked over 5% from 2.1% in April of last year.

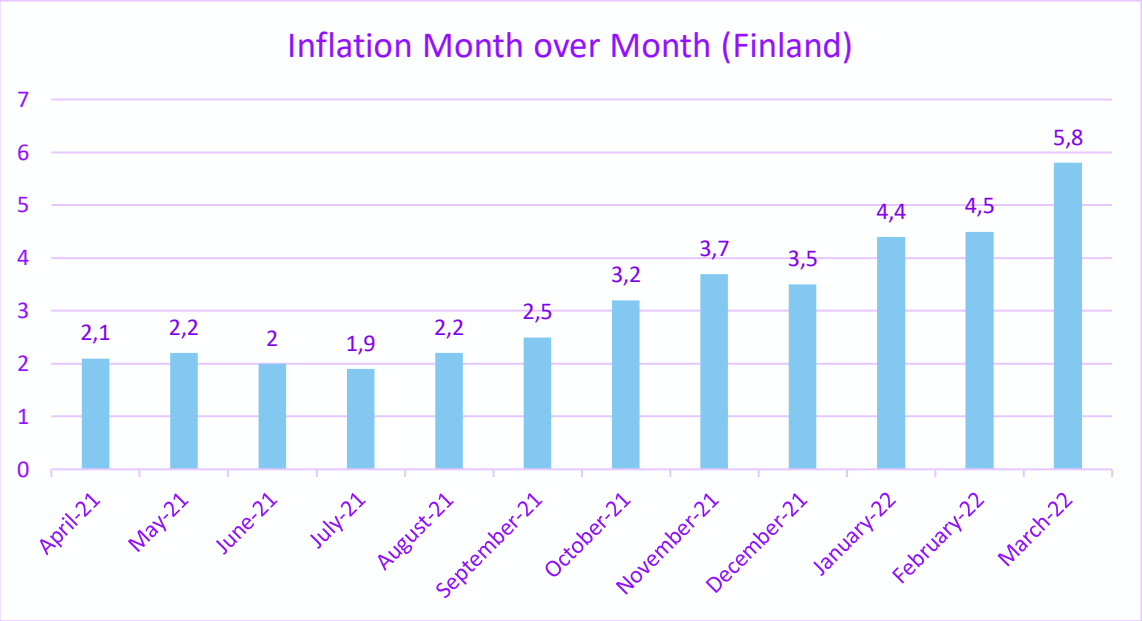

FIGURE 4. Inflation in Finland over the past year with data from Tradingeconomics.com (Tradingeconomics.com, N.d.)

The ECB or European Central Bank, states that price pressures related to oil and gas prices spiking due to the war in Ukraine have caused annual headline inflation in 2022 to be 5.1%, but ease to 2.1% in 2023 and return to 1.9% in 2024 (European Central Bank, 2022).

The importance of the inflationary environment to Cerbelux Oy is that it may force Cerbelux Oy to increase the pricing of their goods in the near-term to match the increase in costs to acquire the inventory or employ staff. Increased costs in materials and overhead can lead price increases and therefore decreased demand for Cerbelux Oy's products. However, according to economists at the European Central Bank this is a temporary economic threat.

3.2.2 Monetary policy

To curb inflation, exacerbated by the war in Ukraine and exacerbated in part by fiscal stimulus during COVID-19, like a negative 0.5% deposit rate and balance sheet expansion through bond purchasing, the ECB or European Central Bank will be forced to raise interest rates. Christine Lagarde the head of the ECB, said in May that the bank will stop balance sheet expansion through bond purchases and then raise rates sometime early in the third quarter of 2022. Economists like Reinhard Cluse at UBS predict a deposit rate of 1.25% by next year. (Arnold, 2022.)

This impacts Cerbelux Oy because deposit rate increases being raised to curb inflation can cause a slowing growth of the European economy and potentially lead to a recession, and if inflation does not decrease, then stagflation. More importantly higher rates can lead to decreases in capital expenditures by firms who would be installing or upgrading lighting systems. This is a major risk to Cerbelux Oy as it can cause there to be a significant decrease in demand for their products, especially in new lighting installations.

3.2.3 Weakening euro

The euro has declined during the past year from 1.22 per dollar to close to parity with the US dollar at 1.08 for the first time in twenty years (Ashworth, 2022). This is due to the economic situation in Europe with the ongoing war in Ukraine, as well as the European Central Bank's hesitance to raise interest rates fearing a recession. These two factors have caused the value of the Euro to weaken against other currencies and has had an exacerbating effect on inflation.

For Cerbelux Oy this represents a foreign exchange risk as importing goods from abroad becomes more expensive. This can impact their profit margins and bottom line through increased costs for goods supplied from outside the Eurozone and may force them to raise prices to the businesses they supply, potentially slowing the demand for the company's LED luminaires and components.

3.2.4 Semi-Conductor shortages

A threat to Cerbelux Oy is increased lead times and pricing of LED control gears caused by the chip and semiconductor shortage. This is due to historically high demand for semi-conductors. This impacts LEDs and LED drivers specifically because they use chips in their manufacturing. According to a Technology Industries of Finland Economic Outlook Report for 2022 “Despite the healthy demand and order books, the shortage of semiconductors and components are a serious burden for companies and turnover development may fall short of expectations” (Technology Industries of Finland 2022, 7).

Three significant issues caused by the Covid-19 pandemic led to a major supply-chain crisis: a shortage of workers due to the pandemic causing reduced production capacity, changes in typical demand and customer purchasing behavior, and manufacturing and logistics systems being run at full capacity (Duke's Fuqua School of Business, 2021). The LED industry was directly impacted in January of 2021 due to major OEMs like Apple and Samsung increasing production of tablets with Mini LED backlights. This increased demand for components from major OEMs, or original equipment manufacturers, caused LED chip downstream companies to aggressively procure components to mitigate price hikes in raw materials, increasing prices by 5% to 10% and with certain components already in shortage, left clients with a choice of price hikes or lead times increasing to two months (Betty, 2021).

Semi-Conductor supply chain shortages have continued into 2022. This is due to increased chip demand from automakers as the auto industry shifted towards automation and electric vehicles, consumer appetite for those vehicles increasing due low interest rates and affordability in 2021, as well as competition with work-from-home technology for chip manufacturing (J.P. Morgan Research, 2021). In February of 2022 lead times for semiconductors were 26.2 weeks, albeit less than the lag times during March of 2021, but microcontrollers specifically had delivery times of 35.7 weeks (Peng, 2022). However due to the cyclical nature of supply and demand for semiconductors the industry should not face shortages for more than a year. According to analysis done by Deloitte Global Experts, by the end of

2022 lead times for semiconductors will be closer to 10 to 20 weeks, and by 2023 the industry will be in balance (Wall Street Journal: Content by Deloitte, 2022) .

This represents an external threat to Cerbelux Oy as there are increased lead times and costs for LED luminaires and components globally. This can impact the cost of the goods sold to their clients as well as the delivery times of the products to their clients, especially if they don't already have the products in their inventory or have regional suppliers with inventory of the products.

3.3 Societal

3.3.1 Demographic changes

Uusimaa and Pirkanmaa are the two of the fastest growing regions in Finland with annual population growth from 2020-2021 at .7 and .9 respectively (Stat.fi, 2022). This is representative of the demographic shift that has been occurring in the Finland as the population continues to move from the countryside into the major metropolitan areas. The population growth in cities will lead to continual construction of new buildings, providing an opportunity for Cerbelux Oy to provide the lighting solutions for those buildings. New construction is shifting away from less efficient light sources to more efficient lighting such as LEDs. According to an International Energy Agency report on lighting LED market share has increased from 5% in 2013 to half of the lighting market sales in 2019. (Figure 5) demonstrates the shift in the market.

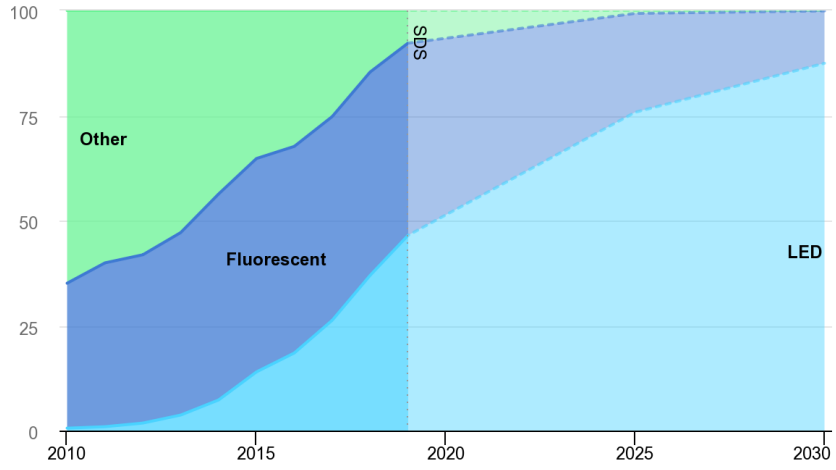

FIGURE 5. Past and projected global market share of LEDs, fluorescent, and Other light sources (IEA.org, 2022)

LEDs have overtaken fluorescent for both residential and commercial applications, but what is important for Cerbelux Oy to note is that sales are lower in lamp replacement as opposed to in installations newly built buildings. LEDs are on track to reach 65% of the global market by 2030. (IEA.org, 2022.)

This represents an opportunity for Cerbelux Oy as they can take advantage of the construction boom, caused by shifting population growth. This will lead to an increase in new light installations, which represent most of the LED industries growth, occurring in major metropolitan areas in Finland like Tampere or Helsinki.

3.3.2 Back to the office trend

Employee well-being has been an important topic since the beginning of the Covid-19 pandemic and recently employees have been returning to working from the office full time or in hybrid work arrangements. At the end of February 2022, the Finnish government ended the remote work recommendation and advised a combination of both remote and office working environments (Valtioneuvosto.fi, 2022). With the focus on employee well-being in the office environment after the pandemic in focus, one well-being aspect that is relevant to Cerbelux Oy, is the ability for smart LEDs to “create and customize optimal natural light levels that exceed employee expectations and improve their overall well-being and productivity levels” (Schmitz, 2021).

This societal trend represents an opportunity for Cerbelux Oy as employers want to attract employees back to the office. Cerbelux Oy can provide an attractive selling point of smart enabled LEDs with a humancentric focus to these employers, which are discussed more in depth in the Section 3.4.2 and 3.4.4, to businesses looking to attract employees back to the workplace.

3.4 Technological

3.4.1 LED technology driving growth

A Research and Markets report (2018) states that demand for energy-saving lighting, modernization of infrastructure, availability of cheap LEDs with their entrance as a light source in general lighting, and the growth of LED technology are the driving forces behind a steady growth of the LED light market. Luminaires will bring the highest compounded annual growth rate to the sector and new light installations will lead the market with outdoor lighting bringing the highest growing end-use for those installations when forecasting to 2024.

Due to the maturity of the LED marketplace, the competitive advantage of company's has shifted from scale and cost to technological capabilities and a product's value add (Evangeline, 2018). The aim of the technological section is to outline the important technological innovation in the sector as this is key to Cerbelux Oy's success and growth in selling LED luminaries, components, and designs. According to the "The Industrial Lighting Market: Worldwide Growth, Trends and Forecasts Through 2019-2024" (lightED, 2019), the Industrial Lighting Market was valued at USD 40.256 billion in 2018 will grow to USD 51.792 billion by 2024, recording a Compounded Annual Growth Rate of 4.5% during the forecast period of 2019-2024, with innovation strategy of both large and small enterprises driving the growth of the sector.

3.4.2 Wireless lighting control

It is expected that wired DALI protocol for digital control of LEDs via the DALI bus, which currently has majority market share due to being specifically designed for lighting with reliability and stability being the main advantage over other technology, will shrink gradually as wireless technology like Wi-Fi, Zigbee and Bluetooth matures (Evangeline, 2018). Bluetooth Mesh and Zigbee smart lighting technologies have clear advantages in industrial lighting applications. When comparing the technologies, Wi-Fi controllers can only control twenty lights or risk losing the connection, but Bluetooth Mesh and Zigbee can control over eighty lights, and

they have higher anti-interference and safety features over Wi-Fi controlled lights (Wang, 2022).

Bluetooth is currently the leading technology in wireless LED control, this is due to standardization in 2017 with the release of Bluetooth Mesh, as well as the Bluetooth Interest Group and DALI Alliance collaboration on specific standardized interfaces (Wong, 2021). Currently the Finnish lighting manufacturer Helvar (2022) uses Bluetooth Mesh in their ActiveHead self-learning wireless lighting and the German company Osram (N.d.) has LUXeye, which uses the DALI interface over Bluetooth Mesh.

3.4.3 Power over ethernet

Another interesting development in LED connect ability and architecture is Power over Ethernet. Power over Ethernet is the “ability to provide low voltage (less than 100w), direct current (DC), electrical power to network devices” via the same Ethernet cables used to transmit the data. With PoE lighting systems there is no need for a separate AC power source to power the lights or light ecosystems, meaning lower costs and capital expenditures in construction and maintenance, greater flexibility in design and optimization, and less energy use and higher efficiency compared to traditional LED lighting infrastructure. (Cisco Systems, 2022)

3.4.4 Internet of things

With the capability to connect LEDs with wireless controllers, one major technological trend is the intelligent lighting using IoT-enabled (Internet of Things) in commercial applications. The main driver of IoT- enabled lighting is the energy-savings of responsible lighting, as well as the tuneability of controlled LEDs to improve health and wellness using illumination control systems. This is enabled by occupancy sensors, IoT connectors, as well as Machine Learning/ AI data analytics. (Sahu, 2021.)

According to a Business Wire report, the smart lighting market is projected to reach USD 27.7 billion by 2026 with a Compounded Annual Growth Rate of 20.5%. Europe has the largest smart lighting market share and the highest growth potential for the market is expected in Asia Pacific, with lights and luminaires holding the larger share of the market until 2026. (Business Wire, 2021.)

3.4.5 Humancentric lighting

Another technological trend that has become increasingly popular and is expected to continually grow are lights that are designed with the well-being of the end-user in mind. According to Peter Dune at Phillips, a global lighting company, the HCL or “Human-Centric Lighting” industry is forecasted to reach USD 3.91 Billion by 2024 due to the availability of tunable LED lighting (Duine, 2020). LED light sources that provide a positive impact on the end-user’s well-being incorporate spectral distribution like sunlight distribution, a specific color rendering index that replicates the real world, reduction of blue light emissions that cause visual stress as seen in and increase of blue light emissions that are optimized for circadian rhythms into LED lighting systems (LAMP, 2010).

The Japanese LED company Nichia has recently partnered with Zumtobel to develop cost effective and “Human-Centric” health and well-being focused luminaires that use Nichia’s Optisolis and Vitasolis LEDs. The -solis line of LEDs deliver the daytime spectrum that give an energy boost and improved sleep patterns to the end-user via a “higher-than-typical cyan energy in phosphor-converted white LED.” (LEDs Magazine, 2021.)

3.4.6 Technology a major opportunity

As Cerbelux Oy shifts to selling LED luminaires, components, and designs it enables them to participate in fastest-growing sections of the LED marketplace if they can focus on the right technological trends. Some of the technologies that are the drivers for innovation and growth in the market include wireless lighting control like Bluetooth Mesh, power over ethernet, internet of things, and

humancentric lighting. Some of these technologies are reliant on each other like internet of things enabling humancentric lighting to be feasible.

These represent an opportunity for Cerbelux to implement these technologies in their lighting designs and LED luminaire and component sales, as the specialized technology in the market will drive the growth of the industry. The shift from scale to technological opportunities is perfect for Cerbelux Oy to find a niche within the market to incorporate into a differentiation strategy. However, the company needs to constantly be aware of new technologies that come to market and change their offering to compete as technology is constantly in development.

3.5 Environmental

3.5.1 Sustainable lighting

Sustainable lighting has been a driving trend in the lighting industry in both consumer and industrial applications. With the prevalence of LEDs, the of efficiency of light sources has increased 75% and the light sources last twenty-five times longer than regular incandescent bulbs (Energy.gov, N.d.). Besides energy efficiency, another environmental trend is now the focus on creating light sources that limit light pollution, also known as darkness restoration.

An online survey in Finland conducted by the Finnish Environment Institute found that 76% of respondents found outdoor commercial lighting disturbing, with 55.7% stating that “artificial lights reduce the overall quality of their own neighborhood. The most mentioned source of light pollution was streetlights and commercial lights, and particularly unpleasant to respondents was the orange-colored light emitted by high-pressure sodium light sources. (Lyytimäki & Rinne 2013, 132-134.)

There are multiple ways that LEDs can help reduce light pollution including using warm LEDs that limit blue light, smart lighting with dimmers, motion sensors, and timers to reduce total illumination, and using outdoor light fixtures that shield light sources to minimize glare (International Dark-Sky Association, 2018). A study by

the Technical Research Centre of Finland (2013) found that Intelligent LED Street lighting, when tested against high pressure sodium and metal halide lamps, received the best feedback in the survey.

Sustainable lighting trends represent an opportunity for Cerbelux Oy because they already provide components like ballasts to a company that maintains streetlamps in Finland. This may be an opportunity for providing LED as opposed to the traditional lighting solutions like high pressure sodium lamps to prevent light pollution and restore darkness via government contracts.

3.6 Legal

The main legal issue that Cerbelux Oy faces is in hiring of new employees. The main provisions that govern employment in Finland are the Employment Contracts Act (55/2001), the Working Hours Act (605/1996) and the Annual Holidays Act (162/2005). Collective bargaining agreements and legislation dictate the mandatory terms and conditions for employment for both the employee and the employer (Lexology, 2019). Cerbelux Oy should also consider that in Finland employer's contribution for an employee in Finland cost around 20-25% in addition to the salary paid to the employee due to pension, health insurance, and unemployment fund costs, as well as accident and group life insurance costs (Yrittajat.fi, 2021).

This is important for Cerbelux Oy to consider in that they are interested in hiring support staff for roles in inbound and outbound logistics and in the marketing and sales functions at the company. Careful consideration of the costs of hiring in Finland should be considered.

4 Value chain analysis

The goal of the value chain analysis in this thesis is to identify core competencies that create value for the customer in any of the primary or support activities that the firm completes (Hitt et al. 2016, 94). Every step on the primary activity on the chain, or what Hitt describes as a firm's core competency, has three aspects: purchased inputs, human resources, and technology. (Porter 1998, 38) This section includes a value chain analysis, starting with the support activities of Cerbelux Oy and then continues into the primary activities of Cerbelux Oy's lighting design business. The goal of this value chain analysis is being able to identify the internal strengths and weaknesses in the company's support and primary activities which are to be used in the SWOT matrix. The actual financial costs of each activity are not included as they are too confidential to be published in the thesis.

4.1 Support activities for Cerbelux Oy

Support functions of Cerbelux Oy are the tasks that a company completes to support the activities that produce, sell, distribute, and service the products that are being produced by the company. Support activities at a firm include human resources, finance, and management information systems (Hitt et al. 2016, 94.)

The main identifiable strength in the support aspect of Cerbelux Oy's value chain is the technology enabling Cerbelux Oy to run efficiently with low overhead costs from employees. The company is dependent on Netvisor software for most support activities and may risk down-time if there is a problem with accessing or using the software. This lack of employees can also be viewed as a weakness as even though the support system is efficient time is still used on support activities when focus can be the primary activities at the company.

(Figure 6) shows the support activities at Cerbelux Oy and as it is a small company with only the founders as the employees, the focus of the support activities section of the analysis will be the finance and management information system, as well as the website.

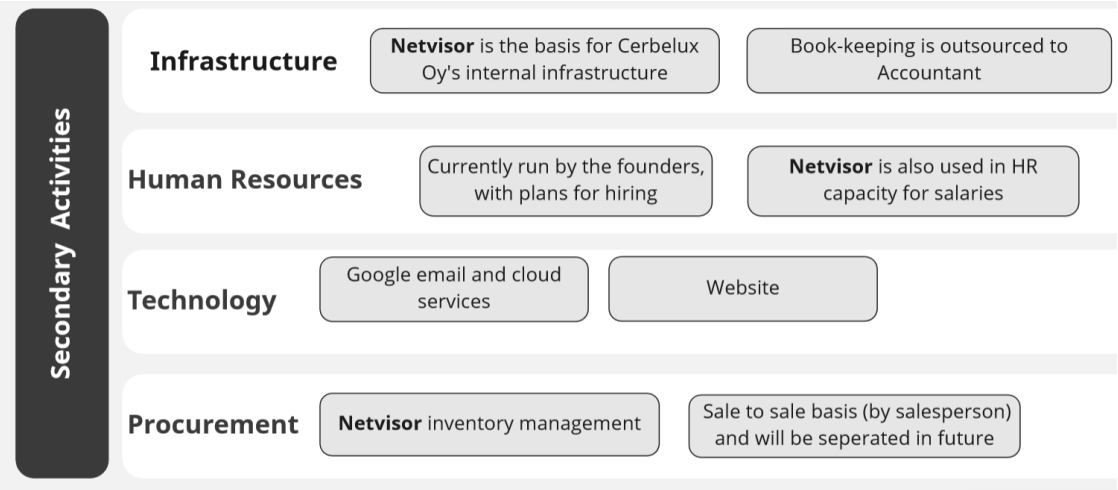

Figure 6. the support activities of Cerbelux Oy

The finance and management software that the company uses is Netvisor, it is used in many different support functions at the company as seen in (Figure 6). One of the co-founders described the various roles and uses of Netvisor including “inventory management, quotation generation, order entering, bill sending, book-keeping, purchases, and entering travel costs.”

The Netvisor financial management software represents a differential technological change. Differential technological changes reduce order processing costs due to the use of new technology (Porter, 1998). Costs have been reduced by Netvisor in that the technology saves the company time, enabling them to limit support staff needed for inventory management, invoicing, book-keeping, limited purchasing inputs and to take care of other support functions at the company, lowering overhead costs.

4.2 Primary activities for lighting design

Primary activities are the physical creation of the product as well as activities related to the sale, transfer, and aftersales (Porter 1998, 38). Primary activities include inbound logistics, operations, outbound logistics, marketing and sales, and after-sales services. The primary activities for Cerbelux Oy's lighting design business are pictured in (Figure 7).

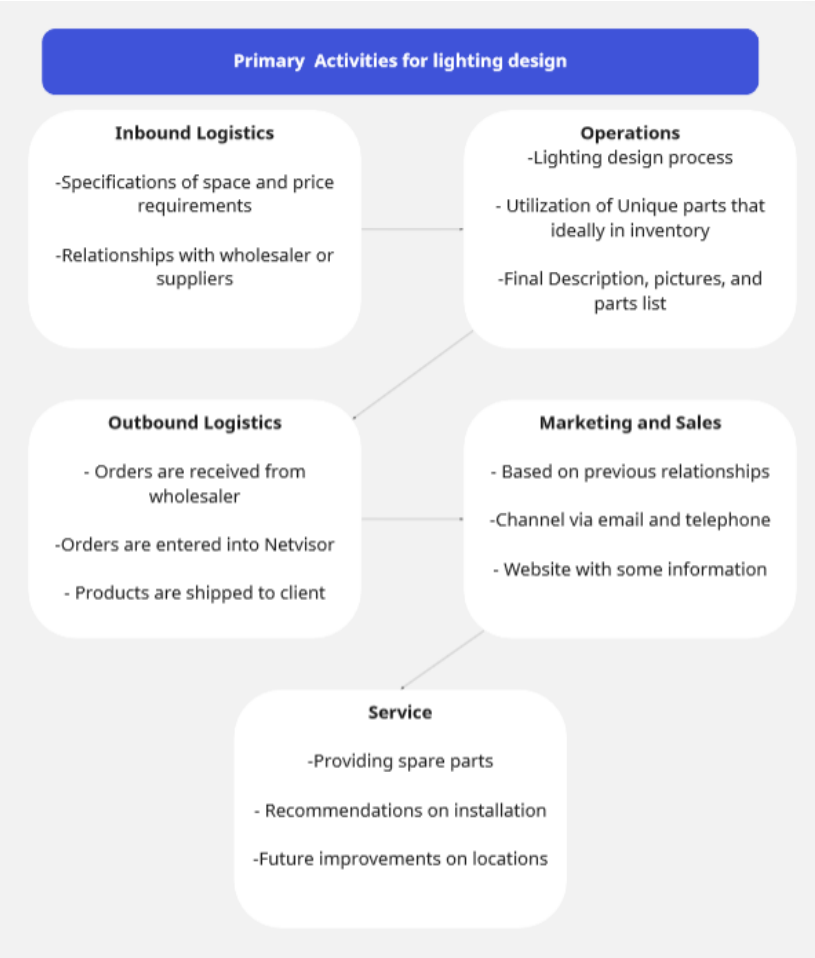

Figure 7. The primary activities of Cerbelux Oy's lighting design business

The first step is inputs or inbound logistics which is the receiving, storing, internal distribution of inputs to the product. (Porter 1998, 40) Inputs for Cerbelux Oy's lighting designs are first specifications, these are generally not well specified and are just budget and space requirements and communicated via in person meetings, email, or phone call. Cerbelux Oy mainly sources their luminaires and components from China, Germany, Poland, and Turkey, meaning that their supply is globalized and is sensitive to supply chain disruptions and increases in transport

costs, ranging from 25%-50%. Also, the founders have noticed increases in lead times from all suppliers especially Chinese suppliers.

The specifications of space and price requirements is an important input in the value chain because it enables Cerbelux Oy the ability to provide customized solutions that are adaptable to each lighting design and client based on their specifications. Design adaptability to each client's specifications and requirements is one of the strengths of Cerbelux Oy. Additionally, strong relationships with wholesalers are essential to mitigating a major weakness Cerbelux Oy has which is a reliance on their wholesalers for revenue generation. The wholesalers are included as they are the input that leads to revenue generation. This is due to how the design and part list is first sent to the client, but the client purchases the parts from the wholesaler, who in turn purchases from Cerbelux Oy.

The relationship with the wholesaler is critical to the lighting design profitability. The dependency on the wholesaler for revenue generation poses a risk to the lighting design aspect of the business, as clients can source alternatives parts, or wholesalers can choose to not get the design's parts from Cerbelux Oy. This is a weakness that is identifiable in the value chain analysis, as the client could source alternative parts especially if there is price sensitivity going into the purchasing decision. Therefore, the operations aspect plays an important role in mitigating this weakness in the lighting design value chain.

The next activity in the lighting design process for Cerbelux Oy would be converting inputs, such as the specifications from clients, into the final lighting design. This falls into the operations section of the value chain analysis as operations involve the transformation of the inputs into the final product. (Porter 1998, 40) The main operation is the design of the lighting solution include selection of luminaire types and components, the placement of the luminaires, and pricing.

Cerbelux Oy's selection of lighting and components for unique parts of the design is the main contributor to value creation, their competitive advantage, and strength. It is essential that the design is unique, incorporating parts that are difficult to substitute or Cerbelux Oy's specialized LED luminaires and components. The design is then sent to the client and approved. After approval of the

preliminary design a proper description with pictures and a parts list is created and sent to the client. Finally, the client goes to the wholesaler and ideally the wholesaler uses Cerbelux Oy for the design's luminaires and components.

Cerbelux Oy's strength is their agility in design creation meaning their ability to utilize different and unique LED luminaires and components in their designs. This provides the company agility in being able to offer several different lighting technologies to clients based on demand, inventory and supply, or cost. This can differentiate them from their competitors as they can provide new technologies in their lighting designs. For example, humancentric lighting for new office space construction, which was a trend in the external analysis, or renovation or explosive resistant lighting for factories.

Outbound logistics are the collection, storage, and physical distribution of the product to buyers (Porter 1998, 40). In this step orders are received from the wholesaler, which are the parts list sent to the client, and parts which are ideally already in inventory are packaged and sent to the client. However, in some cases the parts are then ordered from one or two suppliers to meet the client's needs. Cerbelux Oy again has agility in the utilization of components from their inventory as opposed to outsourcing parts for the design, however they will potentially use one or two close suppliers for this step if it is not in inventory.

Marketing and sales are the way the buyers can purchase the final product and prompt them to do so (Porter 1998, 40). At Cerbelux Oy this is primarily through previous business relationships and conducted via email or on the telephone. However, the company has recently created and been working an improved website to increase their visibility and market their lighting solution business. This part of the value chain is currently where Cerbelux Oy has a weakness in that they need to increase their visibility and marketing especially around their lighting design services by showcasing examples of lighting solutions and highlighting the benefits brought to the client.

Finally, service is the enhancement or maintenance of the value of the product (Porter 1998, 40). Cerbelux Oy mainly will provide the spare parts needed for the maintenance of their lighting designs or rarely they consult on installation of the

designs with the client. In the interview with one of the lighting designers at Cerbelux Oy after sales service and especially assisting in installation were rare occurrences and does not have much weight in value creation. However, the client will usually return if they need lighting designs for other areas of their facilities, which Cerbelux can then provide.

4.3 Primary activities of component sales

The biggest identifiable strength in the component value chain is the ability for Cerbelux Oy to get components that are difficult to find and is a way to differentiate themselves from the competition. (Figure 8) shows the primary activities that go into component sales, this is another aspect of Cerbelux Oy's business operations and represents most of their inventory, some of which is threatened by regulation by the European Union in 2023.

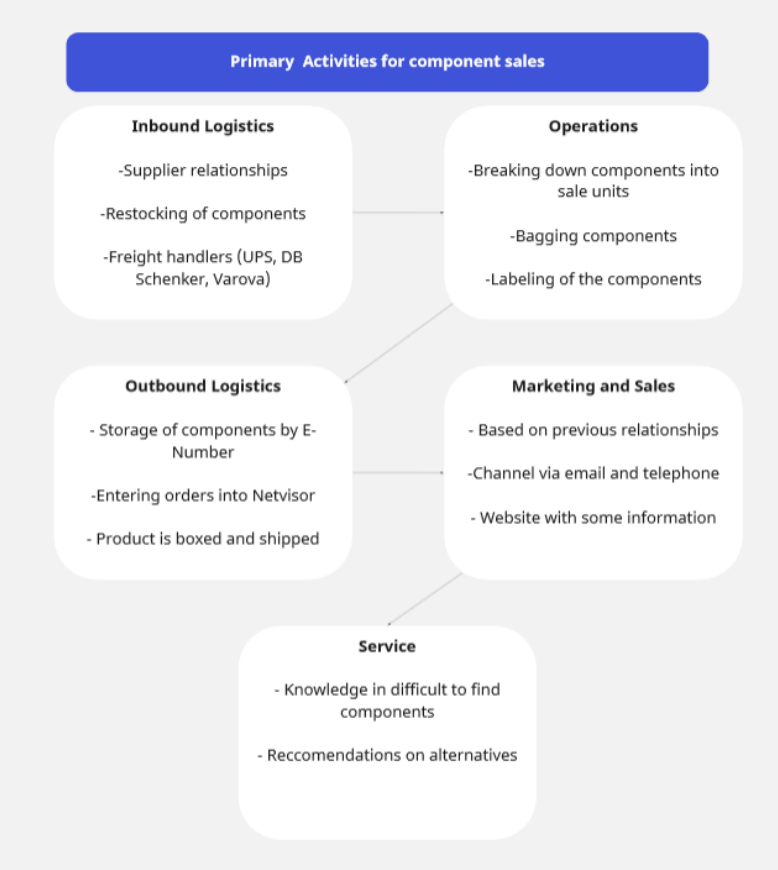

FIGURE 8. Primary Activities of Component Sales

One important strength to point out in this value chain are the supplier relationships as that can lead to decreased costs and regionalized supply chains when companies in Europe provide cheaper inbound logistics due to the relationships that these component sales provide to Cerbelux Oy. According to the co-founder some suppliers can provide alternatives to UPS, Varova, or DB Schenker in inbound logistics especially suppliers located in Poland and Estonia.

When companies were surveyed by Mckinsey & Company 90% of companies planned to use some form of regionalization to combat supply chain risks (Alicke, Barriball & Trautwein, 2021). Focusing on building relationships with suppliers within the European Union could be a potential strength to combat the threat of supply chain issues identified in the external analysis due to decreased costs and lead times compared to Chinese suppliers. Relationships with suppliers can add to Cerblux Oy's profit margins and contribute to cost leadership over other domestic component sellers through decreased costs in inbound logistics. Another important aspect to the component sales business and the main competitive advantage that Cerbelux has in this aspect of their business is in the service inputs of the value chain.

Another strength is in the service activities of the component sales value chain. Cerbelux Oy provides expertise in hard-to-find components for their customers. The strength can be used to differentiate Cerbelux Oy from their competitors as is it cultivates relationships based on the expertise of the company. This can contribute to what Porter (1998) attributes as a major benefit to differentiation, which is greater buyer loyalty when there is a cyclical downturn, as Cerbelux Oy has built a good reputation with their customers. Hopefully those relationships will contribute to the LED design, luminaire, and LED component sales future of Cerbelux Oy by utilizing those relationships to sell modern components as the relationships are already built with customers in need of Cerbelux Oys expertise in hard-to-find components.

5 Discussion and conclusion

This section of the thesis will provide the recommendations based on the internal and external analyses done for Cerbelux Oy. This includes a SWOT matrix that synthesizes the Internal Analysis into the company's strengths and weaknesses and the external analysis into the opportunities and threats. Then the thesis recommends whether Cerbelux Oy should be using differentiation or cost leadership business level strategies based off the SWOT analysis and adds an implementation of a differentiation strategy depicted through an example value chain. This section also provides some information on competitors for further development. Finally, this section includes information on further development, an assessment of the thesis process, and some ethical considerations in the research.

5.1 SWOT matrix

The SWOT matrix in (Figure 9) shows Cerbelux Oy's strengths and weaknesses that were identified in the internal analysis and the company's opportunities and threats that were found in the external analysis.

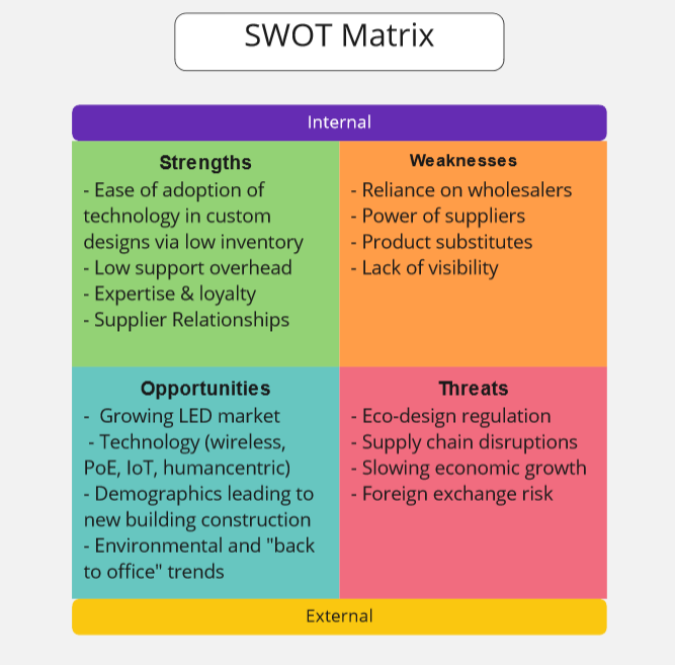

FIGURE 9. SWOT Matrix of Cerbelux Oy

Each of the strengths, weaknesses, opportunities, and threats will be elaborated on in the sections below.

5.1.1 Cerbelux Oy's internal strengths

One main strength that was identified in the value chain analysis was the ability for Cerbelux Oy to easily adapt their lighting designs to specific and unique products. This is important because it ensures that they will be the company that fulfils the parts list for the wholesaler, but also enables them to utilize new technology in their designs with limited risk as they do not need to hold large inventory of the new technology or spend on research and development or production.

In the support section of the value chain the use of technology such as Netvisor enables Cerbelux Oy to keep a limited number of employees required for support functions and lowers their overhead costs. However, they plan on adding additional staff in the future to enable the founders to focus differentiation strategies in the operations, sales, and marketing aspect of the value chain.

Another strength is the expertise they have in finding difficult to find components for clients, this builds loyalty with their clientele that can greatly benefit them in the future. This differentiates their service activities from their competition because the customers come to them for difficult to find components and as mentioned can help Cerbelux Oy keep customer loyalty even if there is an economic downturn, despite the premium on their differentiated offering, which was a threat in the external analysis.

According to research "having a competitive advantage in logistics creates more value with a cost leadership strategy than with a differentiation strategy", this means a valuable way to reduce costs if focusing on a cost leadership strategy is to focus on inbound and outbound logistics in cost reduction (Hitt et al. 2016, 118). Some relationships with suppliers Cerbelux Oy have had, especially in Poland and Estonia, has led to reduced costs on inbound logistics for Cerbelux Oy. The company have been able to utilize supplier's supply chains as opposed to freight companies for inbound logistics, which are significantly more expensive.

A focus on regional suppliers can be used to also mitigate supply chain risks identified in the external analysis. This is a strength that contributes to the potential of adopting a cost leadership strategy for Cerbelux Oy as an alternative to differentiation.

5.1.2 Cerbelux Oy's internal weaknesses

There are two main weaknesses that can be found at Cerbelux Oy, this includes their dependency on their suppliers and the wholesalers as well as the threat from alternative components and luminaires. The lack of in-house manufacturing means that Cerbelux Oy faces supplier risk and maintaining these relationships is key in the success of the business, as they currently outsource the research and development and the manufacturing for their luminaires and components.

When doing lighting designs Cerbelux Oy relies on the wholesaler to ensure that part lists orders come through them, which is another risk when offering design services. This means that they must ensure the luminaires and components are unique enough so that there is not an easily sourced alternative, but there always may be price sensitive clients that can source alternative parts for their lighting solutions.

One last weakness is in the marketing and sales activities of the company, on the website more information could be included that advertise their lighting design solutions on top of the components they stock, including showcasing examples of completed lighting solutions and what specialty luminaires and components went into the designs to demonstrate the ability of the company to meet the customer's needs.

5.1.3 Cerbelux Oy's external opportunities

The LED market is projected to continuing growing, especially in new installations, and is driven not by scale but by technological innovation. This represents a great opportunity for Cerbelux Oy to invest time and resources in incorporating new technology in their LED luminaire, component, and lighting designs. They can increase the value of their offering and differentiate by incorporating technologies like PoE, better integrated IoT and connectivity, humancentric lighting developments, increased efficiency, and lights that reduce pollution.

Demographic shifts can also represent an opportunity to be a driver of the company's growth as there is an increase in LED demand by new lighting installations as people in Finland move into the cities creating demand for lighting installations, companies want to attract employees back to the workplace with amenities like humancentric lighting, and cities adopting sustainable LED lighting for streetlamps. Finally, in the interview one of the co-founders mentioned the chance at creating in house luminaires with local manufacturers, which can lead to opportunities to expand and export onto the European and international marketplaces and would pivot Cerbelux Oy to be able to compete with original equipment manufacturers.

5.1.4 Cerbelux Oy's external threats

The co-founders main concern for Cerbelux Oy was the vulnerability to supply chain disruptions. This is because their suppliers are global with the largest in mainly China, Germany, Poland, and Turkey. The war in Ukraine and the chip shortages have caused increases in lead times from Chinese suppliers, causing delays in all aspects of the business. However, from the analysis supply chain disruptions may be a temporary issue. Focus on regionalizing supply chains with suppliers in the European Union like Poland and Estonia can help mitigate this risk. Another threat is the threat of regulation on some of their component sales, which according to the interview represent a large portion of current sales by adopting new technologies they can mitigate this risk. And finally, the economic outlook poses a threat as the economy may slow in Europe due to hawkish

monetary policy like increased deposit rates, slowing growth, and causing decreases company's capital expenditures on lighting solutions.

5.2 Competitors

This thesis did not focus on competitors, but on the general external environment and an internal analysis of the company's activities. It is important to note however that strategic decision making does not occur in a vacuum. In further study or development of this topic an in-depth competitor analysis would greatly contribute to providing Cerbelux Oy a better understanding of their strengths and weaknesses when compared to other firms. This thesis did mention how some competitor firms are utilizing new technology in the external analysis.

When asked about what Cerbelux competitors for components are the companies mentioned by the co-founder were "Tridonic, Signify, Osram, Lifud, Eaglerise, KGP, TCI". The main luminaire competitors were "Glamox, GreenLED, Eaton, Tehdasvalo, I-Valo, EasyLED, Airam, Ledvance, Lug, and Raytec." As the focus of the value chain analysis was on the lighting design aspect of the business, the thesis did not focus on the competitive landscape, but on external opportunities and threats and internal strengths and weaknesses specifically for Cerbelux Oy.

5.3 Strategies, recommendations, and implementation

Differentiation is a strategy that is well suited to Cerbelux based on the SWOT matrix above. In a differentiation strategy a firm produces distinctive products with features that customers value, without significant cost increase, providing the firm the ability to charge premium prices. (Hitt et al. 2016, 122) Differentiation strategy provides Cerbelux Oy with an opportunity to utilize distinctive features in their lighting designs with reduced risk compared to their competitors.

Cerbelux Oy can use the ease of adaptability of their lighting designs and strong supplier relationships to incorporate new technological features in their design

without major investment in new inventory. This is one advantage to Cerbelux Oy's reliance on partnerships and foreign suppliers for research and development and manufacturing.

(Figure 10) shows how Cerbelux Oy can implement the strategy in the value chain, showing where increased costs would be if Cerbelux Oy used differentiation, via incorporating technology such as power over ethernet to make their lighting design carry a higher premium

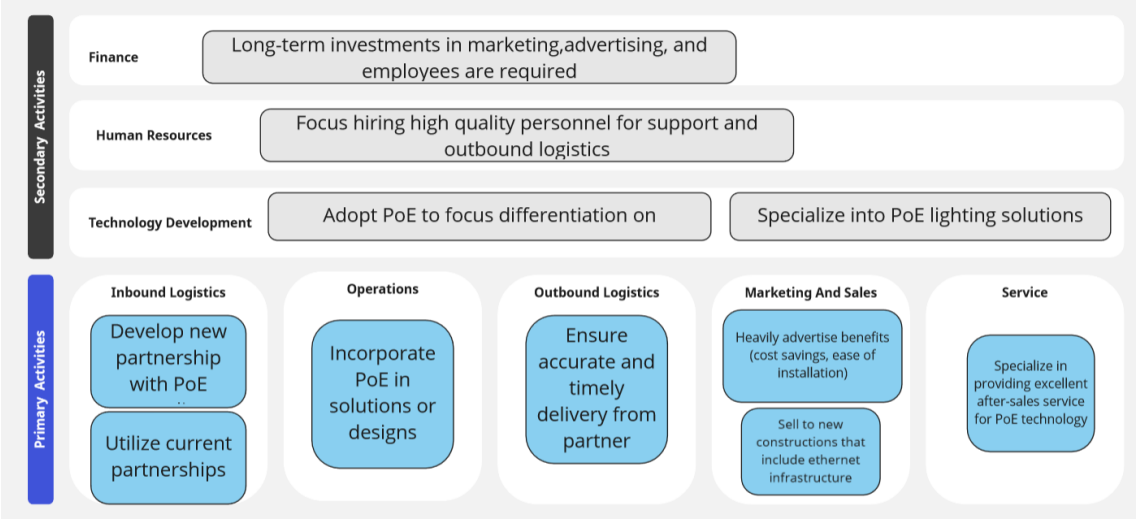

FIGURE 10. Value chain for implementation of tech differentiation

However, increased costs may be incurred as the founders would have to focus on technology development to incorporate the new product in their designs, increased marketing and sales costs to promote the product in the designs. The largest cost to the company would be to hire employees for other activities like support and outbound logistics to enable the founders to focus on incorporating the technology into the lighting solutions.

Power over ethernet technology would be an ideal candidate for taking advantage of the new installations as most new buildings have ethernet cabling built into them. Power over ethernet is one example used to demonstrate some changes to the value chain. For all differentiation via technology the biggest challenge for Cerbelux Oy would be identifying the distinctive feature or technology and establishing a relationship with a supplier who already manufactures or will manufacture the technology to incorporate into Cerbelux Oy's lighting designs.

As soon as the competitive advantage of the differentiated product is lost, Cerbelux Oy would need to adapt quickly and change their offering. Another way for Cerbelux to differentiate is via a providing their clients with a better service. Currently Cerbelux Oy does differentiate by providing clients with hard-to-find components, which builds customer relationships and loyalty. But more ways Cerbelux Oy can achieve this differentiation is by optimizing for speed of delivery, customization of design, or better quality over their competitors in the lighting design business.

The threat of slowing economic growth and rising interest rates would negatively impact the differentiation strategy because businesses would cut capital expenditure to save costs. However, the company has built strong relationships through their component sales that may help mitigate this threat to differentiation. The premium for a differentiated product may be too expensive, but due to customer loyalty provided from their expertise in component sales Cerbelux Oy may be able to maintain the clients despite the cyclical nature of the economy. However, the less optimal strategy that is recommended to differentiation due to the premium of the product and cost for Cerbelux Oy is called Focused Cost Leadership.

The second strategy, which is if differentiation poses to much cost and is not attractive in a slowing economy that could be recommended, is focused cost leadership. Like cost leadership, focused cost leadership is offering goods or services at the lowest cost to consumers relative to competition, but focused cost leadership aims to serve a particular competitive segment (Hitt et al. 2016, 127).

The reason focused cost leadership is recommended over cost leadership is because of the small size of Cerbelux Oy and its resources compared to its competitors. Cerbelux Oy can “fly under the radar” of competition by narrowing the scope of their offerings that are cheaper than the competition. Focused cost strategy would also benefit Cerbelux Oy over general cost strategy as they would need to find suppliers for only distinct product categories, making it easier for a firm with their resources to utilize this strategy. Partnering with a supplier that manufactures luminaires and components in China such as CU-power for a lower price than regional suppliers would be an example of this. This is another strategy

suited to Cerbelux Oy in that they just need to find the right partners and suppliers with products that they can bring to market for a lower price, but if outsourcing to China has amplifies the risk to their supply chain.

5.4 Conclusion

In conclusion to answer, “What are opportunities and threats in the general business environment that influence Cerbelux Oy’s business position?” There are a many external opportunities including the projected growth of the LED market, incorporation of new technology being introduced into the LED market, construction of new LED installations due to demographics, and the potential to become a small-scale Finnish original equipment manufacturer. Also, there are external threats such as the vulnerability to supply disruptions, the threat of regulation from the European Union, and the economic outlook in Europe.

When answering, “What are Cerbelux Oy’s internal capabilities or strengths and weaknesses when creating lighting designs and selling components?”, the analysis found that Cerbelux Oy’s ability to adapt new technology into their LED component, luminaire, and design sales was their greatest strength, with low overhead from staffing in support roles, they can easily pivot their business to differentiate along technological advancements in the industry. They can also utilize relationships with regional suppliers to decrease inbound logistic costs and assist with supply chain disruptions from Chinese suppliers. The greatest weakness is that they rely heavily on outsourcing their supply of manufactured luminaires and components and there is a chance that customers can find alternatives to the luminaires and components in their designs.

In conclusion, when asking “Can cost leadership or differentiation be used in strategies recommended to Cerbelux Oy when pivoting their business towards primarily LED luminaire, component, and design sales?” The best business level strategy that Cerbelux can use is differentiation along technological or improvements in their service. This is because Cerbelux Oy can incorporate the technology with ease in shifting their designs to better LED luminaires. There are costs involved in finding new suppliers and hiring staff for other activities in the value

chain. However, if necessary, the costs are too great focused cost leadership can be achieved through finding the right suppliers to provide cheap components compared to their competitors, but if sourcing cheap components and luminaires from China there are increased risks from supply chain disruptions.

5.4.1 Development, potential topics, and self-evaluation

This thesis used a PESTEL analysis and a value chain analysis in the formulation of strategies for Cerbelux Oy. Further development of the topic can be using other approaches to determining internal capabilities in a company. Examples include doing an VRIO analysis, an OCAT or organization capacity assessment, or McKinsey's 7S framework. Another way to develop the thesis topic is a more in-depth investigation of competitors in the industry. This can be done using the five-force model to look at the threat of new entrants, rivalry among competing firms, bargaining power of suppliers, bargaining of buyers, and threat of substitute products. This thesis touched on some of these points in the SWOT, but a full analysis would provide Cerbelux Oy with more understanding of their position relative to their competitors.

Analyzing competitors listed in section 6.2 can be used to better determine the value of Cerbelux Oy's internal strengths as well. Some ways that can be done is through comparison of the rarity or the ability of other firms to replicate Cerbelux Oy's capabilities. This also provides a greater understanding of the firms position in strategy decisions. Potential development includes understanding the value of a firm using evaluation of resources and capabilities via an in-depth comparison with competitors.

In evaluating this thesis process, the thesis process used provides a good starting point for Cerbelux Oy in its recommendations on strategic decision making, identifying where Cerbelux Oy can differentiate or become a cost leader. The external analysis provides information on opportunities and threats, provides the company on important information on EU regulation, economic outlook, and technology trends. While the internal analysis provides some limited information on what

resources and capabilities add value to the firm but does not use any actual calculations of cost for each activity due to confidentiality.

However, the analyses do not provide a framework for comparison with other firms, and the thesis lacks an in-depth analysis of the competitors in the industry to provide more information on Cerbelux Oy's position. Also, the primary data collection could be more extensive, using more primary data sources outside the company to contribute to the external environment analysis or capabilities of other firms in the industry. Another option would be an in-depth exploring of the financials and exact costs that go into each activity in the value chain, providing a clearer picture where cost reductions could be used to become a cost leader in the future with companies that have that information publicly available. In the future this framework would be excellent for a company with publicly accessible financial information and the inclusion of an in-depth competitor analysis to create SWOT matrixes that compare the company internal strengths and weaknesses to their competition.

5.4.2 Ethical considerations

When conducting the interview, the ethical considerations were that there was information the interviewees did not want to be published. These mainly included specifics around the costs of certain activities in the value chain and inventory, some specifics about suppliers, as well as exact financials. Also, the interviewees consented to being interviewed and published in this thesis with their names withheld for anonymity. The results of the thesis were shared with the company before the publication to ensure the credibility of the interviews and analysis.

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APPENDICES

Appendix 1. Initial Interview

1. Who represents Cerbelux Oy's main customers, are they SMEs or larger enterprises? Can you estimate what percentage goes to each kind customer?
2. What kind of relationships do you have with these buyers? How much input do you have when they buy from you?
3. Which customer groups / or product lines perform better in terms of sales and revenue growth?
4. What are some of Cerbelux Oy's needs or opportunities?
5. What activities do you outsource?
6. Does Cerbelux Oy collaborate with other firms and how?
7. Who are your main competitors for components and luminaires sales?
8. What aspects of your business do you intend to change in the next few years?
9. Have you ever been the first importer to bring any products to the EU market? Do you plan on introducing new lighting products to the EU market in the future?
10. What is an estimate of the % of sales that face phasing out from environmental legislation, especially related to minimum efficiency requirements?
11. What are the main economic factors that concern Cerbelux Oy?
12. How much have transport costs increased when importing goods from abroad over the past 6 months?
13. What countries are your biggest suppliers from?
14. Have you noticed an increase in lead time from Chinese suppliers?
15. What is the average lead time for goods from Chinese suppliers?
16. What lighting innovations or technologies do you perceive to have the highest interest in the market?

Appendix 2. Detailed interview for value chain analysis

1. What is the role of Netvisor in supporting activities at the Cerbelux Oy?
2. What other technologies are used to support activities at Cerbelux Oy?
3. How does the relationship work with partners in the context of lighting designs for clients? Do you hold any inventory?
4. For inbound logistics, what are the major companies you use? What is the form of transport for deliveries from EU and then from China?
5. When creating a lighting solution for a client, what are the main inputs?
6. Do you procure the parts for the lighting designs for the clients?
7. What goes into the transformation of those inputs into finalized design (output)?
8. What channel of communication do you have with lighting design clients?
9. How do clients usually find you? And what goes into the pricing for the design?
10. How involved are you with the installation process? What other services do you provide?
11. Who are your main competitors?