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Measurement of sustainability metrics in oil & gas and food industries: industry specific context

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TIIVISTELMÄ:

Toimitusketjujen vastuullisuutta on tutkittu aiemmin monella eri tapaa useiden eri perpsektiivien näkökulmasta. Vaikka toimitusketjujen vastuullisuus on jo varsin usein esiintyvä aihealue, akateemisessa kirjallisuudessa ei olla juurikaan tutkittu tarkemmin toimialakohtaista vaikutusta toimitusketjujen vastuullisuuteen. Tämä Pro Gradu työ tutkii kuinka kaksi valittua toimialaa vaikuttaa siihen, miten toimitusketjujen vastuullisuus näkyy yrityksen toiminnassa. Tässä tutkimuksessa vertailun kohteena olevaa kahta toimialaa tutkitaan kahden eri yritysten käyttämien vastuullisuusmittareiden perusteella. Vertailtavat toimialat ovat öljy & kaasu- ja ruokayhtiöala, yritysten ollessa BP Oil ja Nestlé. Yritysten käyttämien vastuullisuusmittareiden perusteella tämä tutkimus osoittaa mitä vastuullisuuden osa-alueita painotetaan enemmän kahdessa toimialakohtaisessa kontekstissa. Tutkimustavotteen täyttymiseksi tähän työhön on kerätty empiiristä dataa kahdesta yrityskohtaisesta vastuullisuusraportista ja toimittajille suunnatuista eettisestä ohjeistusdokumentista, sekä kolmannen osapuolen vastuullisuusindekseistä. Käyttämällä kolmea erilaista lähdetyyppiä tutkimus pyrkii antamaan mahdollisen kattavan kuvan siitä, mitä vastuullisuusmittareita kaksi esimerkkiyritystä painottavat yritystoiminnassaan etenkin toimitusketjukohtaisessa kontekstissa. Tutkimuksen tulokset löydökset osoittavat, että kahdella eri toimialalla löytyy kohtia, joiden perusteella voitaisiin todeta että näillä kahdella eri toimialalla keskitytään erilaisella painotuksella tiettyihin vastuullisuusmittareihin. Ensinnäkin, tutkimuksen perusteella ruokayhtiöalla on kaiken kaikkiaan isompi painotus ympäristötekijöihin kuin öljy & kaasualalla, sillä ympäristöön liittyviä mittareita toimintaketjujen kontekstissa esiintyy enemmän saatavilla olevissa empiiriseen tutkimukseeen käytetyissä dokumenteissa. Tämän huomaa erityisesti siitä, että öljy & kaasu-yhtiön toimittajalle suunnatussa ohjeistusdokumentissa ei ole lainkaan mainittuna ympäristöllisiä tavoite- ja ohjeistusmittareita. Tätä vastoin, ruokayhtiöalan vastaava dokumentti esittelee konkreettisesti erilaisia ympäristövastuullisuusmittareita. Toiseksi, sosiaalisen vastuullisuuskategorian sisällä näkyy tutkimuksen tulosten perusteella selvä ero. Ruokayhtiöalalla on isompi paino raportoinnissa ihmisoikeusalueella, ja öljy & kaasualalla taas työturvallisuudessa. Nämä erot on helpoin huomata kahden yrityvastuuraportteja tarkastelemalla. Lisäksi, öljy & kaasuala ei mainitse lainkaan eläinten hyvinvointia osana sosiaalista vastuullisuusmittaristoa toimitusketjukohtaisessa kontekstissaan, mikä on myös ero ruokayhtiöalaan. Kolmanteen ESG- pääososa-aluueseen, G:hen liittyvä raportointi oli hyvin yhteneväistä kahden yrityksen välillä, joskin öljy- ja kaasuyhtiön dokumenteissa oli enemmän tähän osa-alueeseen kuuluvien erilaisten mittareiden mainintoja. Yllämainitut tutkimustulokset antavat ohjeistavan kuvan siitä, mitä mittareita ja tekijöitä öljy & kaasualan, sekä ruokayhtiöalan yhtiöt painottavat toimitusketjukohtaisessa toiminnassaan. Tämän tutkimuksen löydökset ovat konkreettisia ja ne antavat potentiaalisesti yritysjohdolle työkaluja yleisten vastuullisuusongelmien ratkaisemiseen. On tärkeä myös todeta, että koska tämän tutkimuksen kohteena oli vain yksi esimerkkiyhtiö per toimiala, saadut tutkimustulokset saattaisivat muuttua mikäli tutkimuskohteena olevien yhtiöiden määrää lisättäisiin.

AVAINSANAT: Sustainability, Supply Chain Sustainability, Supply Chain, ESG, Metrics

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ABSTRACT :

The sustainability of the supply chains has been studied in many studies in different contexts. Although the supply chain sustainability is already a frequently occurring topic, the academic literature has not studied the industry-specific effect on the sustainability of supply chains in more detail. This paper examines how two selected industries affect the way the sustainability of supply chains is reflected in the company's operations. In this study, the two industries that are the subject of comparison are investigated based on the sustainability metrics used by two different companies. The two industries in question are oil & gas and food companies, companies being BP Oil and Nestlé. Based on the sustainability metrics used by companies, this study shows which aspects of responsibility are emphasized more in the two industry-specific contexts. To fulfill the research goal, empirical data from two company-specific sustainability reports and supplier code of conduct documents was collected, as well as from third-party sustainability indices. By using three different types of sources, the study aims to provide a comprehensive picture of which sustainability metrics two example companies emphasize more in their business operations, especially in a supply chain-specific context. The findings of this research show that it could be deduced that these two different industries focus with different emphasis on certain areas of sustainability. Based on the research, the food company has an overall greater emphasis on environmental factors than the oil & gas company. This can be noticed from the fact that in the supply chain context, the environmental metrics appear more in the available documents used for the research. This can be seen especially from supplier code of conducts, where the oil & gas company does not mention metrics related to environmental targets and guidance at all. In contrast, the corresponding document for the food company industry presents various environmental metrics. Within the social sustainability area, the food company sector has a greater weight in reporting the human rights, while the oil & gas sector in health and safety. In addition, the oil & gas industry does not mention animal welfare at all as part of the social sustainability metrics in its supply chain-specific context, which is also a difference to the food company industry. The reporting related to the third ESG main component area, G, was very similar between the two companies, although the oil and gas company mentioned more metrics belonging to this area. The above-summarized research results give guidance and a better picture of which metrics and factors the companies in the oil & gas industry and the food company industry emphasize in their supply chain-specific operations. The findings of this study are concrete, and they can give the managers tools for solving general sustainability problems in their company. It is also important to note that since the scope of this research comprised only one example company per industry, the obtained research results could be subject to change would the number of case companies increase.

KEYWORDS: Sustainability, Supply Chain Sustainability, Supply Chain, ESG, Metrics

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1 Introduction

1.1 Background of the study

Krysiak (2009) defines sustainability as the extent to which current organizational decisions have an impact on the natural environment, society, and commercial viability in the future. Many organizations have been pushed to include sustainability issues in their strategic improvement plans as a way to minimize the negative environmental and social impacts of their business operations over the past decades due to pressures similar institutions such as governmental legislation and international standards (Ahi and Searcy, 2015). For the past decade, both academia and practitioners have been fascinated by the concept of supply chain sustainability. (Hassini et al. 2012; Morali and Searcy, 2013). Many corporations have embraced a certain amount of commitment to sustainability practices derived from pressures by many stakeholders, particularly government regulators, community activists, non-governmental organizations (NGOs), and global competitors. (Hassini et al. 2012).

From a supply chain's perspective, Silvestre (2015) sees that industry leaders, researchers, and politicians have recently focused their attention on sustainable supply chain management. Hoffmann et al. (2014) see that a firm with good supply chain management process may still be likely liable to risks related to sustainability issues. Indeed, the stress for sustainability has also extended to the area of supply chains.

Organizations must address sustainability challenges not only in their operations, but also in the larger supply chain networks in which they operate due to changing business trends and stakeholder impact (Miemczyk et al., 2012; Meixell and Luoma, 2015). The increased stress towards sustainability practices has been applied to various supply chain actors such as suppliers, manufacturers, transporters, warehouses and retailers,

which have been forced to integrate actions to address not only economic but also environmental and social aspects. (Ansari and Kant, 2017).

Abbas and Sagsan (2019) argue that environmental effect is a major topic of discussion when it comes to supply chain sustainability. This focus pushes enterprises to use environmentally friendly manufacturing and production procedures, as well as reduce negative impacts on natural resources. Overall, the strive towards sustainability is becoming more widely recognized as a viable method for dealing with some of the most pressing issues confronting global supply networks. It also improves financial performance and increases competitiveness (Wang and Sarkis, 2013).

It is typical for companies that they do not have a common way to evaluate sustainability in their operations (Hassini et al. 2012). Similarly, Lehtinen and Ahola (2010) have argued that there are incompatibilities among the performance measures and supply chain dynamics. Thus, there is a need for more research on creating a framework for measurements and metrics of supply chains in terms of their sustainability (Hassini et al. 2012).

As the concept of sustainability is gradually getting more integrated into the context of supply chain management, Seuring and Gold (2013, p.3) see that inspecting how to measure sustainability performance in the context of supply chains is highly important. Moreno-Camacho et al. (2019) see that sustainability addresses the balance of economic, social, and environmental issues. This sustainability balance corresponds to the need to use different metrics that create a clear view of the organization (Taticchi et al. 2013). Sustainability metrics are frequently used to assess and motivate progress toward long-term sustainability goals (Veleva and Ellenbecker, 2001). Although supply chain sustainability has been evaluated from the perspective of various quantitative

models, only a few of focus on the difficulty of selecting and weighting sustainability metrics. (Bai et al., 2012 & Feil et al., 2015).

Osiro et al. (2018) deployed their own selection process of metrics in the context of supply chain sustainability without addressing how metrics might be affected by various industries. As future research recommendation they propose to weigh and select different supply chain sustainability metrics in different industry fields. An issue with supply chain sustainability metrics may be that they are too simplistic and generic, thus not being suitable for the challenges revolved around a specific industry (Stindt, 2017). Several authors stress the significance of generating metrics that also consider the context in which they are applied, such as specific industry characteristics. (Ahi and Searcy, 2015a; Taticchi et al., 2013). This leads to the idea of investigating more closely what kind of sustainability metrics are typical for specific industries. This would preferably result in a better understanding of the way industries affect what sustainability metrics are used and present in them.

1.2 Research question, objectives, and delimitations

The significance and demand for sustainability in supply chain management has placed strong pressure on not only focal firms but also on the way other supply chain partners and stakeholders can be integrated to the operations, thus impacting the supply chain performance in a sustainable way (Yuen et al. 2019). Therefore, the concept of sustainability is not exclusively pertaining to the focal company, but also other players such as stakeholders and suppliers that take part in the supply chain (Zhu et al. 2005). Thus, the mutual contribution of all the stakeholders in strategic or operational activities are essential to positively impact the supply chain sustainability of the focal firms, suppliers, and other key stakeholders across the supply chain. The same study further shows that internal integration of supply chain processes between the different actors

involved in it simultaneously enhances sustainability in all three supply chain sustainability dimensions that are *EES.* (Donkor et al. 2021).

From the previous it can be deduced that it is relevant to study the metrics in the context of supply chain sustainability. Furthermore, this paper will investigate the effect that an industry has on the kind of metrics being used. Xu et al. (2019) see that future research should focus on characterizing sustainable supply chain intensively, as it is highly dependent on the nature of industries. This paper will focus on how the sustainability of a supply chain is evaluated by metrics, and this issue is approached from an industry context. A *metric* in this research signifies a point of measurement that in this study context usually pertains to one of the three main dimensions of sustainable development, *economic, environmental*, and *social* (Hassini et al. 2012). This study strives to investigate how the context of industry affects what metrics are selected in measuring sustainability in the supply chains.

As such, the main research goal of this study is as follows:

How performance metrics for sustainability of supply chains differ depending on the industry in globally notable companies?

There will be three research objectives that will aid in developing an encompassing answer for the main research goal of this study. Through literature review, it will be investigated what kind metrics are used, and whether they are part of the three main sustainability dimensions.

Firstly, it is intended to understand the elements by which sustainability measurement can be conducted in the context of supply chain sustainability. This creates a good premise to a more thorough analysis of the empirical findings that will be found in the latter parts of this paper. For instance, Ahi et al. (2015) have used sustainability dimension-oriented approach in their measurement of supply chain sustainability. According to their study metrics for GSCM and SSCM must address the broader

sustainability context of the supply chain. According to them, this means that any supply chain should consider all three main sustainability dimensions, economic, environmental, and social. As such, a focal element used to measure sustainability can be seen as sustainability dimensions. The first objective is as follows.

To identify frameworks to measure sustainability performance of supply chains.

Secondly, as the objective of this thesis is to understand the way industries affect the sustainability measurement of supply chains, it is important to study whether there are specific sustainability dimensions that prevail in given industries. Furthermore, this allows to see whether specific metrics are more occurring in different industries. The second objective is as follows.

To categorize themes of performance metrics for the three dimensions of sustainability (EES) and identify the potential effects of industry context (literature review)

As the third objective, it will be empirically explored how industry affects what sustainability performance metrics that are used in sustainability assessment. This will be done by choosing two separate companies from two separate industries and by studying their sustainability reports. In this empirical analysis, the three components of the ESG concept will be used when exploring the metrics that appear in the two industries based on their publicly available documents. It cannot be known in advance which of the three entities pertaining to ESG will be most prevailing in the empirical analysis, as it depends on how the two companies stress and address their concern for supply chain sustainability in terms of the metrics used. The third objective is as follows.

To explore the used performance metrics and their connection to the sustainability dimensions in food industry and oil & gas industry based on case study research

1.3. Structure of the study

The structure of this study is as follows. The study will commence with a literature review in which it will be investigated what has been previously studied concerning the subject of sustainability metrics in the supply chain context. This will also give out a clearer idea of the matters that have yet not been addressed and how this study can be of benefit. After the literature review, this paper will further investigate different kinds of sustainability metrics, and how do they prevail depending on the industry context. Therefore, different industries will be scrutinized, and it will be illustrated how different sustainability metrics are stressed depending on the industry.

Consequently, an empirical part will follow, in which publicly available documents concerning two case companies will be investigated. Based on the documents available, it will be deduced how the two industries differ in terms of what sustainability metrics in the supply chain context are used more. The purpose is to draw conclusions on how the stress on different sustainability metrics areas differ between the oil & gas and food industries. As an ending result, findings based on the research will be introduced.

2 Literature review

The literature review regarding this topic will investigate what has been previously studied about the way sustainability is measured. Furthermore, to support the purposes of this study, it will be focused what previous studies have shown about measuring sustainability of supply chains. The term for this area can be referred to as “supply chain sustainability” in this paper. This chapter will also introduce the three main sustainability dimensions, that are economic, environmental, and social.

2.1 Defining sustainability in the supply chain context

Sustainability can be recognized as the consequence of a balance between the three pillars of sustainable development: economic, environmental, and social. As such, the sustainability of industrial processes can be evaluated by these three main dimensions. (Mata & Costa, 2007). Even though here these three metrics are mentioned in the context of industrial processes, they seem to prevail in other contexts of sustainability evaluation as well. All of them are also the main concepts to measure the Sustainability Impact Assessment by the Organization for Economic Co-operation and Development (OECD, 2010). Similarly, a sustainability framework of the United Nations environment programme is called “Environmental, social and economic”.

The UN has also its separate acronym, “ESES” (Environmental, Social, and Economic Sustainability) identical to the one of the OECD. (UN, 2020). Findings by Institution of Chemical Engineers (IChemE, 2003) yields that sustainability metrics are grouped into economic, environmental, and social categories, respectively. Consequently, it can be deduced that the concepts *economic, environmental, and social* could be considered major, even core sustainability dimensions, on which the sustainability metrics are be based. The combination of these three will be referred to as an acronym *EES* in this paper. One can be tempted to consider a wide number of indicators to cover all the key

aspects of sustainability. However, a minimal number of metrics is preferable from a practical standpoint. (Mata & Costa, 2007).

To achieve successful sustainability performance, organizations must pay attention to the supply chain (Paulraj, 2011). As a result of familiarizing with a large amount of literature pertaining to business sustainability and supply chain management, Ahi and Searcy (2013) generated their definition of sustainable supply chain management (SSCM). Their definition of SSCM starts with the words “The creation of coordinated supply chains through the voluntary integration of economic, environmental, and social considerations”, thus capturing a source within the supply chain context where the combination of *EES* prevails. Bai et al. (2012) propose a framework that measures both environmental and business performance. In it, a set of relevant business and environmental performance metrics for a sustainable supply chain are employed. Svensson (2007) sees that in order to make a supply chain more sustainable, it is needed to incorporate economic, environmental and social dimensions into it.

Hervani et al. (2005) provided an outline of the issues regarding the measurement of sustainable supply chain performance. They claimed that the goal of a green supply chain is to eliminate or reduce negative environmental consequences (air, water, and land pollution) and resource waste (energy, materials, and goods) from raw material extraction to final use of products. As per this discussion it can be noted that the intertwining of sustainability measurement is quite apparent between the non-supply chain and supply chain contexts of sustainability. Nevertheless, supply chain context of sustainability will be specifically targeted in this research.

A "metric", which is a core term in this paper, can be defined as "a standard of measuring" (Merriam-Webster, 2014) according to a dictionary definition. In this study *metrics* will be used in the context with which Veleva and Ellenbacker (2001) define

sustainability indicators. That is, to evaluate and promote progress towards sustainability objectives. Thisstudy will strive to focus more on such qualitative ways to measure sustainability in the supply chains. Furthermore, both words *metrics* and *indicators* will be used in this paper, and there will be no distinction made between the two.

2.2 Economic, Environmental, and Social dimensions

Elkinton (1997) is known for popularizing the three dimensions, calling them in his own way, the triple bottom line (*TBL*) that consists of profit, planet, and people. As per previous discussion, the *EES* constitute the core dimensions in the discussion of the measurement of sustainability and a sustainable supply chain. These early findings create somewhat a premise for this paper. Amidst the investigation of the sustainability measurement, it will be considered whether a given metric falls in one of these three dimensions, *economic*, *environmental*, or *social*. Because of the relevance of these concepts, it will be individually gone through what have previous studies addressed about the three dimensions.

2.2.1 Economic and Governance dimensions of sustainability and their role in this research

Economic sustainability is described as the ability to provide long-term increases in economic indicators, particularly the ability to generate revenue and employment for the population's survival (Capone, 2016). Alternatively, Magon et al. (2018) portray economic sustainability as capital flows that ensure liquidity and consistent returns in the short, medium, and long term. Hassini et al. (2012) have found that in the future the access to capital markets will be granted only for companies that are seen as sustainable, and that to compete at a marketplace, the company’s offerings need to be considered as green or sustainable. Economic measurements are often more

consolidated than those pertaining to environmental and social dimensions due to legislative obligations for standardized financial reports (Osiro et al. 2018).

It can be debated that there should not be too much focus on the economic dimension, as it can hinder the creation process of environmentally sound supply chains in organizations (Setthasakko, 2005). The Economic dimension has not been clearly depicted in the supply chain sustainability discussion, and thus its connection to the topic is rather ambiguous. Thus, even though it is here introduced as one of the three main sustainability dimensions, its role in conducting this research will be minimal, as social, and environmental dimensions have much clearer role when discussing the sustainability metrics in the supply chain context.

The combination of Environmental, Social, and Corporate Governance (ESG) is a way to evaluate the firm's consciousness for social and environmental factors (CFI, 2022). Thus, the inclusion of ESG and all its components as a supporting tool in this paper is supposedly logical. While the meaning of the environmental and social factors has already been explained, Governance, as in the context of ESG, is explained by OECD (2005) in a following way: "Governance in support of sustainability expands authority, policies, and procedures to address sustainability issues. It means looking at social, environmental, and economic impacts and making decisions from a broader perspective." Also, according to Robeco (2021), Governance refers to a set of rules or principles defining rights, responsibilities and expectations between different stakeholders in the governance of corporations. It can be thus perceived as a broader way of fulfilling sustainably sound governance within a company that supports the successful implementation of metrics that pertain to the social and environmental dimensions of sustainability.

In terms of specific metrics, governance can pertain for instance to corruption and bribery, political affiliations, board composition and diversity, and the integration of ESG in the supply chain in general (CGlytics, 2022; S&P Global, 2021). Such specific metrics

can be deemed as easier to understand and noticed than economic metrics in the supply chain sustainability context. Consequently, governance will replace the economic sustainability dimension in the empirical part of this research, as the two case companies will be investigated not only based on the environmental and social sustainability dimensions, but the governance factor will be also taken into account. As such, the empirical part is conducted based on the ESG factors.

2.2.2 Environmental and Social Sustainability dimensions

Environmental effect is a major topic of discussion when it comes to supply chain sustainability. As a result, a variety of stakeholders are putting pressure on businesses to adopt environmentally friendly manufacturing and production practices, as well as reduce negative impacts on natural resources. (2019, Abbas and Sagsan). According to Hassini et al. (2012) the role of the environmental dimension in the supply chain sustainability field is to adapt practices that generate environmentally friendly material sourcing and thus resulting in low greenhouse gas (GHG) emissions with the addition of low impact on the environment. Early findings of Rao and Holt (2005) find that pursuing a greener supply chain promotes environmentally friendly performance, minimal waste, and saves costs. On the other hand, businesses that sell environmentally friendly products cost more for the end customers, thus resulting in a need to justify the value proposition to the customers (Hassini et al. 2012). Nevertheless, in a case study by Silvestre et al. (2020) it was shown that environmental sustainability was instrumental in driving economic profit for the studied company in question.

Hassini et al. (2012) see that in the supply chain sustainability field the role of the social dimension is to engage in labour practices that are considered ethical. Due to the dynamics of business trends and stakeholder influence, companies need to address social sustainability issues in their supply chains. Contemporary social issues occuring in the working environment such as poor working conditions and subsequent workplace

accidents (Manik & Yardley (2013) signify that social dimension is important to be considered (Nakamba et al. 2016).

Also, the social aspect of sustainability has received considerably less attention compared with ways of sustainability measurement. (Miemczyk et al. (2012). Similarly, Mani et al. (2016) note that the social aspect of supply chain sustainability has been under-explored compared with the environmental and economic perspectives. This may imply that one dimension that is part of the *EES* is under-studied, even though as Huq et al. (2014) have noted, social dimension of sustainability is a holistic concept that should be integrated with environmental and economic considerations.

2.3 Sustainability performance measurement frameworks

The lack of frameworks that develop practical sets of metrics may add confusion and uncertainty regarding the way sustainability of the supply chains is measured (Ahi & Searcy, 2015). This chapter will focus on looking at what kind of sustainability measurement frameworks have been identified through studies.

As a first example Ahi and Searcy (2015) introduce a detailed supply chain sustainability framework in which they see that among other elements, sustainability of a supply chain shall be measured by considering all three sustainability dimensions, that belong to *EES.* This section will focus on reviewing frameworks that clearly revolve around the consideration of the three main sustainability dimensions in the measurement of sustainability of a supply chain.

In total, 2555 different metrics were identified in the study. Such a big number of metrics hasbeen identified based on the published literature on the topics of green supply chain

management and sustainable supply chain management. The metrics have been allocated to 13 different dimensions, of which 3 are *EES.* The prevalence of *EES* is still apparent in this framework, as roughly 80% of the identified metrics fall into these three core dimensions. Also, this framework stresses that clearly the most metrics that have been identified belong to the *Environmental* dimension. The most notable and commonly used metrics of such sort are mentioned to be “air emissions”, “GHG Emissions”, and those related to the water usage.

For *Economic* dimension the most common dimensions were “cost” and “return on investment”, whereas for *Social* dimension “discrimination” and “health and safety”. It was also noted that there are metrics that address more than one dimension, such as “environmental cost”, which pertains to both *Economical* and *Environmental* dimensions.

As another example, Hassini et al. (2012) conducted a case study on a Canadian electric utility company for which the proposed framework was used. The framework had *EES* as the main dimensions but it did was not disclosed what would the used metrics be, as in this context it was left for the supply chain actors, such as suppliers and manufacturers to decide on this. The study only thus provided a basic framework that could be used in the supply chain sustainability context.

Sloan (2010) offer a similar supply chain sustainability framework in terms of its size and metrics. Again, the framework is based on *EES* dimensions and is constructed as follows.

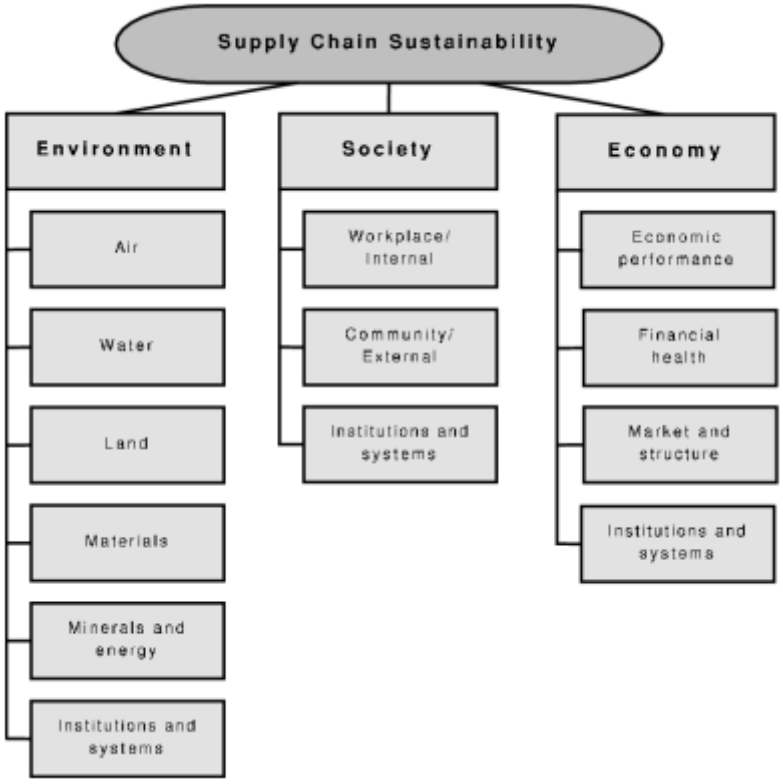

Figure 1. Supply Chain Sustainability Framework (Sloan, 2010).

The bigger metric categories, such as Air, Workplace/Internal and Economic performance are further divided into more specific metrics. For instance, "Air" holds a specific metrics called "Emissions per unit produced".

All of the sustainability performance measurement frameworks portrayed here have been studied by using the *EES* as the core dimensions to which the different metrics have pertained to. Studying the example frameworks did not touch on the issue of how specific industries affect what metrics are used, but it is now clearer that *EES* dimensions dictate the way different metrics are induced in the discussion of supply chain sustainability measurement. As such, it will be consequently interesting to study whether the above-mentioned metrics will be prominent in the further industry specific scrutiny of the topic.

3 Categorization of performance metrics and industry context

As implied previously, the three core dimensions include different metrics, of which some seem to be more prevailing and studied in the previous literature. To serve the purpose of this paper, it is needed to investigate the connection of the EES dimensions with different industries. There may be many ways of measurement available from the main dimensions, but it is not fully clear which metrics are more prevailing and in which industry-related contexts. For instance, regarding the environmental dimension, there is no shortage of environmental indicators but there is a difficulty in deciding on which ones to use, when and how (Hervani et al. 2005). As such, this chapter will further study how industry affects what metrics are used in different dimensions.

Hassini et al. (2012) note that much of the existing literature that focuses on sustainability measurement of supply chains focuses on manufacturing sector. Companies in the manufacturing sector are often pressured to employ leaner manufacturing practices, which makes it logical for such companies to adopt sustainable practices amidst their supply chains (King and Lenox, 2001). On the contrary, there is a lack of studies that focus on supply chain sustainability within the Information and Communication Technologies field, to which large corporations such as Dell, HP, and Yahoo pertain (Hassini et al. 2012).

Qorri et al. (2018) introduce a conceptual framework for measuring sustainability performance of supply chains. Their framework is based on the *EES* dimensions, but in this study specific metrics for each dimension are proposed as follows. This is an example of how each sustainability dimension can yield specific metrics that are used to evaluate the sustainability of a supply chain.

Economic: quality, efficiency, cost, timeliness
Environmental: Air, water, land, energy
Social: Noise, health, employee satisfaction, customer satisfaction

This framework offers concrete metrics that could be used to evaluate the sustainability of a supply chain, and such sustainability metrics scrutiny can be adopted to industry-specific context. Subsequently in this chapter it will be investigated what kind of sustainability metrics prevail amidst the supply chain context depending on the industry that is in question.

3.1 Identifying how industry affects the way sustainability dimensions prevail

After investigating what sustainability metrics have been mentioned in the context of sustainability measurement of supply chains in different industry contexts, a short summary of the findings is in place. There were different metrics identified from several industries, and it can be deduced that some sustainability metrics look to be more prevailing than others. The purpose of this chapter was to investigate whether specific sustainability dimensions are more prevailing in given industries. Furthermore, this allows to inspect whether there are metrics that look to prevail more in given industries.

Firstly, as in accordance with what Hassini et al. (2012) have previously studied, there were no studies found that investigate supply chain sustainability within the Information and Communication Technologies field. On the contrary, the industries that were most prevailing in the context of supply chain sustainability measurement studies were found to be related to meat production, food manufacturing, oil and gas, and textiles/clothing.

Studies on supply chain sustainability within meat production industry seem to include studies on all three main sustainability dimensions, also being the only industry in which the topic has been studied from the economic dimension. On the other hand, in studies pertaining to food manufacturing, oil and gas, and textile industries the topic was mostly studied by focusing on the environmental sustainability dimension. In these industries, the most prevailing metrics were even somewhat aligned. Previous studies regarding all

these three industries have focused on environmental metrics that are in some way related to water and its management. Also, both food manufacturing and oil and gas industries seem to have GHG emissions as a strongly prevailing metric. The most common metric related to social dimension seems to be concerning the issues with the health and safety of employees, i.e., health and safety (H&S).

3.1.1 Food manufacturing industry

A study by Hubel and Schaltegger (2021) focused on issues meat production industry is facing when thinking of implementing more sustainable practices in its supply chains. The predominant issue was linked to economic factors; the high cost and relatively low demand of local organic or ecologically produced meat makes it considerably more profitable for the meat producers to opt for the conventional procurement of cheap animal feed. The same study also shows how regulatory concerns impede the implementation of more sustainable supply chain practices in the industry. This is portrayed by an example in which extending a shed in a meat processing plant in the name of improving animal welfare is not permitted because of its inconsistency with building authorities and their regulations. (Hubel and Schaltegger, 2021). As a result, animal welfare, an essential metric of social dimension (Jones, 2014), is subject to deterioration.

A review of studies regarding the sustainable development within food manufacturing industry by Munoz-Villamizar (2019) showed that in the food manufacturing context literature is focused on investigating the topic focusing on the environmental dimension rather than applying a holistic *TBL* (*EES*) approach. In a study by Salva et al. (2013) an environmental audit toolkit was developed to assess the supply chain sustainability of six fresh food manufacturing suppliers. The environmental metrics addressed included “environmental management, waste, materials, energy, emissions, water, and packaging.

These metrics are somewhat similar to the ones officially listed by an American Alliance for Sustainable Agriculture called *Field to Market*, that are biodiversity, energy use, GHG emissions, irrigation water use, land use, soil carbon, soil conservation, and water quality (Field to Market, 2019). Here, all the metrics acclaimed by *Field to Market* belong to the environmental dimension of sustainability.

A study of 62 Dutch food and beverage companies showed that implementing a clear code of conduct when collaborating with suppliers induced greater performance in the sustainable procurement in the supply chain (van der Werff et al. 2018). A code of conduct as such holds various sustainability metrics that often pertain to the *EES* dimensions. Even though pork consumers worry about direct personal advantages like their safety and health are also pork health and welfare are a concern for many people (Grunert et al. 2018). Hence, there is a need in the food supply chains to have more focus on the social sustainability metrics according to Zira et al. (2020). In terms of social sustainability dimension, pork supply chains are subject to accidents at slaughterhouses, gender inequality, and flaws in animal welfare. Regarding the economic dimension, because of the sustainability issues that the pork supply chains face, farmers experience low incomes. (Zira et al. (2020). From the environmental dimension viewpoint, pig production systems promote deforestation (Rajao et al. 2020), water pollution, and GHG emissions through various activities (Gerber et al. 2013). GHG emissions is also the main metric for sustainability performance in the aviation fuel industry (Martinez-Valencia et al. 2021).

3.1.2 Oil and Gas industry

Through a case study, Silvestre et al. (2015) it is noted how the sustainable performance of a notable Brazilian corporation from oil industry was monitored based on environmental and social metrics. The company was subject to poor environmental performance, such as having oil spills, and issues related to the social dimension, such as problems with health and safety conditions in terms of workplace accidents.

Consequently, the company altered its approach by significantly improving its environmental and social dimensions.

Alternatively, in an empirical analysis of various UK oil and gas industry supply chains, Yusuf et al. (2013) focus on the sustainability evaluation of companies in the field from the perspective of environmental dimension metrics. The sustainability of the oil and gas supply chains were assessed by six environmental metrics; amount of energy used in the company, Waste management, Reduction of amount of resources used, e.g., water, Carbon footprint (which is the total amount of GHG generated, (The Nature Conservancy, 2021) reduction, Reduction of air pollution, and Source(s) of raw material. In their study of gas industry supply chain sustainability measurement, Bazyar et al. (2021) offer five somewhat similar sustainability metrics to the previous example. In this study it is depicted that the sustainability of supply chains of companies subject to gas industry is measured with five metrics; GHG emissions, Electricity consumption, Gas consumption, Water consumption, and Wastewater generation.

3.1.3 Electronics industry

A recent study by Rakesh and Menon (2021) investigates how sustainability in the electronics industry can be improved. Sustainability issues in the electronic industry are described to specifically revolve around the environmental and social dimensions. Common metrics in this industry that are part of these dimensions are mentioned to be environmental policy, greenhouse gas emissions, working conditions, and workers' health and safety. (Rakesh and Menon, 2021). Since electronics industry is a field where physical resources are increasingly used (Yin et al. 2014), and it is growing quickly (Wath et al. 2010), it is creating a substantial burden on earth's resources, primarily by producing excessive amount of waste (Sheoran and Kumar, 2020).

3.1.4 Textile industry

Raian et al. (2021) investigated how sustainability risks can be assessed in the supply chain of textile industry. The industry is considered as highly polluting, especially by the means of discharging vast amounts of wastewater (Hossain et al. 2018). In general, studies have shown that companies in the textile industry are often non-compliant with environmental and social issues (Hossan Chowdhury and Quaddus, 2021). The fact that the industry specific risks in this field are mostly related to environmental and social dimensions is derived from two notions according to Turker and Altuntas (2014), and Nagurney and Yu (2012). Firstly, the textile industry uses chemicals that are detrimental for both environmental ecosystems and human health. Secondly, as notable global buyers of textiles are striving to use excessively cheap suppliers, social and environmental regulations are easily neglected in the manufacturing process.

3.2 Summary

Consequently, the textile industry has become an important area in which supply chain sustainability issues can be investigated and assessed. The three most notable sustainability risk metrics in the study were found to be ‘poor product transportation system’, ‘air, water, and soil pollution’, and ‘factory fire’. (Raian et al. 2021). Similarly, Majumdar and Sindha (2021) show that supply chains in the clothing industry detrimentally contribute to the environmental dimension by using excessive amounts of water and other natural resources. Holkar et al. (2016) have investigated that textile and clothing supply chains account to 20% of the total industrial water pollution. As such, metrics pertaining to the environmental dimension have been portrayed as the most prominent in the textile and clothing industry.

To give more clarity to the findings of the chapter the findings are summarized in the below table. In the table, meat production falls under the column of food manufacturing industries.

Industry	Most prevailing sustainability dimension and metrics
Electronics	Environmental and Social: GHG emissions and H&S
Oil and Gas	Environmental and Social: GHG emissions and H&S
Food manufacturing	Environmental and Social: GHG emissions and Animal Welfare
Textile	Environmental: Water pollution

Table 1. Sustainability metrics in different industries. (Raian et al. 2021), Majumdar and Sindha (2021) & Holkar et al. (2016)

4 Research methodology

4.1. Case study research

A literature review was conducted to learn what has been previously studied about the topic of supply chain sustainability and the way sustainability metrics have been presented in this context. The empirical part of this study will be case study research, in which two case companies are selected. The empirical chapter will focus on empirical evaluation and comparison of sustainability metrics from two different industries.

This study is case study research, and it is also therefore a qualitative study. While Yin (1984:25) cautions researchers not to confuse case studies with qualitative research, he also notes that "case studies can be based entirely on quantitative evidence". A researcher can carefully evaluate the data within a particular context using the case study method. In their purest form, case studies explore and investigate modern real-life phenomena through in-depth contextual analysis of a small number of circumstances or occurrences and their connections. (Zainal, 2007). Yin (1984:23) defines the case study research method "as an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used." Also, according to Yin (1984), a case study is a way to observe any natural phenomenon that exists in a set of data, in a way that only a small number of subjects are subject to scrutiny.

The previous depiction of the characteristics of case study research goes well in hand with this paper and its purpose. As per the definition of a case study, this paper investigates a contemporary phenomenon of sustainability through smaller number of circumstances and occurrences, such as the variety of sustainability metrics in different industries in the supply chain context. The connection of the industry with the

occurrence of the sustainability metrics is what is specifically sought after. Also, multiple sources are used in this study to generate the sufficient information for the empirical case study research part.

Either a single-case or a multiple-case study design can be used to conduct case study research (Zainal, 2007). To conduct this research, two separate companies will be chosen from two different sectors, and sustainability metrics will be investigated for both companies and industries. The sectors selected for this paper are oil & gas industry, and the food industry. Thus, this paper corresponds to the definition of a multiple-case study design and is therefore a multiple-case study research.

Nestlé S.A. (Nestlé) has been selected as the case company for the food industry, while The British Petroleum Company plc (BP) will represent the oil & gas industry. These case companies from two different industries were chosen for the empirical part of this thesis for several reasons. Firstly, both companies are notable actors in their respective industries, which can be seen to be an instrumental factor when the intention is to induce information that illustrates and represents the objective of the research.

Secondly, as the intention of this research is to learn more about supply chain sustainability practices and metrics in an industry context, it was important to select companies that comply to sustainable businesses practices, and furthermore to transparency amidst the processes pertaining to the supply chain. The evidence of such compliance for these companies is the fact that both have publicly available documents that are either revolved around or show notable commitment towards sustainable and responsible business behaviour in the supply chain context.

4.2. Data collection and analysis

Sustainability reports published by the companies will be the primary source of investigation for this case study research. The information available on the company websites and code of conducts directed to the suppliers, i.e. supplier code of conducts will be used as supporting primary source of information.

Another source of information will be induced from 3rd party ESG (Environmental, Social and Governance) ratings. ESG means that Environmental, Social, and Governance factors are used to evaluate the sustainability performance of companies (Robeco, 2021). Although this does not specifically pertain to the supply chain sustainability context, because of the relevance of ESG, and the apparent intertwining of the non-supply chain and supply chain sustainability contexts as per the discussion in the second chapter of this paper, it is decided to be suitable to include the context of such 3rd party indexes in the empirical part of this study. The metrics measured in these indexes are often the ones that have been deduced to be part of supply chain sustainability evaluation in this paper. Such sustainability indexes are published by independent 3rd party companies, and there are several notable indexes that evaluate the ESG performance of publicly listed companies. Such indexes publish ratings for the companies that are the subject of evaluation, and different matters pertaining to the ESG criteria are evaluated and consequently rated. The 3rd party index related scores that the two companies have received will be introduced at the start of the next chapter. Introducing the 3rd party scores in the beginning of the empirical analysis offers an objective way to show how are some focal sustainability metrics and the performance related to them been evaluated by independent sources.

Companies from food processing (i.e., food industry) and oil and gas (i.e., petroleum industry) industries will be used to explore the industry-specific sustainability metrics that are present. This will serve as an empiric way to deduce what are the sustainability performance metrics that prevail in the two respective industries. As depicted in the

previous chapter, metrics pertaining to the environmental sustainability dimension were found to be the most common in the food processing and oil and gas fields, with social metrics also being mentioned. Hence, it will be interesting to conduct an empirical investigation on whether this is still the case concerning the two example companies. Also, a more thorough insight is intended to be deduced by looking at two separate companies from different industries.

Also, both companies have a code of conduct in place which is specifically directed to the suppliers and business parties with which the two companies do business with, and consequently influence their supply chain sustainability. Since 3rd party ESG indexes will be used as a secondary source of information in the empirical part of this thesis, it was needed to choose example companies that are evaluated by such 3rd party ESG indexes, so that these external scores on the ESG matters could be considered when investigating the main research question of this thesis.

4.3. Reliability and validity

According to Saunders (2014), a method is reliable when the used data collection techniques generate consistent information. In other words, the findings of a study would be replicated if the procedures of the study would be done again (Golafshani, 2003). This information in the empirical part of this paper is yielded from the latest publicly available sustainability reports, supplier code of conducts, and 3rd party indexes. Because these are the only sources from which the data is collected, the information would be most likely consistent in a way that the study findings would also be replicated in another study on the same topic. Saunders (2014) notes that in a situation where the original research context is different to the context in which it is being replicated, results might be also different. This would also be the case in this papers' context, would the information for instance in the sustainability report change when it will be published next year.

According to Saunders (2014), a method is valid, when the procedure used to collect the data accurately measures what is intended to be measured. In such a case an analysis is appropriate for the collected data, making the findings relevant. In the case of this paper, the sustainability reports and the supplier code of conducts show the way two different companies report their sustainability metrics in a supply chain context. Since this is what these paper aims to investigate, the procedure used to collect the data measures what is intended to be measured. It might be worth noting that the sustainability reports and the supplier code of conducts do not solely focus on investigating the companies' respective sustainability metrics in the supply chain context but offer also other types of information regarding the sustainability of the company. This can be regarded as something that hinders the validity of collected data. Anyhow, the intended subject of investigation can be clearly found from these documents, and the findings are therefore relevant from the perspective of the research goal of this study.

5 Measurement of sustainability metrics in the oil & gas and food industry

The usage of different sustainability metrics can be presumed to be connected to the characteristics of an industry, and it is thus good to consider some of such industry specific characteristics. Discovering them may disclose some reasons regarding the differences between the sustainability metrics that are used in the industry contexts.

Climate change threatens the prosperity of the supply chains, as it results in problems with the food supply by hindering the quality of the crops. Accordingly, food companies have committed to notable environmental goals in their operations. Unilever has committed to being carbon-positive by 2030 by concentrating on the renewable energy sources, and Danone strived to eliminate deforestation in its supply chains in 2020. A study by a consulting company BCG showed that most consumers are willing to pay extra for food products that are produced and packed in an environmentally friendly manner. (Walter et al. 2020). Such data implies that the environmental topic can be seen to be the most relevant sustainability topic discussed amidst the food industry.

As the one the main energy sources, oil and natural gas sector plays a significant role in the fuel sector and the global economy (Library of Congress, 2021). An article by the consulting group McKinsey & Company shows that oil and gas companies are increasingly setting net-zero-emissions targets especially by the means of incorporating more renewable energy in their supply chain activities. Encouragingly, over the past decade the costs of renewable energy have dropped substantially, thus making them more competitive with more conventional fuels such as coal and natural gas. (Beck et al. 2021). The information presented shows that the environmental area seems to be the most stressed sustainability topic in the oil & gas industry.

Both the food and oil and gas industry seem to share similar industry characteristics when it comes to the stress on the sustainable matters, as environmental issues seem to dictate the discussion in both industries. Consequently, it would be logical to expect that the most sustainability attention in the supply chain context of the food and oil & gas industries specifically would be presented by the means of environmental metrics.

As stated previously in this paper, the metrics that prevail in the supply chain sustainability context of the two case companies will be investigated based on the three areas that belong to the ESG, environmental, social, and governance. Consequently, the intention is to obtain a good understanding of the way the sustainability of the supply chains is addressed and evaluated in terms of the metrics that used in two different industries. The idea is to create knowledge on what are the metrics that are most appreciated and relevant according to the sources pertaining to the two companies, thus showing concrete insight on the way companies from the two spheres treat the matter of supply chain sustainability. Having induced such information, it can be compared to the earlier parts of this paper that introduced information based on earlier research and created the premise on the nature of the metrics that are used in different industries in the supply chain sustainability evaluation.

5.1 Nestlé and BP in 3rd party indexes

The information available in the 3rd party indexes offers supporting information about the sustainable compliance that the company holds regarding some sustainability metrics. The information offered by 3rd party indexes serves as a way to start the discussion and comparison of the metric-related sustainability performance of the two companies that represent two different business fields. Such indexes that are used in this part of the paper are CDP and S&P Global. CDP measures performance of companies by specific metrics that are climate change, forests, and water security. Thus, CDP only considers metrics that pertain to the environmental sustainability dimension. The CDP

metrics are scored on a scale from A to D. The S&P Global index, on the other hand, measures three main upper-level metrics that are environmental, social, and governance & economic. The upper-level metrics of the S&P Global index are scored on a scale from 0 to 100. Consequently, the CDP index offers specific score information for the two companies regarding environmental metrics, while S&P Global index more general assessment regarding the three ESG areas. (CDP 2021; S&P Global 2021). For the year 2021 CDP has generated Nestlé scores A- for climate change, B for forests, and B for water security, thus capturing a high level of compliance of the company towards the Environmental metrics from a third-party perspective. BP has not responded to any other metrics besides climate change, for which CDP has granted it a score of A-. (CDP 2021; S&P Global 2021).

In terms of S&P Global index, Nestlé has received scores 59, 44, and 43 for the environmental, social, and governance & economic areas. The scores compare really well in terms of the industry mean figures that stand at 23, 24, and 24 respectively. From the other industry that is the subject of scrutiny, BP has similarly; 55, 48, and 46, while also being well above the industry average figures that are 31, 31, and 37. (CDP 2021; S&P Global 2021).

5.2 Food manufacturing industry: Nestlé

As implied earlier, it was crucial to select a company that is a notable actor in its industry and one that is actively involved in working towards a sustainable supply chain. Nestlé is the world's largest food company (Forbes, 2017), food processing being its primary business operation (Nestlé. 2021). Also, Nestlé is partnering with suppliers in more than 187 countries, which means that its operations are extensive. In the company's website it is clearly seen that Nestlé is committed to sustainable orientation amidst the supply chain operations, as there is plenty of information devoted to the topic of supply chain sustainability, while the company's commitment is to implement responsible sourcing by "ensuring a transparent, sustainable and resilient food supply chain". (Nestle, 2021).

Information on the company website discloses that at Nestlé the sustainable transformation of the supply chain is conducted following four focus areas: transparency of the raw materials by knowing where they are from and how they are produced, natural capital by taking environment into account, human rights of people, and animal welfare, which focuses on the rights of animals in the supply chain. Also, the company has a strong focus on tackling deforestation risks with a target to be completely deforestation free by the end of the year 2022. This is achieved by making sure that the key forest-risk commodities bought are not associated with deforestation risks on any level. (Nestlé, 2021). This company website information can be seen as a premise for the supply chain sustainability focus areas of the company, and it is seen that the focus is on social and environmental sustainability dimensions.

5.2.1 Nestlé Supplier code of conduct

Nestlé has in place an openly shared document called *Nestlé Responsible Sourcing Standard* (2020) which acts as a code of conduct devoted specifically for third parties with which the company collaborates, such as suppliers and business partners. The presence of such a document can be regarded as evidence of a commitment towards sustainable supply chain, as in this case its purpose is to promote a “sustainable long-term supply and to reduce the impact on the planet´s resources”, as stated in the document.

Consequently, there are many different principles listed to which Nestlé requires compliance from its third-party associates. Firstly, there are principles pertaining to the social sustainability dimension that are listed in the document, which are divided into two main upper-level metrics, Labour and Universal Human Rights and Health & Safety. The former encompasses principles such as responsible employment, equal remuneration, minimum age for employment, and working time and rest days, while the latter includes emergency, workplace environment in terms of its safety, and adequate

housing conditions. Such principles that are placed under the upper-level metrics could be referred to as sub-metrics that imply more specific point of concern that are subject to the measurement of sustainability of a supply chain within the sustainability dimension that is social in this context.

Upper-level metrics that pertain to the environmental dimension include nature conservancy and hazards, which relates to the use of hazardous materials and chemicals. Nature conservancy encompasses different more specific sub-level metrics such as air quality, responsible forest management, with the addition of even more specific list of metrics that fall under water management measures and biodiversity management. Water irrigation and soil health are examples of such metrics.

There is also an upper-level metric called Business Behaviour that includes sub-level metrics that can be perceived as such that pertain to the “governance” part of the ESG concept. The sub-level metrics include ethics by the means of bribery and corruption, grievance mechanism, and conflict of interest. Here, grievance mechanism can be seen as a rightly belonging part of governance, as according to SPOTT (2017) the implementation of effective grievance mechanisms supports proper anti-corruption policies, and lack of grievance mechanisms significantly decreases the effectiveness of governance processes. Conflict of interest can be seen to relate to governance since governance is used to define rights, expectations, and interests between different stakeholders (Robeco, 2021).

5.2.2 Nestlé Sustainability report

Nestlé has also in place a publicly available sustainability report (Creating Shared Value and Sustainability Report, 2020) which focuses on non-financial related progress with a specific stress on sustainable development. The sustainability report has plenty of emphasis on the supply chain sustainability aspect as nearly half of the report is devoted to ´responsible sourcing´ to which the company adheres by introducing the company´s

actions to tackle issues related to issues pertaining to environmental and social sustainability dimensions. As stated in the document, the adherence to these issues is strictly followed throughout the different stages of the supply chain.

In the sustainability report the metrics contributing to the transparency and sustainability of the supply chain is divided to those related to social and environmental dimensions. Firstly, the social metrics that are tracked amidst the supply chain operations by Nestlé according to its sustainability report are extensive and include several different aspects that have been occurring amidst the discussion of notable social sustainability metrics. The most prominent and extensive upper-level social metric discussed by Nestlé is Human Rights, to which the company pledges to address an extensive amount of attention. In the report, the area of Human Rights is supported more specifically by the following lower-level metrics that are addressed by Nestlé in its supply chain; protection of workers and children, promotion of decent employment and diversity, opportunities for young people, and empowering women. In the human rights section, there is also a metric “access to water, sanitation, and hygiene” which focuses to ensure the access to these across the value chains that are operated under the company.

Another notable upper-level social metric addressed is workplace related Health and Safety, but it is not as extensively communicated in the report. Nestlé pledges to secure safe workplaces for its employees but does not disclose any specific ways to achieve this. A focus on improving the mental health of its employees is mentioned. Recognizing challenges with Animal welfare is also mentioned within the social metric section, and it is mentioned in commitment by Nestlé: “Implement responsible sourcing in our supply chain and promote animal welfare”.

The section related to environmental sustainability dimension within the supply chain processes is also extensive in the Nestlé sustainability report. Firstly, the challenges pertaining to water is addressed by a metric called improved water efficiency which

focuses on direct water withdrawals and its maintenance. A second major metric of the environmental dimension is “climate change leadership”. It basically promotes a proactive engagement on climate change amidst the value chains, the specific and most mentioned metric being the reduction of GHG emissions generated by the company´s operations. Also, the company strives to focus on using renewable energy sources in an attempt to make its operations more sustainable. Nestlé has two main climate commitments that are presented under the climate change leadership; striving for zero environmental impact in its operations by 2030 and achieving 100% deforestation-free supply chains by 2022. Two environmental metrics that are plausibly related specifically to the food manufacturing industry; improving packaging performance and reducing food loss and waste.

Consequently, it can be noted that as per the Nestlé sustainability report 2020, the supply chain related sustainability metrics are mostly focused on the social dimension area of human rights, which has a clear stress on minorities. In terms of environmental perspective there is a strong focus on water efficiency & management and climate change leadership, primarily by the means of reduction of the GHG emissions across the value chains.

5.3 Oil & Gas industry: BP

BP (BP p.l.c.) is a British oil and gas company (BP, 2022) that is one of the five largest publicly traded oil companies that are also referred to as the supermajors (Reuters, 2008). The devotion to sustainability practices is evident in the company, as it is stated on the company´s website that sustainability is a foundation of BP´s strategy and key to the long-term value of the company. The “sustainability frame” of the company is divided into three main sustainability objectives that are “Get to net zero”, “Improve people´s lives”, and “Care for our planet”.

5.3.1 BP Supplier code of conduct

Similarly to Nestlé, BP has a separate publicly available code of conduct document that is specifically targeted to the company´s suppliers and business partners under the name "BP´s expectations of its suppliers". Firstly, it can be observed that the code of conduct is significantly less extensive than the one used by Nestlé. Secondly, the document revolves heavily around issues related to governance and social sustainability dimension, without any metric-specific information pertaining to environmental matters. In terms of governance issues, BP expects its partners to address several different metrics in their operations; bribery and corruption, money laundering, conflicts of interest, and grievance processes. For social dimension the BP code of conduct for its suppliers targets compliance to health & safety matters and human rights. More specifically, the human rights section is named as "BP Labour Rights & Modern Slavery Principles", including different metrics mainly pertaining to adequate working conditions guaranteed to employees.

5.3.2 BP Sustainability report

BP has its own publicly available sustainability report in place under the name "BP Sustainability Report" (BP Sustainability report, 2020). The report has a strong devotion to the supply chain sustainability as the topic is mentioned a lot throughout the document. Also, one of the 20 sustainability aims of the company that are listed in the report is to "develop a more sustainable supply chain", by embedding sustainable practices to the company´s suppliers.

As per the sustainability report, in the year 2020 the main supply chain sustainability focus of BP was on Human Rights-related issues, as labour rights, human rights, and modern slavery are addressed as the main metrics that were monitored during that year. Health, safety, and wellbeing is also mentioned as an important metric monitored within social sustainability, which holds preventing incidents, identifying hazards, and

managing risks at every stage of BP´s value chain operations. A part of this is preventing oil spills from happening on sites in which BP is operating. Safety at BP is monitored through system called Operative Management System (OMS) which is a specifically dedicated framework that promotes safety amidst the operations that BP is subject to. A focus on driving safety is a safety metric that aims to keep fatalities and accidents related to driving to a minimum at operations in which BP is taking part. Also, it is monitored that at BP-owned retail stats the staff must be equipped with personal protective equipment (PPE). Addressing the importance of the company´s employees health and fatigue management is also mentioned as part of the health, safety, and wellbeing entity.

A second major focus was on environmental sustainability by monitoring the metric of greenhouse gas emissions generated by BP´s suppliers across their operations. The focus here is also in reducing the GHG emission from BP´s own operations. The total greenhouse gas emissions across BP´s supply chains were lowered by acquiring new renewable energy partnerships. This process is specifically labelled as a metrics called “renewable energy” and “access to clean energy”, which shows that improving the environmental aspect of the supply chain revolves strongly around focusing on using renewable energy sources in BP. There are also other environmentally oriented metrics that the company targets, primarily tracking carbon intensity, and reducing methane intensity amidst its value chain operations. There is one specifically mentioned water-related metric, becoming “water positive” which means that the company targets to replenish more freshwater that what it consumes within its operations.

Consequently, it can be noted that the BP sustainability report 2020 quite equally emphasizes matters related to both social and environmental sustainability dimensions. From social dimension the most stressed metrics are related to health & safety, where several distinctive metrics that are subject to measurement can be identified. For environmental dimension the main focus area is the metric of GHG emissions that are

targeted to be reduced. This area is specifically aimed to be tackled by acquiring new renewable energy-related solutions, to which the company devotes a special focus.

5.4 Case Comparisons

Based on the information yielded from the supplier code of conducts and sustainability reports, a summary table is provided below. The table includes the most prominently mentioned supply chain sustainability-related metrics that the companies pledge to monitor amidst its operations both in supplier code of conducts and sustainability reports. For the environmental and social metrics there are first mentioned metrics that have a broader meaning and could thus be referred to as upper-level metrics, under which more specific lower-level metrics are written. This is just a detail to make a minor distinction between the types of metrics presented for the two sustainability dimensions, without addressing any difference in their relevance when presenting these findings. To make the comparison between the two more apparent, the common metrics that are shared by both companies are highlighted in green, and the ones that are not, in red.

Sustainability metrics based on the supplier code of conducts and sustainability reports

Environmental

Nestlé	BP
Upper-level metrics	Upper-level metrics
Climate change leadership, Nature conservancy, air quality, water efficiency,	Climate change, Water positivity
Lower-level metrics	Lower-level metrics
Reduction of GHG emissions, Deforestation, Direct water withdrawals, Reducing food loss and waste, Access to renewable energy	Reduction of GHG emissions, Access to renewable energy, Carbon intensity reduction, Methane intensity reduction, Positive replenishment of freshwater

Social

Nestlé		BP	
Upper-level metrics		Upper-level metrics	
Human rights, Animal welfare	Health & Safety	Human rights	Health & Safety
Lower-level metrics		Lower-level metrics	
Protection of workers and children, Promotion of decent employment and diversity, Opportunities for young people, Empowering women, Access to water, sanitation, and hygiene	Emergency plan, Workplace safety, Mental health of the employees	Labour rights, Human rights, Tackling modern slavery	Preventing workplace incidents, Identifying hazards, Managing risks amidst the whole supply chain, Prevention of oil spills, OMS-safety framework, PPE equipment for staff, Driving safety, Mental health and fatigue management of the employees

Governance

Nestlé	BP
Bribery and corruption, Grievance mechanism, Conflict of interest	Bribery and corruption, Money laundering, conflicts of interest, anti-tax evasion policy, and Grievance mechanism

Table 2. Supply Chain Sustainability metrics comparison between Nestlé and BP. (Nestlé Sustainability report. (2020)., Nestlé Responsible Sourcing Standard. (2018., BP Sustainability report. (2020). & BP's expectations of its suppliers. (2019).

Based on the information deduced from the sustainability reports of the two companies it can be deducted that environmental and social sustainability dimensions are the most prominent areas addressed. Consequently, the most stressed metrics amidst the supply chain sustainability for both companies belong to these two areas.

However, as the supplier code of conducts have been a part of this analysis, it should be noted that if the sustainability reports of the two companies are left out of the scrutiny, the focus on sustainability dimensions differs between the companies as per the areas addressed in the code of conducts. While Nestlé has an all-encompassing supplier code of conduct in terms of addressing all the main focus areas, environmental, social, and governance, the supplier code of conduct of BP does not have any specific focus on the environmental dimension of sustainability. The code of conduct document of Nestlé addresses specific supply chain related sustainability metrics in all three focus areas, while in the BP´s code of conduct this is the case only for the Social and Governance areas. It is also worth noting that the Nestlé's supplier code of conduct also addresses the social sustainability metrics much more thoroughly than BP. These notions can be seen from the earlier table presented in the end of the fifth chapter. The differences between the findings derived from the code of conducts are shown in the earlier table that only considers metrics from the code of conducts. Such findings may be interpreted as a premise which signals that Nestlé has higher devotion and stress towards the environmental, and even the social sustainability metrics in the supply chain context than BP.

The data findings are somewhat different depending on which sources of data are used to make comparisons between the two industries. To show how the sustainability metrics would be compared in the situation of the two companies if only the data from the supplier code of conducts would be used, the following table has been created. As it can be noticed from the table, BP does not address the environmental dimension of sustainability on any level in its code of conduct. This is strongly different from the code of conduct of Nestlé which thoroughly addressed different environmental metrics within its supply chain sustainability area. Also, the social area is much more thoroughly addressed in the supplier code of conduct of Nestlé compared with the equivalent document of BP.

Sustainability metrics based on the supplier code of conducts

Environmental

Nestlé	BP
Nature conservancy, Minimizing environmental impact, Plastic packaging stewardship, Air Quality, Farm Water Management, Water Withdrawal & Irrigation, Biodiversity management	No environmental metrics addressed.

Social

Nestlé		BP	
Labour and Universal Human Rights	Health & Safety	Human rights & Modern slavery	Health & Safety
Responsible Recruitment, Responsible Employment, Freedom from Forced, Bonded or Prison labour, Freedom of Association and Collective Bargaining, Minimum age for employment, Equal Remuneration	Emergency plan, Workplace safety, Housing Conditions	Non-discrimination, grievance processes and freedom of association	No more specific metrics addressed

Governance

Nestlé	BP
Bribery and corruption, Grievance mechanism, Conflict of interest	Bribery and corruption, Money laundering, conflicts of interest, anti-tax evasion policy, and Grievance mechanism

Table 3. Supply Chain Sustainability metrics reported by Nestlé and BP as per their supplier code of conducts. Nestlé Responsible Sourcing Standard. (2018). & BP's expectations of its suppliers. (2019).

6 Discussion and Conclusions

After comparing the collected empirical data, the conclusions of this case study can be conducted. Consequently, the following chapter will discuss the theoretical and contributions of this paper, and the way it answers the main research question. Also, managerial contributions are given and potential suggestions for further research are addressed in the end.

6.1 Discussion and Theoretical contribution

Although researchers have been fascinated by the subject of supply chain sustainability (Hassini et al. 2012; Morali and Searcy, 2013), there were no previous research found that focused on comparing two companies from different industries from the perspective of sustainability metrics in the supply chain context. Also, while there had been previous study that focused on the measurement of sustainability metrics (Osiro et al. 2018), it did not consider them from a comparative perspective between different industries. Thus, this paper offered a new take on the way sustainability can be measured between two different industries in a more specific context revolving around the supply chain area.

According to the empirical data collected based solely on the sustainability reports of the two companies, there are both resemblances and differences when comparing the two companies in terms of their metrics. When it comes to the environmental sustainability dimension, it can be noted that both companies have devoted plenty of attention to tackling climate change, as the topic was widely addressed especially in the sustainability report of both firms. Also, the main specific metric by which climate change is being monitored and addressed in the two companies is by targeting the reduction of GHG emissions across their supply chain operations.

In addition, both companies have metrics in place concerning water withdrawal, while BP has a specific attention on water replenishment also. Monitoring air quality is another type of environmental metric that is tracked by both parties. Both companies

pursue environmental success in its operations is by renewable energy, which they strive to intensively integrate to their business. BP has a stronger stress on the importance of renewable energy sources, which may be characteristic of the oil and gas industry. Therefore, it can be seen that the environmental area is monitored and addressed similarly in terms of supply chain sustainability related metrics in both companies.

An environmental metric that stands out in terms of different approach between the two companies is the way the topic of deforestation is addressed. While Nestlé has devoted plenty of attention to the importance of addressing deforestation amidst its supply chains, BP does not mention whether it plans to treat the issue of deforestation in its operations. Nestlé has also put in place clear objectives for in terms of tackling deforestation in its supply chain operations. BP, on the other hand, has not done this, and furthermore does not mention its stance and concern when it comes to the area of deforestation amidst the supply chains in which it is active. BP´s lack of concern towards the area of deforestation, which can be seen as an important environmental sustainability metric in the supply chain area, somewhat justifies the rudimental premise introduced in the beginning of this chapter arguing that the overall environmental concern amidst the supply chain operations is lower in the context of BP.

When looking at the approach of the two companies towards the social sustainability area, it is quite evident that both companies have the strongest focus on the areas of human rights and health & safety. While the two companies mainly focus on these two upper-level areas, the metrics and stress pertaining to them varies quite apparently. Consequently, when considering the findings within the social sustainability dimension, the differences between the two are more apparent than within the environmental sustainability dimension.

In terms of human rights issues amidst the supply chain operations, the sustainability report of BP includes three metrics that are named labour rights, human rights, and tackling modern slavery. The company addresses these three areas as the main human right metrics amidst it´s attempts to secure more sustainable procurement processes.

In the supply chain context, these metrics are not elaborated on any more thorough level, and there are no additional metrics that fall under the area of human rights.

On the other hand, as per Nestlé´s sustainability report, it has a much broader and in-depth focus on the human rights issues. Pertaining to the company´s supply chain operations, it pledges to tackle multiple issues within the human rights area. The list includes protection of workers and children, promotion of decent employment and diversity, opportunities for young people, empowering women, access to water, sanitation, and hygiene. Consequently, Nestlé addresses the human right issues in its sustainability reporting in a much more specific way, introducing several concrete ways to tackle the problems that relate to human rights within the supply chain-related processes. In addition, Nestlé devotes a significant consideration for the issue of animal welfare amidst its supply chains. This metric that considers the animal rights is not mentioned in the sustainability report of BP, which further illustrates how much more attention Nestlé seems to devote towards human and animal rights amidst its business. On the other hand, it could be the case that animal rights is not characteristic for the oil and gas industry. Such a notion can be deemed as debatable, as for instance a notable company pertaining to the oil and gas industry, Shell, has strong devotion to the importance of the issue surrounding animal welfare, and even comprises annual animal welfare reports (Shell, 2021).

When looking at the way the two companies address the second main social sustainability metric, health & safety, a complete opposite tendency can be observed based on the information yielded from the sustainability reports of the two companies. Amidst the supply chain sustainability area, Nestlé only mentions three more concrete metrics without any more specific elaboration: emergency plan, workplace safety, and mental health of the employees. BP, on the other hand, reports and tracks a much wider range of more specific health & safety metrics: preventing workplace incidents, identifying hazards, managing risks amidst the whole supply chain, prevention of oil spills, PPE equipment for staff, driving safety, mental health and fatigue management of the employees. In addition, the company has in place a specific framework that strives to manage and prevent workplace accidents under the name *OMS-safety framework*.

The negligence of Nestlé when it comes to reporting its health & safety procedures is not necessarily an industry-specific characteristic feature. For instance, another notable food industry company, Danone, seems to have strong devotion to health and safety matters as it has even published a specific workplace health and safety report which addresses multiple targets and metrics within the health & safety area (Building the future with Danone employees, 2020).

Consequently, it can be deduced that while Nestlé introduces a specific take and consideration on the area of human rights, BP offers the same way of thorough attention towards health & safety by pledging to tackle multiple different specific metrics. It is an interesting finding, since both companies have a much more specific and thorough take on only one of the two upper-level social sustainability metrics, and when doing a comparison, almost neglecting the other of the two. Also, it may be deemed as surprising that BP´s sustainability report does not have any say on the issue of animal welfare, which can be considered as an important and visible metric pertaining to the social sustainability area (Keeling et al. 2019).

The metrics pertaining to the Governance area are similar as per the reporting of the two companies. Based on the supplier code of conduct that BP and Nestlé have in place, the two companies comply to the issues of bribery and corruption, and conflicts of interest, with the addition that both companies have a grievance mechanism in place. While Nestlé does not mention of governance-related metrics in its sustainability report, BP´s sustainability report addresses its compliance for money laundering. Also, it states to have an anti-tax evasion policy in place. Therefore, it can be seen that BP´s compliance towards issues related to the governance area is a little stronger than the on of Nestlé, as it addresses more metrics in its public reporting, and also includes governance-related metrics in its sustainability report besides the supplier code of conduct.

To conclude the empirical research conducted for the two companies, factors and information derived from the supplier code of conducts, 3rd party indexes, and sustainability reports serve as the basis for the final verdict of this paper. Based on these sources it will be deduced which of the two companies has a broader and more

encompassing compliance towards the supply chain sustainability issues in a metrical context, and how these differ in the three areas of the ESG. Consequently, the purpose is to generate an answer to the main research question of this study.

Starting with the supplier code of conducts of BP and Nestlé, a clear distinctive factor is that Nestlé's code of conduct includes metrical factors related to all three areas of the ESG, while BP does not mention anything related to the environmental area. Therefore, based on the code of conduct it can be deduced that BP has less stress and compliance for the environmental area within its supply chains.

The analysis of the 3rd party indexes, CDP and S&P Global Index of the two yields really similar results, as both companies score similar points for all the areas measured. Within the CDP index which considers only environmental metrics, BP has responded to only of the three measured areas, unlike Nestlé, which has responded to all of them, which can be interpreted as low environmental engagement from BP. The S&P Global Index scores are heavily similar between the two, Nestlé scoring higher in environmental, while in the social and governance. Based on the 3rd party index results it is easy to deduce that Nestlé has higher consideration of the environmental metrics than its counterpart from the oil and gas industry.

The broadest and most intensive source of information in the empirical research were the sustainability reports. Based on them, the environmental compliance is stronger at Nestlé, as BP distinctively does not address the topic of deforestation in its reporting. This can be seen as a major finding, as according to Vedantu (2022) deforestation is a severe environmental concern, and a growing number of major retailers, brands, suppliers and investors have promised to eliminate deforestation from their supply chains (Forest Solutions Platform, 2022). Within the social area concerning the supply chains the clear difference between the two companies is that Nestlé has much more intensive focus on addressing the metrics related to human rights, while BP has more focus on the metrics related to health and safety. It is also relevant to note that BP does not address animal welfare, an important metric related to the human rights. Within the governance, BP mentions two metrics more than Nestlé.

As a result, the below main research question of this study can be answered.

How performance metrics for sustainability of supply chains differ depending on the industry in globally notable companies?

Based on the study conducted of two companies representing two distinct industries, Nestlé (food industry), and BP (oil and gas industry) the metrics related to the environmental area are more stressed in the food industry than in the oil and gas industry in the supply chain context. In this context the environmental metrics have a higher amount and are stressed in a larger number of sources when it comes to the food industry. A clear distinctive factor regarding the environmental area is that the environmental metrics are not mentioned at all in the supplier code of conduct of BP. In the supply chain context, in the food industry the metrics pertaining to the human rights have the stronger focus, while in the oil and gas sector metrics related to health and safety are more stressed. This can be seen from the abundance of different examples of metrics for only one of the two areas within the social dimension, while comparable shortage regarding the other area. Also, the supplier code of conduct of Nestlé is more thorough in an overall addressment of the social sustainability metrics. Regarding governance, oil and gas sector has slightly more focus on the area, but the difference is much less apparent than what it is within the environmental and social areas.

6.2. Managerial contribution

This research offers managers of companies that pertain to the oil & gas and food industries tools that they can use as guidance when tackling possible problems that are related to the area of supply chain sustainability. As this research shows what sustainability areas are more likely to be problematic within the two industries, managers can have a better understanding of the way resources should be allocated to avoid “common” industry-related sustainability problems amidst the supply chains. Consequently, as per the results of this research, managers can devote extra attention

in ensuring the compliance of the more lacking areas of the two industries, which according to this research are health & safety area in the food industry, and human rights in the oil & gas industry. Also, management of oil & gas industries could take a closer look at the compliance within the animal welfare area, as BP served as an example of a company from this industry that does not address the issue. This research had also broader implications regarding the environmental, social, and governance areas that could be of benefit to the managers that work within the two respective industries.

It should be noted that as there were only one case company for each of the two industries introduced, managers should keep this in mind when interpreting the results of the study. Therefore, as the scope of this study did not consider more example companies, the results of this study should serve more as a directing guidance that would facilitate finding possible areas of concern within the different sustainability areas in the context of supply chains. Since different sources were used to gather the empirical data in this paper, this research can also serve as guidance to which publicly available materials could be used for such sustainability scrutiny of different companies. Thus, this study shows that even with already available documents, a good sustainability due diligence process can be conducted to create a better picture of the way different sustainability-related matters are carried out in a specific company.

6.3. Limitations and suggestions for further research

This paper studied the difference between two industries regarding the used sustainability metrics in the supply chain context. The paper compared food industry and oil and gas industry by including one sample company from each industry to find the answer to the main research question. Since doing a comparison between just two example companies may not yield the most encompassing research results, it would be advisable to use more sample companies from each industry considered. This would add more credibility to the results generated by the study.

The research conducted used publicly available documents, such as code of conducts and sustainability reports as the primary source for the empirical data. As an alternative it could be considered to use more tacit data as the primary source of information. Such types of data could be induced from employee interviews or questionnaires that could be sent to the personnel of different companies. Information deduced from the target companies by using such ways could add more insightful knowledge on the studied matter. Also, such tacit information could maybe act as a factor that would reduce the chances of greenwashing that the research results could be subject to.

Finally, because these types of comparable empirical studies between two different industries on the topic of sustainability metrics have not been intensively studied previously, it is welcomed to have more similar studies that are conducted for other, alternative industries besides the food industry and the oil and gas industry. This would promote a better understanding of the prevalence of different sustainability metrics in a variety of industries. It would be therefore also easier to see how much certain sustainability metrics intertwine between different industries.

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