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Sustainability as a Criteria to Supplier Scorecard in a Case Company

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Abstract

Sustainability has become a megatrend in business and a way to create value for customers. The use of natural resources and emissions have become the central topic to investors and companies are expected to share information about their environmental performance.

The objective of this thesis is to create a supplier sustainability scorecard to SCM organization of the case company. The purpose for creating the scorecard is to be able to measure and improve the sustainability of the key suppliers of the case company. The proposal for the sustainability scorecard was done in cooperation with the key personnel from the case company in three workshops.

This thesis studies best practice from corporate sustainability and balanced scorecards, and the current sustainability practices and supplier scorecards in the case company. With this information, a practical excel file for measuring suppliers' sustainability performance with five criteria was proposed for the case company's use. In addition the thesis gives proposals for the next steps for implementing and developing the scorecard.

Language
English

Pages 44

Keywords
corporate sustainability, balanced scorecard

Contents

Abbreviations

BSC	Balanced Scorecard
DPPM	Defective Parts Per Million
EFRAG	European Financial Reporting Advisory Group
ESG	Environment, social and governance
FMD	Full Material Declaration
KPI	Key Performance Indicator
LTIFR	Lost Time Incident Frequency Rate
POPs	Persistent Organic Pollutants
R&D	Research and Development
REACH	The European Union Regulation on the Registration, Evaluation, Authorisation and Restriction of Chemicals
RoHS	The European Union Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment
SCM	Supply Chain Management
SSBM	Sustainable Supplier Base Management
TSCA	The Toxic Substances Control Act

WEEE	Waste from Electrical and Electronic Equipment
WFD	The Waste Framework Directive

1 Introduction

1.1 Background of the study

The subject of this master thesis is about supplier scorecard development regarding sustainability in a case company. The target is to make a proposal for a sustainability scorecard to track and improve sustainability performance of material suppliers at the case company's supply chain management function. The case company is having ambitious targets regarding sustainability internally and the same approach is wanted also throughout the supply chain.

By creating a sustainability scorecard for the suppliers, the case company can compare the sustainability actions and capabilities between their key suppliers. By using the customer's voice, the case company can motivate and support the suppliers to make improvements towards more sustainable business. Sustainability is becoming more and more important when companies are making their business decisions, and a sustainability scorecard will support that decision making.

1.2 The Background of the Case Company

The case company of this master thesis is a global electronics manufacturing company. The business unit that this case is focusing on designing and producing low and medium voltage frequency converters for many industries, such as pulp and paper industry, marine industry, and energy industry. The unit has globally about 5000 employees and in Finland about 1400 employees in a factory in Helsinki.

The SCM function in the case company is divided into two separate departments that are supporting different business divisions. The SCM

departments consist of sourcing teams, indirect sourcing team, supply management teams and development teams.

1.3 Key Concepts

Sustainability can be divided into four categories: ecological sustainability, financial sustainability, social sustainability and cultural sustainability. This study is focusing on the first three, which are described below.

Ecological sustainability is related to environmental influence in a company's business. Companies should understand the impacts of their actions on natural resources, biodiversity and climate. Ecological sustainability focuses on topics such as generation of clean energy, responsible material consumption and climate actions. (*Ekologinen kestävä kehitys* 2021)

Financial sustainability means that business growth and business decisions need to be done in a way that financial growth is balanced with ecological sustainability. Companies need to understand that natural resources are limited, and climate actions are necessary. Circular economy and sustainable use of natural resources are key topics in financial sustainability. (*Taloudellinen kestävä kehitys* 2021)

Social sustainability focuses on people's well-being and treatment. Every person should be offered equal rights for basic human rights and well-being all over the world. Main actions enabling that are for example support of employment, prevention of social exclusion and support of healthcare. In companies this means equal possibilities for people's development and salary, as well as taking care of personnel well-being. (*Sosiaalinen kestävä kehitys* 2021)

Balanced Scorecard is a management system, which purpose is to build performance objectives in an organization based on an organization's strategic goals. A balanced scorecard provides a more thorough view of an organization's performance on top of the financial performance, and it gives managers possibility to see development areas in the organization. Usual perspectives for balanced scorecards are financial perspective, customer perspective related to for example customer satisfaction and internal processes that are measuring organizations core competencies. (Tucci 2021)

Responsible sourcing is a voluntary commitment by companies and its target is to integrate environmental and social considerations into their supply chains. Companies are actively sourcing products and services in an ethical way. In other words, companies ensure that their business practices in SCM are not harming people or the environment. (Sedex 2023)

Sustainable Supplier Base Management is a program at the case company, which target is to do business with the suppliers in an ethical way. According to the web sites of the case company, it is done by ensuring that the suppliers are following international and local laws and regulations, suppliers are taking actions to limit their environmental impacts, suppliers respect the human rights of their employees, and they have health and safety policies in their own operations as well as in their own supply chains.

Full Material Declaration is a list of items used in manufacturing of a product. Often this information is used to ensure compliance thresholds for substances that might be harmful for the environment or people. (Muteti 2022)

Lost Time Incident Frequency Rate measures the number of injuries that resulted in a worker's inability to work the next full workday, which occurred in a certain period relative to the total number of working hours in the period. It is often compared to 1 000 000 working hours. As an indicator, it works the best in companies with large group of workers. (Safeopedia 2020)

Carbon Neutrality refers to a balance between absorbing carbon and emitting carbon from the atmosphere in carbon sinks. Carbon sink is a system that absorbs more carbon than emits, such as forests and oceans. To achieve net zero emissions, all greenhouse gases worldwide need to be balanced by carbon sinks. (European Parliament 2023)

The findings from academic and business literature, which are relevant for this thesis, are presented in a conceptual framework. The conceptual framework is described in figure 1 below. The conceptual framework is built on two elements that are corporate sustainability and balanced scorecard, and they form the basis for the proposed sustainability score card.

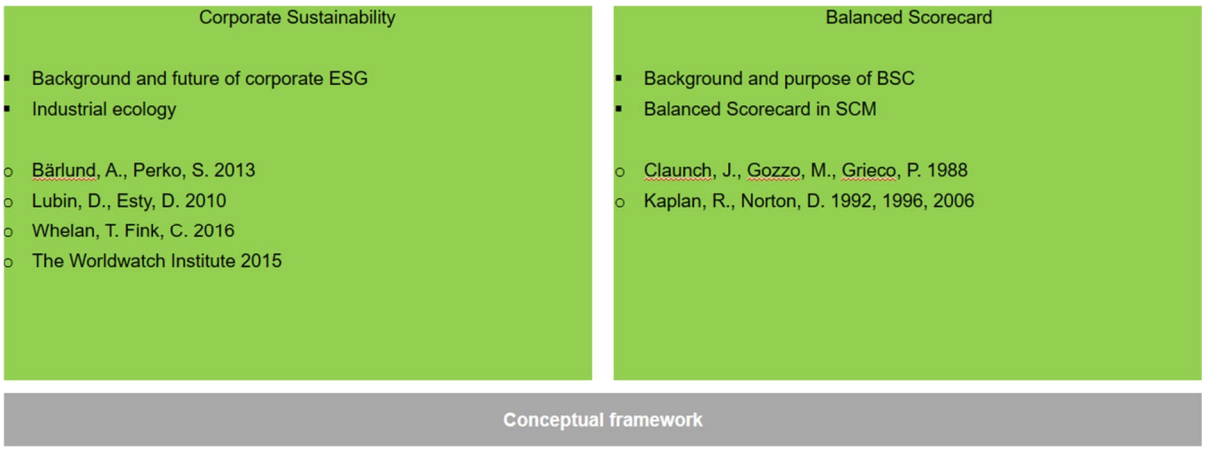


Figure 1. The conceptual framework of this study

The conceptual framework starts from corporate sustainability, where the background and importance of corporate sustainability are described. More focus is given to the concept of industrial ecology. The second element is about balanced scorecards. There is described the history and purpose of balanced scorecards and how they are being used generally and especially in SCM, in supplier ratings.

Based on these elements the sustainability scorecard can be successfully created for the needs of the case company. This conceptual framework is applied in section 6 where the interviews and workshops are being held to create the sustainability scorecard.

2 Corporate Sustainability

2.1 Background of Corporate Sustainability

Endless economic growth has been central to economies and many political and corporate leaders have seen that environmental actions conflict with the economy. The challenge is how to continue economic development while at the same time, ensuring that there are enough natural resources for the growing demand (State of the World, 2015, 4-5). Economic growth has brought wealth and better living standards for many people and tax profits for governments. At the same time, it has been accomplished with high environmental costs (The Worldwatch Institute 2015, 39).

It has been estimated that by 2030 the global demand of water will increase by 30%, demand of energy will increase by 40% and demand of food will increase by 50% compared to 2013. All this requires more resource efficiency in producing goods and cleaner technologies. The use of raw materials needs to be more innovative than today, meaning efficient use of raw materials and recycling. (Bärlund & Perko 2013, 28)

Sustainability has become a megatrend in business and a way to create value for customers. Emerged markets, like China and India, have increased competition for natural resources. Therefore, the use of natural resources and emissions have become a central topic to investors and companies are expected to share information about their environmental performance. At the same time governments are concerned about climate change as well as industrial pollution, and consumers are more and more looking for sustainable products and services. All of this means that companies must include sustainability as a part of their long-term business strategy. (Lubin & Esty 2010)

2.2 Sustainable Management

Sustainable management means securing employees' and stakeholders' well-being, commitment and performance by logical, visible and responsible leadership practices. The result is a supportive working environment that increases work motivation, which enables profitable and responsible business. This then increases positive social and ecological impacts on society. Business management is responsible when it considers all the impacts of the company on society and enables people to work so that the negative impacts of the business are decreased or completely removed. (Bärlund & Perko 2013, 103)

Main thing in sustainable management is that society is considered as a system where impacts of different natural effects and consequences are being predicted and companies are prepared for them before they create risks for business. Current standards of living in Western societies rely on economic, social, cultural and ecological sustainability and those four principals need to be in harmony. They are prerequisite for successful business and companies that are applying sustainable management practices aim to promote well-being of people, nature and society to increase the profitability of their business. (Bärlund & Perko 2013, 104-105)

To make business sustainable the business must be profitable. This requires that the profits are created in ethical and moral ways. The key is in developing the business constantly and choosing to invest in products and services that are successful in the markets. At the same time companies need to be able to increase the competence of employees, take into use new technologies and create innovations. The well-being of people is about highlighting trust and openness in companies. The employees need to be treated in a fair and respectful way, and the work environment must be safe. (Bärlund & Perko 2013, 106, 116)

The third principle in sustainable management is about protecting nature and ecosystems. This means that companies must know the environmental impacts

of their business and target to decrease the negative impacts. They think about the life cycles of their products and create closed circles to their operations. The last principle focuses on the well-being of societies. Many industrial companies have long traditions of supporting and creating schools or free time organizations around their facilities. Basically, it aims to improve local well-being and economy in different ways. (Bärlund & Perko 2013, 122,132-133)

2.3 Industrial Ecology

A thorough strategy for sustainable industry is called industrial ecology. It focuses on different production processes of goods from nature's point of view. The objective of industrial ecology is to improve business performance while preserving the environment and taking care of the well-being of the local community. A part of industrial ecology is called industrial symbiosis, where different kinds of industries are collaborating locally with an aim to get competitive advantage by exchanging materials, such as energy and by-products. They are transforming the wastes and by-products of one company to resources or raw materials for another one. (Valenzuela-Nenegas et al. 2016)

In other words, industrial ecology means that companies that are manufacturing products with less harm and waste are more economical and, in a long term, more profitable. In this concept, waste that is generated in the industrial process is not considered as waste at all. The process is built so that it prevents material from becoming waste and generates income from the waste. (Hawken 2010, 72)

To apply industrial ecology successfully, it requires closeness and communication between all the operators of the industrial ecosystem. Good examples of industrial economy are power plants, which excess heat is used to heat nearby homes. A famous example is Kalundborg Symbiosis that was established 1972 in Denmark. There are currently altogether 16 companies

working together in a circular economy in the Kalundborg Symbiosis. (Benson et al. 2021)

All the buildings and factories relate to each other in the Kalundborg Symbiosis. There is a coal power plant that heats 3500 homes and other factories, as well as an oil refinery, a biomass factory, local farms and many other industries. As another example, the oil refinery supplies gas to the power plant and it generates sulfur as waste, which is used as a raw material in a sulfur acid factory. In the figure 2 below the relations between the different operators are shown. (Green-Ecolog.com 2023)

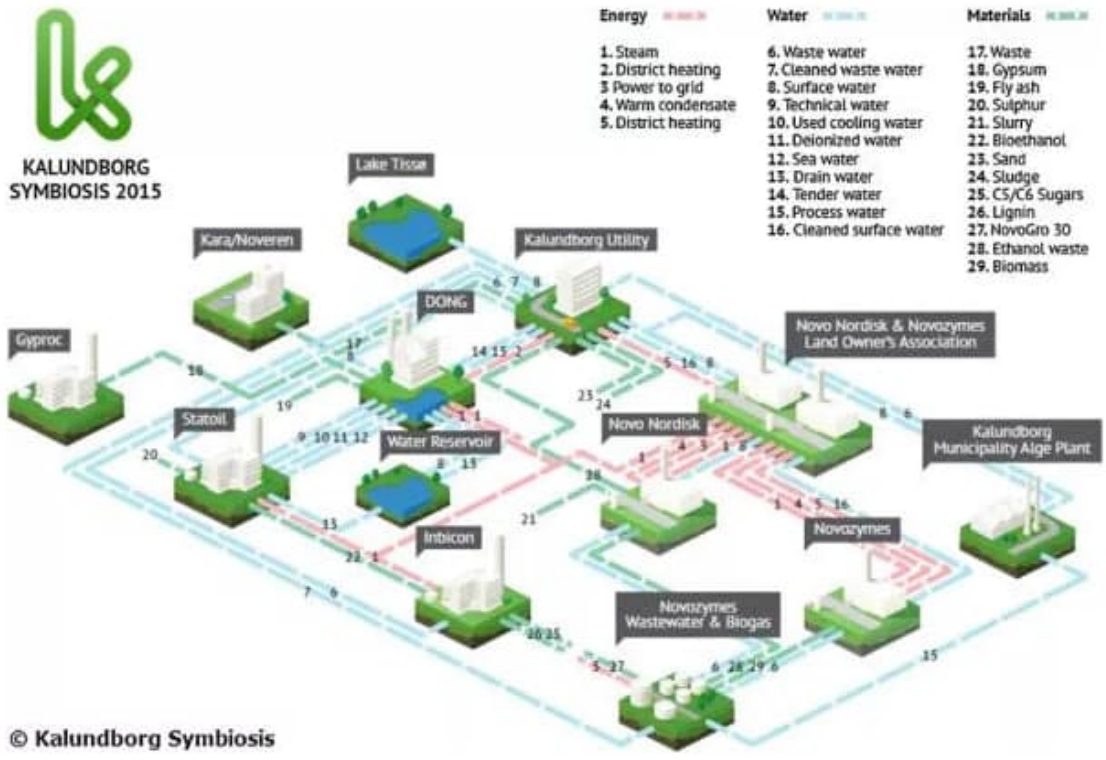


Figure 2. Kalundborg Symbiosis (Green-Ecolog.com)

2.4 Sustainable Product Lifecycle Management

To make sustainable products throughout their whole lifecycle, the products need to be designed according to a circular economy model that can be seen in figure 3 below. In practice it means that all products must be designed to be

reused and recycled. The life stages of a product are product design, material sourcing, manufacturing, operation and service, and end of life. By understanding how efficiently a product progresses through its lifecycle, the designers can determine how a product impacts the environment. For this reason, sustainable product design is so important. Product design determines if a product will be sustainably resourced, manufactured, operated and in the end, recycled. (Dave 2023)

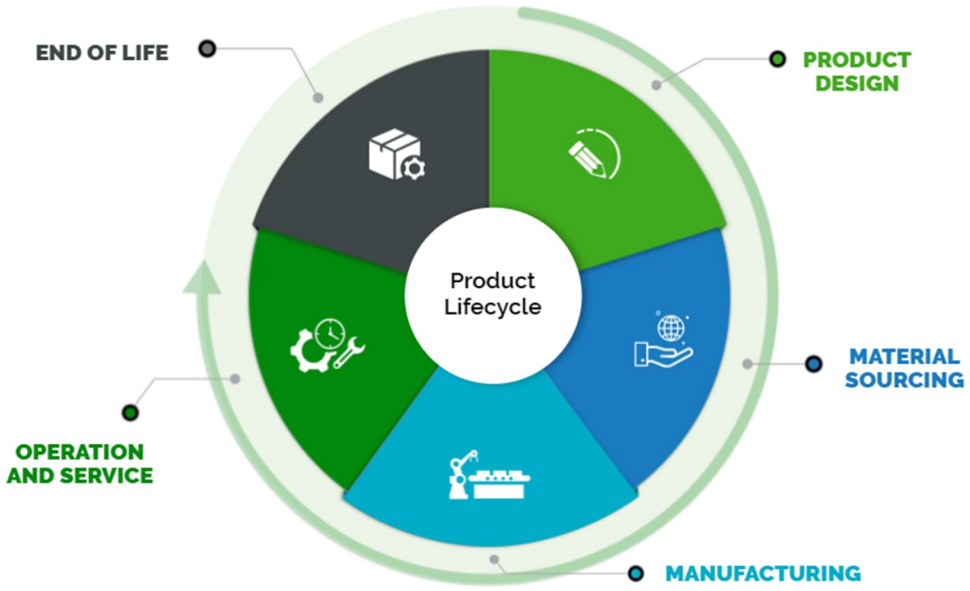


Figure 3. Circular Economy Model. (Guide to Sustainable Product Design: A Sustainability Roadmap for Manufacturers 2023)

To create sustainable products, the products need to be designed for reuse and recycling. In the design phase it must be made sure that the components can be reused in other products and the used raw materials can be recycled at the end of the product's life cycle. The raw materials must be sourced from sustainable sources, and it must be possible to recycle them. An important thing is also to design durable products so that the product's life cycle is as long as possible. (Dave 2023)

2.5 Future of Corporate Sustainability

In the past ESG data was used to show a company's commitment to environmental and social actions. Today investors are asking for the company's capabilities and strategic vision to achieve strong ESG performance. This has increased the need for measuring and reporting their ESG actions. In the future the focus will move from good environmental and social intention to delivering results. Company's actions and results will be compared against their competitors and the role of sustainability strategy in business will keep increasing. (Serafeim 2020)

Traditionally businesses are founded to create value for shareholders. Sustainable businesses are having wider perspective as they are creating value for all stakeholders, such as material suppliers, employees, and civil society. By creating value for all stakeholders, companies can use sustainability as a risk management tool. Also, sustainability can be used as an innovation tool for new business opportunities. As environmental standards are becoming stricter the need for redesigning products and supply chains to more sustainable direction is growing. Studies are already showing that employees that are working in companies with sustainability programs are prouder to work there. As competition of employees is growing the sustainability strategies are becoming a bigger factor in recruitment and employee turnover. This all has a major impact on companies' financial performance. (Whelan & Fink 2016)

2.6 Sustainability in Supply Chain Management

Responsible business is closely related to practices in SCM. The bigger the corporation, the bigger the impact of their purchasing decisions. By responsible sourcing corporations can make a difference to the wellbeing of people and nature. In the manufacturing industry the decisions are mostly related to raw material purchases, packaging, transportation and ethical topics. (Bärlund & Perko 2013, 179-180)

Corporations are more and more working with their suppliers to promote and implement social and environmental standards. Often big corporations are demanding actions from their first tier suppliers and ask those suppliers to demand actions from their suppliers. This practice then is expected to go on throughout the whole supply network. The objective of this practice is respectful, but the results are difficult to monitor and measure, especially when talking about the lower tier suppliers. (Villena & Gioia 2020)

Often the problems with implementing sustainability practices start from the big corporations themselves. The targets that they give to their suppliers regarding the delivery times and costs are very high, and the demand for materials is not indicated early enough. The orders that are given to suppliers exceed the suppliers' capacity or can't be produced in normal lead times. This means that suppliers are doing too much overtime work. When the suppliers' focus is in order fulfillment and decreasing costs, the environmental and social actions are considered as secondary priorities. The lower tier suppliers are often not known by the end-customers, which makes implementing sustainability actions almost impossible with those companies. (Villena & Gioia 2020)

What are considered as good practices to tackle these problems are creating long-term sustainability goals in the corporations, require long-term goals from the first tier suppliers, include lower tier suppliers in the sustainability strategy and assign specialists in the corporation to implement these practices in the supply network. There are different approaches that corporations can take to implement sustainability actions to their supply network. (Villena & Gioia 2020)

A direct approach means that corporations set clear requirements for their suppliers regarding sustainability and their results are periodically monitored. An indirect approach means that there are no measurable targets, but first tier suppliers are being educated about the elements of sustainability management. Customer offers training to suppliers about the ways to implement sustainability practices. A collective approach means that big corporations are working

together with their competitors or with corporations from other industries, and with their biggest suppliers to develop sustainability standards. The benefits of the collective approach are that suppliers can use the same reporting methods to several customers and more suppliers are interested in joining the collaboration when the targets are common and reporting practices are efficient. (Villena & Gioia 2020)

2.7 Corporate Sustainability Reporting Standards

In April 2021 the European Commission gave a legislative proposal for a corporate sustainability reporting directive. The aim of this was to drive companies in Europe to report their sustainability performance in a standardized way. The european financial reporting advisory group was mandated to develop a draft of the reporting standards with detailed requirements. The first draft was finalized in April 2022 for commenting. (EFRAG 2023)

The new standards will expand companies reporting to their whole value chain. The standards would be applied by all large and most listed EU companies, large subsidiaries of non-EU companies and non-EU companies with a turnover of more than 150 million EUR in the EU region. This will have a remarkable impact on the volume and scope of sustainability reporting in corporations. (KPMG 2022)

The final standards are scheduled to be available in June 2023 and first companies need to apply the standards in the financial year 2024. The scope of companies will be further increased in 2026. The standards will consist of general requirements and disclosures, environmental standards such as climate change and pollution, social standards such as own workforce and value chain, and governance standards. (EFRAG 2023)

Standards related to the supply chain are under pollution and value chain in the new draft. These will require companies to report information about emissions

from the value chain and workers conditions in the value chain, such as equal treatment and opportunities, working conditions and human rights at their suppliers. (EFRAG 2023)

3 Background of a Balanced Scorecard

3.1 History and Purpose of a Balanced Scorecard

Balanced scorecard was founded in 1990 by Robert Kaplan and David Norton. They started a research group with 12 corporate leaders with a target to create a new model for companies to measure their performance. As a result, the group came up with a model that aims to create long-term financial benefits for companies instead of short-term success. Originally it was a set of operational measures, which raised operational meters in the level of financial meters. Throughout the years it has developed into a thorough performance management system and there are many different solutions for balanced scorecards. (Malmi et al. 2006, 88, 96)

Purpose of a balanced scorecard is to help companies align their organization structure with their strategy. Big corporations are often built of several individual business units and functions. Balanced scorecards enable companies to align all units, help them with decision making and ensure that all functions and employees are working towards common goals and create value to customers and the company itself. (Kaplan & Norton 2006, 39-40)

Generally balanced scorecards are divided into four main perspectives. The perspectives are linked with the company's vision and strategy, and with each other, as described in figure 4 below. *Financial Synergies* are focusing on maximizing the value creation and value of sales. They are often measured for example by revenue and return of investment. *Customer Synergies* focus on combining company offering from several business units for customers to

service customers with the lowest cost and customized solutions. Customer synergies can be measured for example by customer surveys such as net promoter score or on-time-delivery performance. *Business Process Synergies* are focusing on performance and development of company's core competencies and operational efficiency. They can be measured for example by cost reductions of produced goods or by the number of new customer solutions. *Learning and Growth Synergies* focus on sharing know-how and the best practices across the different business units and functions in the company. They are often measured by employee satisfaction surveys or the number of participants in training courses. (Kaplan & Norton 2006, 39-61)

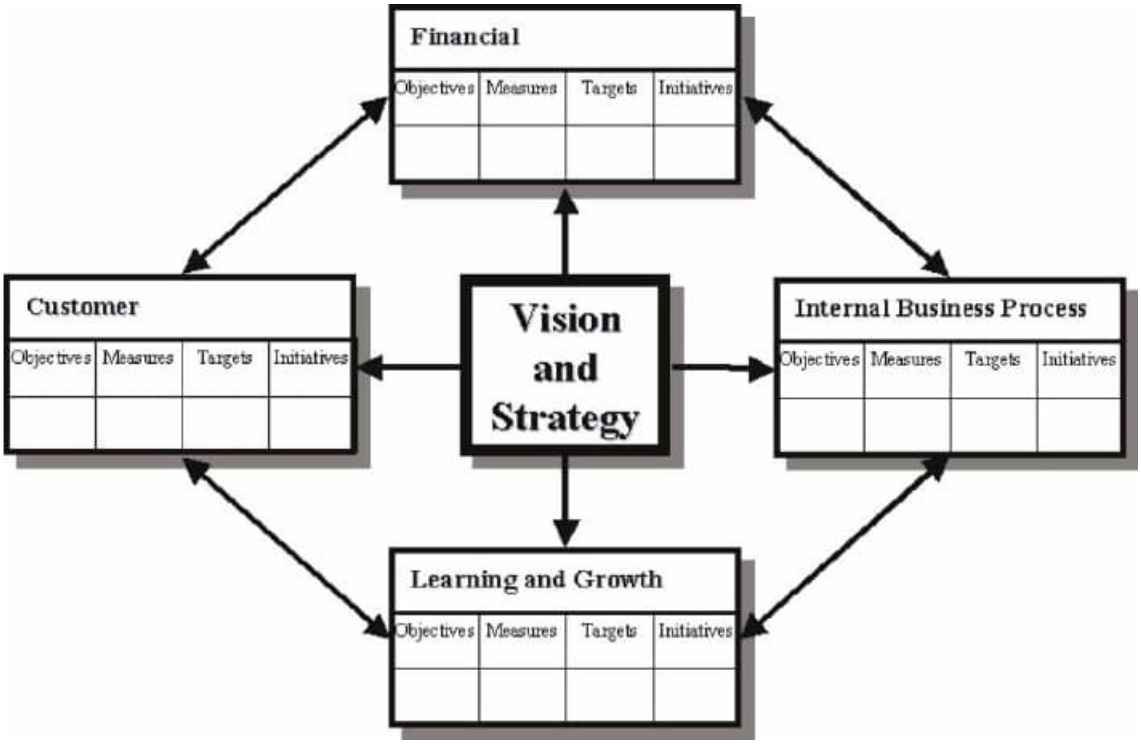


Figure 4. The perspectives of a Balanced Scorecard (Kaplan & Norton 1996, 9)

The name balanced scorecard comes from the balance that these four perspectives give: long-term and short-term objectives, financial and non-financial objectives and internal, as well as external performance. Balanced scorecards are proven to clarify, communicate and manage corporate strategy. It is used to set goals for teams and individuals, employee compensation and

resource allocation, as well as budgeting and business planning. This framework is described in figure 5 below. (Kaplan & Norton 1996, 8-9)

In this way managers do not need to choose between different perspectives or to trust just one set of measures. Managers can use balanced scorecard as a management tool that can give them immediately a thorough view of their business performance. It tells them the results of the past performance financially and operationally, but also of their future performance by improvement and innovation actions. (Kaplan & Norton 1992, 1-8)

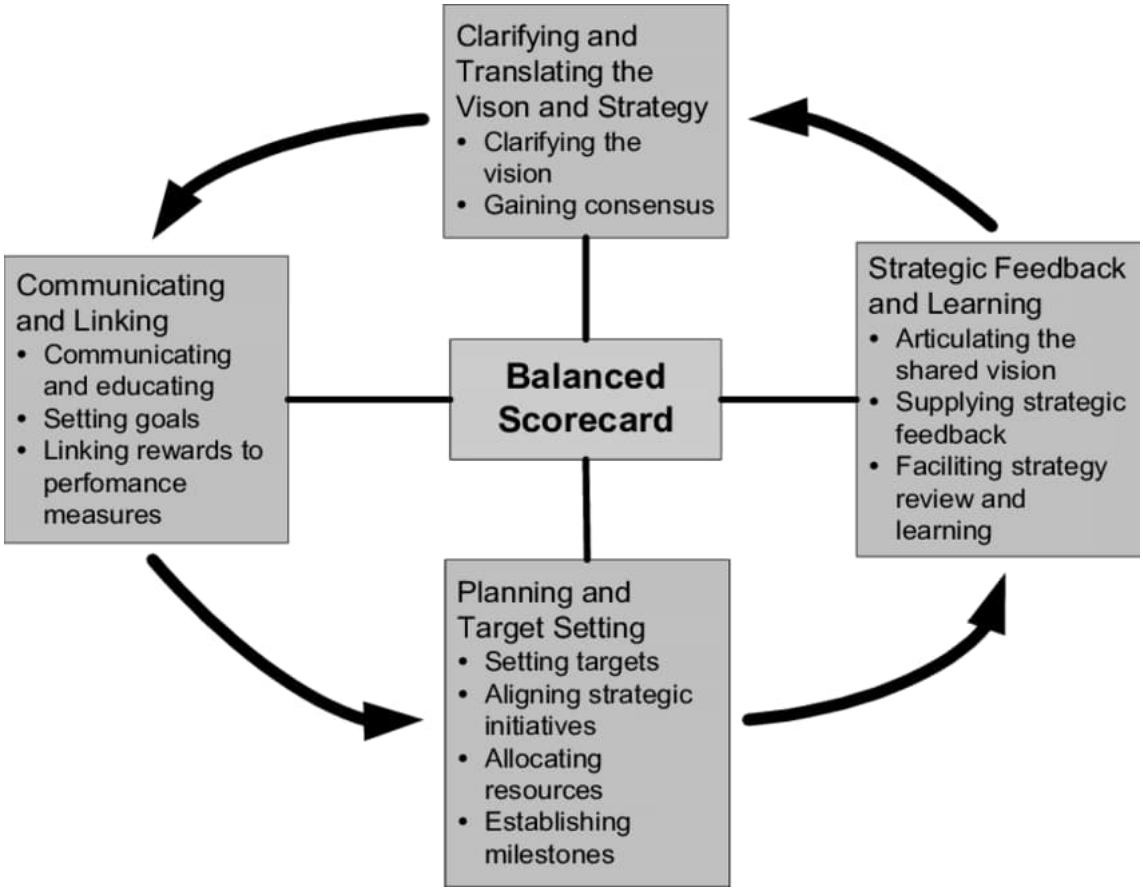


Figure 5. The balanced scorecard as a strategic framework for action (Kaplan & Norton 1996, 11)

Balanced scorecard can also easily limit the number of measures to prevent people getting too much information and focusing on irrelevant objectives or sub optimization. Balanced scorecard also helps managers to understand how different functions must be linked to each other to achieve the objectives that

have been set on their scorecard. This enables them to work more together and to remove functional barriers. (Kaplan & Norton 1992, 1-8)

3.2 Balanced Scorecard in Supplier Rating

One example of using scorecards in measuring external performance is supplier ratings. Supplier ratings are done to find out which suppliers are capable and committed of supporting companies' strategy and performance. It is a tool that is used to identify improvement areas at suppliers and eliminate bad performing suppliers from companies' supplier base. A balanced scorecard is used in supplier rating to show suppliers the key performance indicators that are the most important performance elements from the customer point of view. (Claunch et al. 1988, 149-150)

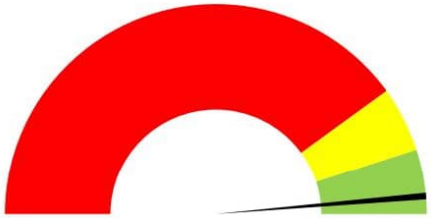
Balanced scorecards are used with suppliers because in many companies' successful performance is highly dependent on the performance of their key suppliers. Often in industry, the main objectives are to develop and manage the supplier network so that the required volumes and quality can be delivered when they are needed and with competitive prices (Kaplan, R., Norton, D. 1996, 109). These kinds of practices help customer and supplier to work together towards their long-term objectives and strengthen their business relationship. It creates trust and understanding between the companies and enables them to work more efficiently (Kaplan & Norton 2006, 15)

The criteria in the supplier rating need to be quantified measurements, such as product quality, total cost and on-time delivery performance. Elements, such as customer service should also be included in the supplier rating, but the criteria still need to be quantified data. In that case the criteria need to be suppliers' capability to perform certain critical activities, such as R&D services or warehousing activities. All the elements need to have a certain maximum point level and criteria for how to reach different point levels (Claunch et al. 1988, 150-151). An example of a supplier rating is shown in figure 6.

Petoskey Plastics

YTD 2016
Supplier Performance Scoreboard

Supplier XYC Company			
Category	**Grade**	**Weight**	**Supplier Score**
On Time Delivery	93%	40%	**97%**
Quality PPM Score	99%	40%	
Purchase Price Accuracy	98%	10%	
Continuous Improvement	100%	10%	



Under Performing Supplier	< 80%
Acceptable Supplier	80% - 89%
Preferred Supplier	90% +

Total Lines Ordered	1,819
Total Lines On-Time	1,700
	93%

On Time Delivery	Color Rating
97%+	Green
93% - 96%	Yellow
< 93%	Red

Total Pieces Received	1,083,847
Total Pieces Rejected	100
	92

Quality - PPM Score	Color Rating
<1000 (90%+)	Green
1000 - 1999 (80% - 89%)	Yellow
2000 - Above (< 80%)	Red

Total Lines Invoiced	2,018
Total Variances	50
	98%

Purchase Price Variance	Color Rating
95% - 100%	Green
90% - 94%	Yellow
< 90%	Red

Total Ideas Required	5
Total Ideas Submitted	5
	100%

Continuous Improvement	Color Rating
5+ (100%)	Green
2 - 4 (40% - 80%)	Yellow
Less than 2 (< 40%)	Red

Figure 6. Supplier rating template (Petoskey Plastics 2016)

The rating systems can be tailored according to class of suppliers and fundamentals of the service that is provided. The important thing is to be able to evaluate and compare suppliers with their competitors and find the critical

development areas. The supplier ratings should be performed on a regular basis, quarterly or annually depending on the type of rating. (Claunch et al. 1988, 150-152)

4 Research Objectives

4.1 Objective and Scope

The objective of this thesis is to propose a sustainability balanced scorecard for the case company. With the sustainability balanced scorecard, the case company can evaluate the sustainability actions and performance of its suppliers and implement better sustainability practices. Also, it is possible to report internally and externally the case company's scope 3 emissions with the data provided by the score card.

To achieve this objective the researcher has studied best practices of corporate sustainability, sustainability balanced scorecard in theory and done interviews and workshops inside the case company with stakeholders that are involved with sustainability. The thesis is written in eight sections.

4.2 Business Challenge

Currently the case company is using different ratings for their key suppliers' operational and financial performance. Sustainability related data has been collected by making separate questionnaires to suppliers by different business units. The problem is that the response data is not collectively used and evaluated, there is no measurable targets regarding sustainability and the data is scattered in different data bases. Also, as it was mentioned earlier, the case company has ambitious targets to reduce CO2-emissions in its supply chain and support the suppliers' financial and social sustainability actions.

Therefore, the case company wants to have its own sustainability balanced score card for their key suppliers, which will integrate all the reported data from different databases. This balanced score card can be used on a global scale and by different business units inside the case company.

5 Method and Material

5.1 Research Approach

The research approach in this study is a case study that aims to develop a specific issue in the case company. The case study requires observations and interviews as a basis for the study. It is useful for making a study of a specific issue or a problem in a selected site. One way of making the case study is by using research questions that will keep the focus on the selected issue throughout the whole study. (deMarrais & Lapan 2003, 225-226)

After the research questions are decided, the data sources need to be determined. Each research question needs to be supported by multiple sources of data and multiple methods, such as literature and interviews. This approach makes the findings of the study more thorough and more complicated as there are several perspectives represented. (deMarrais & Lapan 2003, 228)

In this thesis the researcher has decided to use qualitative research method. Common qualitative research methods are observations, interviews, focus groups, surveys, and data collection from articles. Advantages of qualitative research are flexibility in the data collection and data analysis when multiple methods can be used. Also, through interviews people’s experiences and feelings can be used in designing or improving new systems. The weakness is that the data can be unreliable. Because of that several different sources of data need to be used. (Bhandari 2023)

In this study several interviews and group sessions will be used as research methods. The interviews and workshops will be held with several stakeholders to get a comprehensive overview of the issue and to find the most suitable solution for it. The study will be performed in the form of a development project.

5.2 Research Design

Research design is a plan on how to collect and evaluate data, overcome problems of the research and reach a conclusion in the study. Research design gives direction to the research and gives a structure for the research process to reach the targeted outcome. Research design identifies the problems that will be studied, reviews literature about the problem, describes the sources of data and defines how the data will be interpreted. (Emeritus 2022)

The research design of this study is shown in figure 7 below. The first stage is to define the objective of the thesis. When the objective has been defined there will be a literature review. The review covers the best practice and theoretical framework regarding corporate sustainability and balanced scorecards. The outcome of the review is a conceptual framework.

The third step is to make an analysis of the current state of balanced scorecards and sustainability measurement in the case company. Based on the findings there will be a list of topics that need to be included in the proposal for the sustainability scorecard. In the fourth phase the initial proposal for the sustainability scorecard will be drawn up with the stakeholders. After the first proposal is created with the stakeholders, it is going to be reviewed and validated. Based on the feedback, the proposal can be modified to build the final proposal for the sustainability scorecard.

Figure 7. The research design of this thesis

As described in the figure 7, this study is aiming for a practical proposal for a Sustainability Scorecard based on the empiric data and theory.

5.3 Data Collection and Analysis

In this study the data will be collected in three stages: in the current state analysis, in the proposal building and in the testing phase. Data is collected by

reviewing internal documentation in the case company and by workshops in the case company with stakeholders. Based on the findings from the internal documentation and from the workshops, the list of topics that need to be included in the sustainability scorecard was identified.

Case company documentation review focuses on the most relevant documentation and articles in the case company that were related to the topic. The documentation was related to the sustainability actions and plans in the case company, and on the current scorecards that are in use in the case organization. The sustainability actions and strategy data were collected from the intranet of the case company.

Data collection involves people from two stakeholders inside the case company. One stakeholder is the Global SCM function and the other one a Global Sustainability organization. These stakeholders were chosen because they are driving the sustainability actions in the case organization, and especially in the SCM function.

The workshops were conducted in three stages. In the first stage the objective was to review the current state of the sustainability data that the case company has and compare them to the sustainability framework of the case company. The objective of the first workshop was to identify the targets and measures for the sustainability scorecard. The second workshop focused on the proposal building. The objective was to create a first version of the sustainability scorecard that could be sent for commenting to a larger group of stakeholders.

After receiving feedback, the objective of the third workshop was to adjust the first proposal and to create the final proposal for the sustainability scorecard that could be implemented in the case company’s SCM organization. The people and functions that were present in the workshops are presented in table 1.

Table 1. Workshops of the three data stages.

Participants	Date and duration	Documented as	Topics
SCM Analyst & Tools Development Manager Local Division SCM Manager	Workshop 1. 28.6.2023, 50 minutes	Meeting notes	The most important sustainability topics in the case company, measures that could be used in the score card, current supplier capabilites in sustainability reporting
SCM Analyst & Tools Development Manager Local Division SCM Manager Head of Global Supply Quality & Development Division Sustainability Manager	Workshop 2. 7.7.2023, 50 minutes	Meeting notes	Building the measures and the point system for the score card. First draft of the rating report.
SCM Analyst & Tools Development Manager	Workshop 3. 9.8.2023, 50 minutes	Meeting notes	Discussion and evaluation of the first draft. Discussion how the rating should be implemented and conducted.

All workshops were held remotely via Microsoft Teams in Finnish language. Workshop 1 had an agenda to guide the conversation but there was also open discussion around the topic. In workshop 2, the work concentrated on creating the draft template of the sustainability scorecard. In workshop 3 the first draft was evaluated, and change suggestions were given. In addition, there was a lot of open discussion about the topic during the third workshop.

The result of the first workshop was a list of topics that are wanted in the sustainability scorecard. After the topics were identified, in the second workshop a draft template with initial scoring was created. The result of the third workshop was the initial proposal for the sustainability scorecard template.

5.4 Validity and Reliability Plan

Validity and reliability are concepts that are used to evaluate the quality of research. They are indicating how well the methods are measuring the researched topics. Reliability indicates how consistently methods are measuring the researched topic and validity indicates how accurately methods are measuring. Validity and reliability are usually used in quantitative research, but they can also be applied in qualitative research. (Middleton 2019)

In this study, the stakeholders inside the case company are planned to prove the authenticity of the thesis. The outcome of the thesis needs to match the objective also. In this thesis there is not going to be planned testing of a concept. The reliability will be proved by using workshops, interviews and the best practices that are gathered from the relevant theory from several sources.

6 Work Packages of the Study

6.1 Current State Analysis

Sustainability is a central part of the strategy and purpose of the case company like shown in figure 8. In the company's intranet it is stated that their "purpose is to enable a more sustainable and resource-efficient future with our technology leadership in electrification and automation". In more detail, the case company aims to address the world's energy challenge by developing more energy efficient, safer and affordable solutions to homes, factories and transport. Further, the case company wants to be a forerunner by embedding sustainability in everything the company does by creating solutions that reduce emissions and preserve natural resources. The case company wants to be an example in ethical and humane behavior to make better lives for people. The case company is one of the companies in the Energy Efficiency Movement.

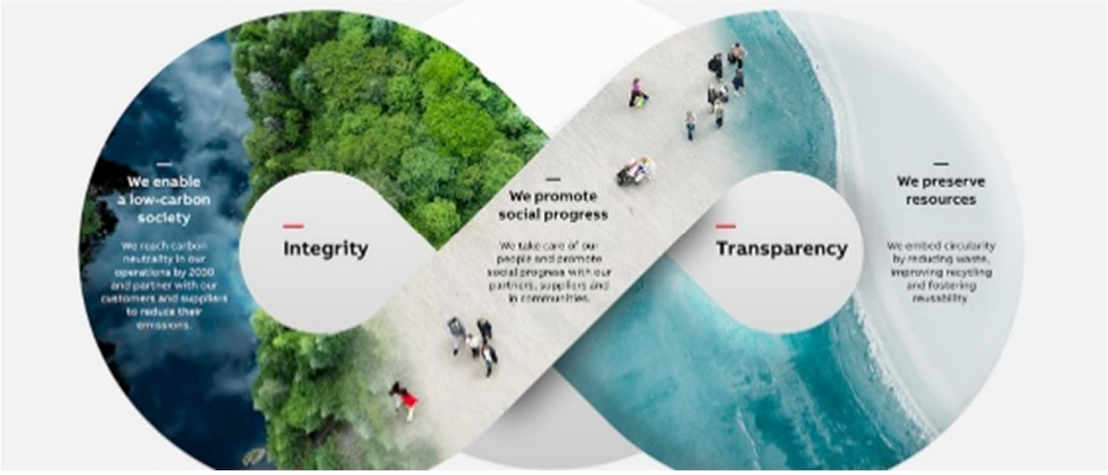


Figure 8. The Sustainability strategy in the case company

The case company has a long history in sustainability. According to their intranet, they published their first environmental report in 1994 and first sustainability report in 2000. Over the years there have been more and more focus areas, starting from health, safety and human rights to climate change. The first sustainability strategy was created in 2015 and updated in 2021 to reach until 2030.

The sustainability strategy has been divided into four focus areas. Firstly *Enabling a low-carbon society*, where the case company is committed to achieve carbon neutrality across their own operations and to reduce supply chain emissions by 50% together with key suppliers. Secondly *Preserving resources*, where the case company is committed to design and produce products and solutions that reach at least 80% circularity approach, zero waste in own operations will be disposed in landfills and at least 80% of supply spend in major countries operated will be covered by a supplier sustainability framework. Thirdly *Promoting social progress*, where the case company has a commitment that zero harm is caused to their people and contractors, number of women in senior management roles will be doubled to 25%, target a top tier employee engagement score in the industry and to provide impactful support community-building initiatives. Finally *Integrity and transparency*, where the

case company is committed to ethical behavior and human rights by following the law, acting honorably and treating other people with respect.

According to the intranet of the case company, circularity is having a major focus in the case company's product design and life cycle management. The circularity approach is described in the figure 9 below. As can be seen, there are several functions taking part in the circularity approach. By *circular design & sourcing* the case company aims to design their products to be more durable and to maximize the content that can be reused and recycled. The raw materials that are sourced must be of sustainable content. By *resource efficient operations* the case company aims to manufacture products in a more efficient way, maximize the use of sustainable packaging materials and improve logistics efficiency. By *optimized use phase* the case company offers customers products and solutions that increase resource and process efficiency, enables upgrade and optimize the lifetime of customers' facilities and equipment. By r*esponsible end-of-life* the case company offers customers take-back services that lead to re-use and recycling of products and components.

Figure 9. Circularity approach in the case company

According to the intranet of the case company, locally in the business unit in Helsinki, the aim is to reach carbon neutrality in own operations by 2030 by using 100% green electricity, using emission free district heating, improving solar plant on the factory roof, installing heat collection system and changing lighting into LED lights. In supply chain management the target is to commit suppliers to respect human rights and improve working conditions, to ensure safe and environmentally friendly operations and to follow environmental regulations. Safety has been the top priority for several years at the Helsinki factory. The case company continues to highlight and develop working according to safe methods and to survey and update risk plans at the factory. For example, every employee has had a target to make a minimum of three hazard reports per year that has been one of the annual bonus criteria.

The case company has a supplier code of conduct document that every supplier needs to meet and follow when doing business with the case company. The supplier code of conduct is available for everyone on the case company's internet site. The supplier code of conduct includes general terms and conditions for doing business, data handling and cyber security guidelines, and several sustainability related topics. The sustainability related topics are material compliance, responsible minerals and SSBM program.

Material compliance is meant to ensure that materials that suppliers are using to produce components do not endanger vulnerable habitats or societies. The case company has developed a list of prohibited and restricted substances that are in line with international regulations such as REACH, RoHS, POPs, TSCA, WEEE, WFD, and the EU Battery directive.

Responsible minerals is related to conflict minerals. In the supplier code of conduct it is stated that "In partnership with our suppliers, we are committed to using in our products tin, tungsten, tantalum, and gold which has been legally and ethically sourced." The case company commits to identify which products

are impacted by those minerals and targets not to buy materials and products from mines that are in conflict-affected and high-risk areas.

With Sustainable Supply Base Management Program, the case company wants to do business with the suppliers in the right way. This means respecting human rights of workers, by following international and local laws and regulations, by limiting environmental impacts and by implementing health and safety procedures. By the SSBM program the case company wants to improve suppliers' sustainability performance. It is especially meant for suppliers that are operating in risk areas. The case company performs on-site audits and projects to support the suppliers and gives sustainability training for suppliers.

6.2 Supplier Scorecards in the Case Company

Currently the case company is using a supplier rating with the key suppliers. The rating consists of three parts, firstly quality, secondly availability and thirdly co-operation and development. With some suppliers the rating has been modified, for example safety is added as a rating topic, but over 90 % of the suppliers are being rated with the basic agenda. The rating is done quarterly.

Quality is measured by comparing the number of claimed parts to the total number of received parts per supplier. The measure is DPPM. Availability is measured by on-time-delivery performance and buffer stock performance. The case company has agreed minimum and maximum buffer stock levels with many suppliers and suppliers are reporting the actual buffer levels weekly. Based on this information it is being calculated how many items buffer levels are over the agreed minimum level.

Co-operation and development are considered as soft KPIs and are measured according to how the supplier responsible persons in the case company are experiencing the supplier's performance. The section is divided into technical

co-operation, commercial co-operation and suppliers' willingness and capability to develope their operations. Technical and commercial co-operation are related to suppliers' responsiveness to questions and enquiries, and their proactiveness in informing the customer about problems related to quality and availability.

6.3 Best Practice for Creating a Sustainability Balanced Scorecard

Earlier studies proposed that the best way to create a sustainability balanced scorecard is to include environmental and social objectives in the scorecard on top of the current financial and operational objectives. The objectives need to be the most important to the company itself and something that they can be implemented in a reliable way. Another way to choose the objectives is to use existing ESG reporting standards, such as European Sustainability Reporting. (Savkin 2017)

Practical objectives that can be well measured are for example,

- Energy consumption and use of renewable energy in operations
- Water consumption in operations
- Amount of waste generated in operations
- CO2 emissions generated in operations
- Use of recycled materials and product recycling rate
- Workplace safety

There are many other objectives that can be used but the ones mentioned above are practical and can be well implemented in the manufacturing industry. (Savkin 2017)

In figure 10 below is an example of a sustainability balanced scorecard where social and environmental objectives are measured together with financial objectives.

Sample MultiCapital Scorecard

● Human
● Social & relationship
● Constructed
● Internal financial
● External financial
● Non-financial
● Natural

BOTTOM LINE	AREAS OF IMPACT	Progression score (A)	Weight (B)	Weighted score (A×B=C)	Fully sustainable score (B×3=D)	Gap to fully sustainable (D−C)	Area of impact bottom line (C÷D)	TRIPLE BOTTOM LINE
SOCIAL	● Living wage	1	1	1	3	2	33%	-25%
	●●● Workplace safety	-1	5	-5	15	20	-33%	
	●●● Innovative capacity	-1	2	-2	6	8	-33%	
ECONOMIC	● Equity	2	5	10	15	5	67%	62%
	● Borrowings	2	1	2	3	1	67%	
	●● Competitive practices	1	1	1	3	2	33%	
ENVIRON-MENTAL	● Water supplies	3	3	9	9	0	100%	53%
	● Solid wastes	1	2	2	6	4	33%	
	● The climate system	1	5	5	15	10	33%	
	OVERALL PERFORMANCE			23	75	52		31%

Figure 10. Sample of a sustainability scorecard. (Thomas & McElroy 2015)

6.4 Building a Sustainability Scorecard in the Case Company

Building the sustainability scorecard was done in three stages. In the first stage there was a meeting where the most important sustainability topics in the case company were taken up. There was also discussion of how the topics can be measured and about the capabilities of the current suppliers to achieve the sustainability objectives.

As an outcome of the meeting, it was decided that the sustainability scorecard should include social and environmental objectives related to responsible sourcing, sustainability practices at supplier and safety. These three areas were chosen because they are related to the case company's own sustainability objectives, and they can be measured with current tools and data sources.

Responsible sourcing in the case company includes use of red flag smelters and suppliers' declaration of materials used in the components they are manufacturing to the case company.

In the second stage the first draft version of the sustainability scorecard was created with an initial scoring system. In the third stage a meeting was held where the first draft version of the sustainability scorecard was reviewed with relevant stakeholders. In the meeting it was decided to reorganize the headings of the scorecard so that responsible sourcing includes red flag smelters and SSBM open actions, governance includes full material declaration, safety includes lost time incident frequency and carbon neutrality includes CO2 emission reduction. Below all metrics are described in more detail.

6.4.1 Responsible Sourcing

Red flag smelters, which measures the rate of red flag smelters of total smelters the supplier is using. Full points can be achieved when there are no red flag smelters in use. If there's any black flag smelters the scoring is automatically 0. Red flag and black flag smelters are smelters that are processing or possibly processing conflict minerals, such as gold or tin, that originate in conflict-affected areas. (European Commission 2021)

Supplier sustainability audit open actions, which measures the number of open actions that the case company has identified in sustainability audit during the SSBM program. Full points can be achieved when there are no open actions that supplier needs to perform.

6.4.2 Full Material Declaration

Full material declaration, which measures the rate of declared components of all components the supplier is producing. Full points can be achieved when supplier is able to declare all the components that they are using in producing goods to the case company. The full material declaration reporting is done annually by the suppliers. The case company is working with an external service provider who is responsible for collecting the information and reporting the results to the case company.

6.4.3 Lost Time Incident Frequency

Lost time incident frequency, which measures the amount of lost time incidents at supplier compared to the total working hours at the supplier. To achieve full points, the LTIFR at the supplier must be lower than the given target from the case company. The targets are set for suppliers according to the industry they are working with and the country they are operating. Industries are having big differences in the average of LTIFR, and countries have different regulations when giving sick leaves for workers.

6.4.4 Carbon Neutrality

Carbon neutrality, which measures the development of CO2 emissions at the supplier compared to the 2019 baseline. The target is that suppliers are reducing their CO2 emissions by 25% by 2025. To achieve the full points, suppliers need to achieve enough CO2 emission reductions annually to stay ahead of the 25% run rate.

7 Proposal for the Sustainability Score Card

7.1 Overview of the proposed Sustainability Scorecard

The proposed solution for the Sustainability Scorecard for the case company is an excel file that presents five metrics that are important for the case company and their own sustainability objectives. The proposal is done in a simple excel file because similar scorecard has been in use when measuring suppliers' operative performance, it is easy to modify in the future if the sustainability objectives or the scoring system changes, and it is easy to fill. The template is suggested to be used in the beginning as a pilot version.

The first part of the template is shown in figure 11, it includes the rating grades and general information,

- supplier's details
- which year results were rated
- the commodity that supplier is producing
- who has done the rating
- when the rating took place

Supplier	Supplier X
Supplier number	123456
Year of the rating	2023
Rating about	Commodity X
Rated by (LBU's)	LBU X
Rated by	Person x, Person y, Person z
Date	dd.mm.yyyy

Rating grades:	
90…100	Target level
80…89	Good
70…79	Fair
50…69	Unsatisfactory
0…49	Poor

Figure 11. General information.

The second part is described in figure 12. It shows the summary of the latest rating score and when the rating has been done for several years, the history of the results is shown in a graph. The trigger level is showing the minimum level

that suppliers should be achieving in total, which is 50 points. The target level is 90 points.

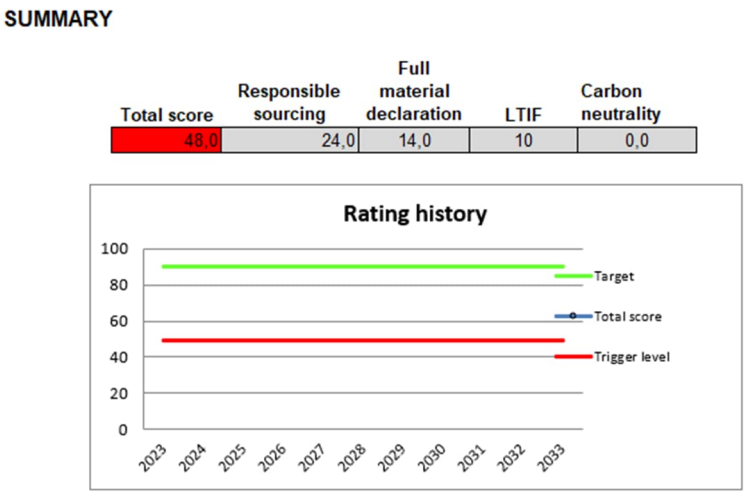


Figure 12. Rating summary and history.

Next all the rated topics are handled separately, first red flag smelters and SSBM under responsible sourcing described in figure 13. Like it is shown in the figure 13, the scoring is based on the red flag smelters that are in use by suppliers' and if there's any black flag smelters the scoring will be automatically 0 points. In the SSBM performance, if the case company is not conducting sustainability audit for the supplier, the open actions will be 0 and the supplier will achieve the maximum points.

RESPONSIBLE SOURCING	24,0	Max. 40 points

Redflag smelters		
Amount of smelters used	67	
Amount of redflag smelters	13	
Amount of black list smelters	0	If any in this list, the score is 0
Result	19,4 %	
Rating points	14,0	
Max. Points	20	

SSBM performance	
Open SSBM actions	5
Rating points	10,0
Max. Points	20

Comments:

Figure 13. Responsible sourcing results.

Second part is full material declaration described in figure 14. The rating in this section is simple, the case company will receive the number of items that need the full material declaration from external service provider. The same service provider will provide the list of items that suppliers' have declared and those results are then rated here.

FULL MATERIAL DECLARATION

	14,0	Max. 20 points

Items to report	100
Reported items	87
Achievement-%	87 %
Rating points	14,0
Max. Points	20

Comments:

Figure 14. Full material declaration results.

In the third section of the rating lost time incident frequency is rated like described in figure 15 below. The rating here is also simple, the case company will set a LTIF target for each supplier and the suppliers' will report the full year result that they have achieved.

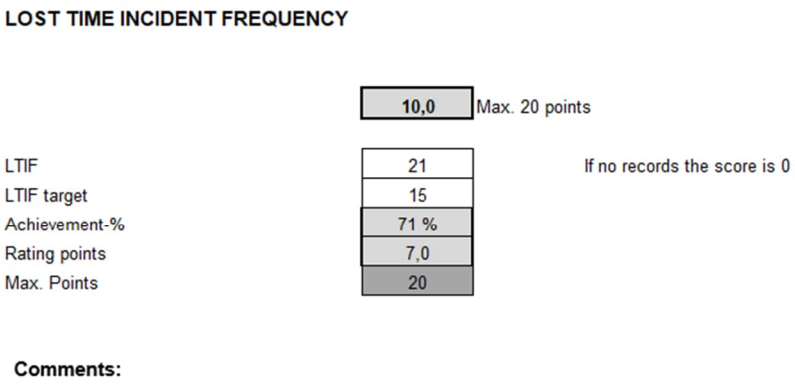


Figure 15. Lost time incident frequency results.

In the last section of the rating carbon neutrality is rated like described in figure 16 below. As it can be seen in the figure 16, the base level is set to 2019 results of CO2 emissions. Suppliers need to report the base level to the case company and the results that they have achieved every year.

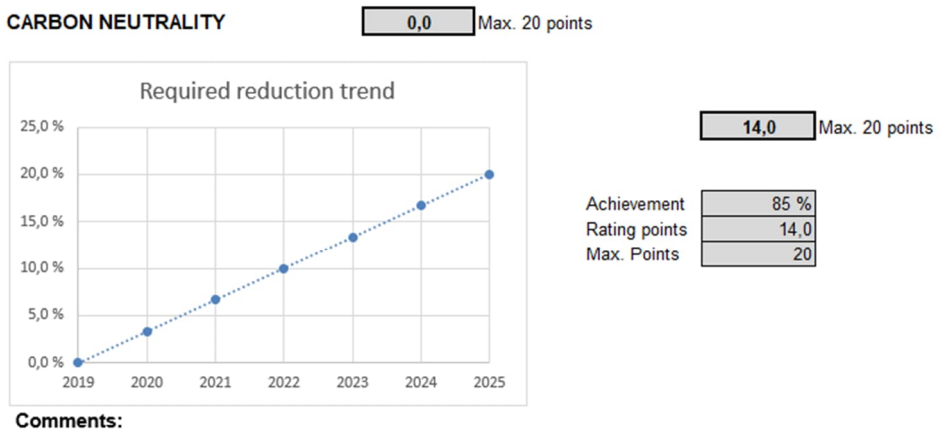


Figure 16. Carbon neutrality results.

In each metric the target level is shown and the actual result from the supplier. In each metric suppliers are awarded with points between 0-20. A comment section was added to each metric if additional details about the suppliers' results need to be given.

7.2 Strengths and Weaknesses of the Proposed Scorecard

The objective of the project was to create a scorecard to track and improve the sustainability performance of the case company's material suppliers. The main objective can be achieved with the proposed sustainability scorecard.

The strengths of the sustainability scorecard are that the metrics that were chosen are established in the field of sustainability, and they can be measured by the case company. The metrics are the same that the case company is monitoring in their own operations, and they have been highlighted as important sustainability objectives at the company. Different suppliers can be compared against each other, and the long-term development of the results can be measured. There are five different metrics included, which are balancing the rating results.

The weakness of the proposed sustainability scorecard is that SSBM program and audits are not performed to all suppliers. It will put suppliers into an uneven situation unless the scope of the SSBM program is widened to all key suppliers, even if they are operating in Western countries. Another weakness is that legislation related to giving sick leaves to workers varies in different countries. That also might put suppliers in an uneven position.

8 Discussion and Conclusions

8.1 Summary

This thesis introduces a balanced scorecard to measure suppliers' sustainability performance in a case company. The SCM function in the case company had ambitious objectives to implement more sustainability practices to their material suppliers and track the effects. With the scorecard that has been introduced by the thesis together with the stakeholders, the case company can start to measure the key suppliers' sustainability performance and highlight the importance of sustainability throughout their supply chain.

This thesis was conducted in several stages, starting from literature review. The literature was chosen based on the objectives of the thesis and the focus was on corporate sustainability and balanced scorecards. The outcome of the literature review was a conceptual framework. In the next stage a current stage analysis was done by having a workshop with key stakeholders and by reviewing the sustainability framework of the case company. The result of the current state analysis was a list of topics that needed to be included in the sustainability scorecard.

Based on the findings from the literature review and current state analysis a first proposal was built. The proposal was created in meetings with the key stakeholders in the case company. The first proposal was presented to key people in the case company working with sustainability topics. Based on their feedback some improvements were made and the final proposal was created. The final proposal still needs piloting, but it includes the most important sustainability topics from the case company's point of view.

8.2 Immediate Next Steps

As a first step the proposed sustainability scorecard needs to be taken into pilot use. It is suggested that the piloting is done with a few key suppliers. In the piloting it needs to be evaluated that the metrics are suitable and that the aims are such that the suppliers can achieve. In chapter 7.2. it was mentioned that one weakness of the proposal is that different countries have different legislations regarding the sick leaves. It needs to be evaluated so that the suppliers can be reliably compared against each other.

After getting feedback and experience, the scorecard can be taken into larger use. This means that use of the scorecard can be expanded to other suppliers and to other business units globally in the case company. When many suppliers and people in the case company start to work with the proposal it most likely starts to create more issues and development proposals that then need to be regularly reviewed to improve the scorecard.

Last, the data collection process needs to be critically evaluated. Collecting the needed data must be easy to do and reliable so that the results of the scorecard are reliable. It needs to be considered that the data collection can be automated so that the suppliers report data to certain platforms where the case company can create easily reports and even a ready scorecard. There are already service providers who are rating companies regarding their sustainability performance, such as EcoVadis and Morningstar Sustainanalytics. During the thesis process it was discussed in the project team that the case company is considering starting co-operation with EcoVadis regarding their suppliers' sustainability performance. EcoVadis is already rating the case company. Using such a reliable service provider could be very beneficial for the case company. The case company could get the needed data and ready ratings and focus on their core competencies in their business.

8.3 Evaluation

8.3.1 Outcome Versus Objective

The objective of this thesis was to create a scorecard to measure the case company's supplier's sustainability performance like described in the section 4.1. In that perspective the objective is achieved. As a result of the development project the case company has a scorecard file that they can implement into use and start to monitor their key supplier's sustainability performance regarding the most important sustainability topics from their point of view that were discussed in the section 6.4. The proposed scorecard still needs to be piloted before larger implementation. The metrics and targets possibly need to be adjusted and the data collection process needs to be evaluated and developed further.

The scorecard takes into account two sustainability categories that were described in section 1.3., ecological sustainability by measuring suppliers' progress regarding carbon neutrality and social sustainability practices at the suppliers by responsible sourcing, safety and full material declaration. This said, the weight in the scorecard is in the social sustainability, and financial sustainability is not measured at all. Something that could be evaluated in the case company later is to add more ecological and financial sustainability topics into the scorecard. In industrial ecology that was described in section 2.3., circularity is in big focus as it is in the case company's sustainability strategy as it was described in section 6.1. Taking circularity as a part of the scorecard was discussed in the workshops but currently it can't be reliably measured in the case company. It is also something that should be included in the scorecard later.

The structure of the scorecard is following the guidelines of balanced scorecards that were described in section 3.1. There are five different metrics included, which makes it balanced. But like mentioned earlier, the weight is in social sustainability so in that sense the scorecard has some imbalance. This

also highlights that the scorecard should include more ecological and financial sustainability topics in the future. Financial sustainability is something that could be easily measured as all key suppliers are reporting their financial results annually. The case company's sustainability strategy focuses on ecological and social sustainability so it is justifiable to start implementing the scorecard with just social and ecological topics.

8.3.2 Reliability and Validity of the Study

In the section 5.4. it was discussed that the stakeholders in the case company will prove the reliability and validity of the thesis. Testing of the proposal is not in the scope of the thesis so the reliability is recognized by gathering feedback from the stakeholders and several sources from literature. The validity was first recognized by finding suitable articles and well-known books related to corporate sustainability and balanced scorecards in sections 2 and 3. In the second stage the validity was recognized by having three workshops with the stakeholders and by reviewing the case company's internal documentation and sustainability objectives.

The reliability of the thesis was achieved by having three workshops with the key stakeholders. In the workshops all development ideas, possibilities and problems were discussed and noted. The literature review is supporting well the final proposal. The weakness of the thesis is that the final proposal is not tested in practice to thoroughly validate the proposal.

8.4 Closing Words

Sustainability is coming more and more imperative in business as investors and customers are starting to require sustainability plans and even ratings from

companies when they are making business decisions. Big corporations need to develop their internal operations in a more sustainable way and they must pay more attention to the sustainability of their supply chain. By conducting sustainability ratings to suppliers, companies can push their key suppliers to improve their sustainability practices, which in the long term can generate more business opportunities and decrease business risks.

By conducting sustainability ratings and taking proper actions with low-performing suppliers, companies can achieve better reputation in their business areas, attract investors and improve their products and services. Sustainability ratings that are regularly done to corporations' supply chain are relatively new, but companies can improve their competitiveness by being forerunners.

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