



GÖTEBORGS UNIVERSITET
HANDELSHÖGSKOLAN

Bachelor thesis

The issues with measuring and reporting emissions - An analysis of
the agriculture sectors efforts to improve sustainability reporting

Bachelor Thesis in Corporate Sustainability, 15 credits

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Abstract

Agricultural greenhouse gas emissions are a major contributor to climate change globally. The way to report and calculate the emissions can require vast amounts of resources and can be a complicated process for both farmers and top-level management. The issues occur as the current sustainability reporting system requires auditors to meander through a large amount of standards and information that a growing number of stakeholders require firms to publicly disclose. In this qualitative study, sustainability reporting is examined from an agricultural perspective and the main issues with measuring and collecting emissions data in the agricultural sector is explained. The study is based on interviews with stakeholders involved in Swedish agriculture from the private and public sector in order to create a more holistic perspective. The thesis further explains which strategic possibilities Swedish agricultural corporations can take advantage of when it comes to calculating emissions and how it results in sustainable development.

The findings of the study indicate that the roles of responsibility differ between farm-level actors and agricultural cooperatives and companies within the food industry. The larger actors need to involve the smaller actors in the reporting and provide them with simple and automated emission calculating tools. If the agricultural actors work together, sharing their knowledge and resources with each other, sustainability reporting and the calculation of GHG emissions can become more accurate. Furthermore, sustainability reports need to present more precise data, become more legitimate and harmonize to make them comparable. Stricter regulations and third-party auditing could help improve the legitimacy. The use of science-based targets, new technologies and innovation is also important in order to further reduce emissions.

Keywords: Sustainable development, Agriculture, GHG emissions, Sustainability Reporting, Natural Resource Based View

Acknowledgement

First and foremost, we would like to thank all of the respondents representing important parts of the agricultural sector in Sweden for your participation. Without the help of your invaluable insights in the agricultural sector and food industry, it would not have been possible to accomplish this report. Secondly, we want to thank our supervisor Anders Sandoff who has been helpful in guiding us in the right direction and showed much interest in our research area. Finally, we want to thank our opponent group who has helped us with relevant feedback on how to improve the text further.

Thank you very much for your important contributions to this study!

Johan Henriksson & Nicole Lindau

Definitions

Agriculture

In this report, agriculture is defined as dairy, meat, crop production and animal husbandry.

Greenhouse gas (GHG) emissions

Greenhouse gas emissions are defined as carbon dioxide, methane and nitrous oxide.

Sustainability

The concept of sustainability is in this report limited to environmental sustainability.

Green Investments

Green Investments is defined as investments in organizations that are directed towards reducing greenhouse gas emissions or pollutants. It is also defined as funding that supports the development of sustainable methods or technologies.

“Greenwashing”

It is explained as the way companies deal with sustainability goals and reporting but that companies often fall in the trap of wishful thinking and good intentions, rather than creating science-based positive change towards sustainability.

LCA

The concept LCA stands for Life Cycle Assessment and is defined as a type of method for understanding and analyzing a product or service's whole value chain and life cycle of emissions, from cradle to grave.

Science-Based Targets

The term stems from the organization Science-Based Target initiative. It means that companies are following environmental science regarding climate change and science-based climate goals in their operations and strategies.

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1. Introduction

In the introductory section, a background of the most relevant topics linking sustainability reporting and the agriculture sector will be presented. The problem discussion will explain what is problematic with the research area, followed by the purpose, research question and delimitations.

1.1 Background

The productivity of agricultural production of food has improved immensely over time, enabling it to feed billions of the growing population globally. However, the improvements in efficiency and technology of agricultural practices has not happened without any backfires. Conventional farming methods and mass production within the agricultural sector has harmed the planet in multiple ways. The United Nations has shown how humanity's food production, eating habits and transport methods are creating a large global impact on climate change, making it even more urgent to switch to a sustainable agriculture and food system in order to reach the Agenda 2030 goal (Batini, 2021).

As the sustainability pressure on companies is increasing, there is also an increasing trend in sustainability reporting. The tool has evolved significantly during the last centuries. Even though it could be argued that the methods of compiling sustainability reports have become more standardized, it is rarely mandatory. Therefore, most companies are free to choose if they want to report, what type of data to include and to what extent they choose to report their environmental impacts on society. The reasons why companies choose to publish annual sustainability reports are many. A common one is to strengthen the company's legitimacy and accountability towards stakeholders (Bebbington, Larrinaga, O'Dwyer & Thomson, 2021). A number of companies are also forced by law. The European Union (EU) has regulated companies to implement corporate sustainability reporting in its annual report. Approximately 11 700 companies within the union are affected by the Non Financial Reporting Directive (NFRD), stating that non-financial disclosure must be implemented for companies with more than 500 employees. In addition the report needs to contain both environmental and social issues (European Commission, n.d.a).

The European Union has tried to improve sustainability reporting and the disclosure of information. The EU Taxonomy is a tool working to clarify which investments, funds and activities that are environmentally sustainable. It regulates mitigating climate change, climate change adaptation, sustainable use and protection of marine and water resources, the transition into a circular economy, pollution prevention, protecting and restoring biodiversity and ecosystems (European Commission, n.d.b). The system is impactful and non-comparable since it involves all large companies (employee amount above 500), government controlled businesses and deals, smaller listed companies and participants of the financial markets. The taxonomy will gradually be implemented and the first part of it will be focused on the activities contributing the most to greenhouse gas emissions. The EU taxonomy will restrict the way companies publish their environmental information in reports and clear communication to stakeholders is important for the reliability of sustainability reports (EY, 2021).

In Sweden, the regulations are stricter than the NFRD. A new part of Årsredovisningslagen was legislated starting from January 1, 2017 stating that all Swedish corporations that have more than 250 employees, a net turnover rate of 350 million SEK and/or a balance sheet total of above 175 million SEK need to establish an annual sustainability report (FAR, n.d). The law also clarifies that the reports need to contain information about the most important aspects of environmental and social acknowledgements in order for the reader to understand the company's future and current results and the impact of these on society. Furthermore, the reported environmental impacts can be from greenhouse gas emissions (GHG), land use, water use or human rights data (FAR, n.d). The agriculture sector is however facing difficulties with reporting emissions due to its complex value chain, since the process includes several stakeholders and the emissions that arise from various sources of origin (Pucker, 2021).

The Swedish agriculture sector is combined by approximately 166 000 individuals, and almost 59 000 different agricultural companies are active in the sector (Jordbruksverket, 2021). The domination of small businesses makes the agricultural sector unique. In terms of small businesses, the structure of the sector shares similarities with other countries within the EU. However it is more common that larger companies are engaged in the agricultural sector abroad. The industry organization Lantmännens riksförbund (LRF) is an important actor in the Swedish agricultural sector since they act in the interest of the sector. LRF has

approximately 140 000 members, their main focus is to support its members and contribute to the development of agricultural companies in regards to growth, profitability and attractiveness and support its members (LRF, n.d). Many farmers in Sweden are privately owned small enterprises that are not required to report by law, but it is common that they are organized in big cooperatives. The two largest actors Lantmännen and Arla together have 21 200 farmers under their division (Arla, 2022), (Lantmännen, n.d). Beyond these two companies, around 1 000 additional farmers are organized in smaller cooperatives (Svensk Kooperation, n.d). The farmers that are a part of the larger cooperatives are included in the cooperative's sustainability reports. Since sustainability reporting generally can be used as a basis for decision making both for internal and external activities, strategies and long-term goals, it is applicable to the agricultural sector as well. However, the small businesses represented by the farmers will not be affected by sustainability reporting if they are not part of a cooperative. About one half of the production value in the Swedish agriculture market comes from harvesting potatoes, cereals and plants. The second half comes from livestock, dairy and egg production. According to Naturvårdsverket (2020) the Swedish agricultural sector causes 15% of the territorial GHG emissions. In addition to carbon dioxide, the emissions primarily consist of methane and nitrous oxide. These emissions are caused by animal digestion, manure management and nitrogen conversion in agricultural land (Naturvårdsverket, n.d). When it comes to fossil fuels, only approximately 25 percent of the Swedish agricultural sector is fossil free. This is far from the goal that some major agricultural organizations have set regarding becoming a fossil free sector by 2030 (LRF, 2020).

In the Swedish private sector the most common reporting standard is Global Reporting Initiative (GRI) (See appendix 1). Greenhouse Gas Protocol (GHG Protocol) (See appendix 2) is often used as a complement since it provides calculation methods and tools to estimate greenhouse gas emissions (GHG). In addition it is mandatory to report in line with GHG Protocol if the organization has set science based targets. Based on the empirical data presented in this report it is conducted that there are several difficulties regarding the collection of emissions data. The majority of the reported numbers in the Swedish agricultural sector is calculated with help from globally standardized stencils. The food industry often relies on impact numbers from a climate database produced by the Swedish research institute (RISE), where the impacts of different food products are listed (RISE, n.d).

Data gathering and measurement on farm level emissions is rare since it is costly and time consuming.

1.2 Problem discussion

All businesses across multiple industries need to address the issue of climate change, and a way to collect, gather and disclose information to stakeholders is to improve and use sustainability reporting frameworks as a tool to a larger extent (World Economic Forum, 2021). In the climate change discussion emissions reduction is often mentioned as an important action to take. The European Union is currently creating frameworks for how to reduce the total amount of greenhouse gas emissions and aims to become carbon neutral by 2050. This pledge is part of the EU green deal, which has the goal of becoming the first carbon neutral continent on the planet. (European Commission, n.d.c). Emissions of anthropogenic greenhouse gasses (GHG) have continued to increase rapidly during the last 200 years since the industrial revolution started. The agriculture and forestry sector accounts for a large part of the emissions, approximately 24 percent of the global emissions of Carbon dioxide, Methane and Nitrous oxide (EPA, n.d). Agriculture and deforestation is the second most emitting source of GHG emissions after the transport & energy sector. Furthermore, global carbon emissions have increased by 90 % since 1970, according to the United States Environmental Protection Agency (n.d.). On top of this, land use for agriculture-related production has over time covered approximately 40-50 percent of the total Earth's surface on land (IPCC, 2007). Simultaneously, the European Union has estimated that the world population will continue to increase a lot in the coming decades, reaching close to 10 billion people on the planet (IPCC, 2007). This increase ultimately puts pressure on the global food production and agricultural sector, which needs to increase production levels, as a consequence sustainable agriculture will become even more important for firms to adopt (IPCC, 2007).

Since agriculture plays a big role in trying to reach the Paris agreement's goal of keeping the planet below a 1,5 degree celsius temperature increase, many steps need to be taken to make agriculture more sustainable. Emissions constitute the basis for the environmental aspect of sustainability reports, making calculation tools and correct emissions data vital to strengthen sustainability reporting. Although sustainability reporting has increased in popularity during the last 20 years, it does not imply that greenhouse gas emissions (GHG) and environmental

damage has decreased. It could be said that sustainability reporting is not a proxy for progress (Pucker, 2021). This is partly due to flawed or non-standardized structures that do not suit the specific industry well and failed measurement methods. The issues with sustainability reporting are many, and there is much room for improvement. According to Pucker (2021), the six main issues with reporting sustainability is the lack of mandates and auditing, emissions targets that are misaligned with the corporate strategy, opaque supply chains, complexity in the environmental measuring process, the collection of data and the vague interpretation of it and lastly the inattention to developing countries.

The complexity of environmental measuring processes is further addressed by Greenhouse Gas Protocol (2014) in their agricultural guidance. They state that emissions factors and empirical models generally are the easiest and least resource-intensive calculation approaches to use when estimating emissions. Unfortunately the tools are not efficient when it comes to capturing geographical variations in the biophysical processes undermining the greenhouse gas fluxes. In addition, the tools do not capture many of the changes that can be done in farm management practices. This results in that the tools can be of value on national level but fail to deliver accurate measures on local or farm-level. Another flaw of the empirical tools is that they tend to focus on one individual emission source at a time. In the agricultural sector this is a major problem since emissions often are connected by complex flows of Carbon and Nitrogen on farms. To receive evaluation, the emissions have to be measured at the same time and at the whole farm-level. Field measurements and process models are better at capturing and measuring the linkage between different emissions simultaneously and can therefore provide farm-level measurements. But the use of field measurements and process models can require expertise, data and time that rarely will be available. (GHG Protocol, 2014)

1.3 Purpose

The purpose of this bachelor thesis is to increase our knowledge about sustainability reporting, focusing on the agricultural sector and its issues with measuring and collecting emissions data. The thesis further investigates the positive environmental change that can be accomplished in agricultural companies, and how sustainability reporting can be helpful deriving that change. By interviewing relevant stakeholders from academia, companies and agricultural organizations, the aim is to pinpoint how the agricultural actors are related to

each other and provide the agricultural companies and actors within the food industry who reports, a general overview of the division of responsibilities.

1.4 Research question

How can sustainability reporting work as a tool in the Swedish agriculture sector in order to reduce emissions and how can it create further sustainable improvements?

1.5 Delimitations

Delimitations are necessary in order to create a study and research area that is relevant and narrowed down to a specific research question. As the chosen research area is linked to how sustainability can work as a tool in order to lower emissions in agriculture, some delimitations are crucial for the question's validity. First of all, this study is focusing on the Swedish agricultural sector, where agriculture is defined as food and cereal farming, excluding forestry and energy supply from the research. As Swedish agriculture is closely related to the laws and regulations within the European Union, some parts of the study will be on European level too. Regarding sustainability reporting, our objective is to narrow it down to environmental emissions and reporting, excluding social and economic sustainability.

2. Theoretical framework

This part explains the theories used in order to analyze the empirical data. In order to understand the main issues that large agricultural actors can face with sustainability reporting, the article by Pucker (2021) is introduced initially. The theory will constitute a basis for how sustainability reporting functions and differs between small-scale farmers and large food companies. Further, the theory Natural Resource-Based View (1995) will be presented. more general understanding of how important sustainability reporting and minimizing emissions is along with a strategic and competitive advantage in firms. Finally, clean technology is explained, giving a short overview of how green, technical solutions can help firms gain competitive advantage.

2.1 Issues with sustainability reporting

In the last 20 years, sustainability reporting and sustainable investments have increased significantly. Likewise has the carbon emissions, the environmental damage and the social inequities. Because of that Pucker (2021) claims that sustainability reporting is not a proxy for progress. Sustainability reporting is flawed with failurable measurement methods, non standardized structures and greenwashing. Furthermore Pucker (2021) elaborates on the issues with sustainability reporting and brings up six main problems.

First off Pucker (2021) introduces the *lack of mandates and auditing*. The majority of all companies can choose freely what standard setting framework and what information they want to expose in their sustainability reports and few are validated by third parties. This implies that a lot of the presented data can be misleading and not showing a representative picture of the whole performance. Secondly the problem regarding *specious targets* is presented. Pucker (2021) refers to a study from 2016 where 40 000 reports were studied, it was found that less than 5% of reporting companies mentioned goals and limits constraining economic growth. Less than 1% stated goals which align with experts' understanding of planetary boundaries when developing their products and services. Since the study was made, science-based targets have become more common but most companies still set their goals based on their capabilities or aspirations, not the limitations of the earth's capacity. *Opaque supply chains* is another problem regarding sustainability reporting. The issues regarding the lack of transparency within the value chains is often due to the highly distributed value

chains of the global business market where the producers of goods are located far away from the end users. Many companies lack insight in the multi-tiered value chains they are responsible for, due to outsourcing or different geographical locations in parts of the world (Pucker, 2021). Furthermore, there is a *complexity* in measurement methods when calculating carbon footprint. Pucker (2021) brings up the three scopes and underlines that even though companies have been able to disclose emissions data, few companies track and report their scope three emissions. This is problematic since the scope three emissions often constitute the largest part of the total company emissions. Pucker (2021) expresses that it can be close to impossible to access the data needed to complete a comprehensive emissions profile due to complexity, absence of tools and the lack of measurements by suppliers and users. Sustainability reports are often concerned with *confusing information* and it can be difficult for consumers to interpret all the numbers. For example it can be difficult to relate what the impact of a product generating 15 kilograms of carbon dioxide actually is and how much better it is for the consumer to choose a product with less impact. The last problem is regarding to Pucker (2021) the *inattention to developing countries*. The discussion regarding issues in sustainability reporting is often focused on publicly traded US and European companies but the fastest increases in consumption, emissions and social impacts will occur in Asia and in Africa. The goal setting to preserve key global resources will therefore be even more important than it is today (Pucker, 2021).

2.2 Natural Resource Based View

Hart (1995) develops a further extension of Barney's (1991) framework named "Resource-Based-View", which covers the characteristics a firm's resources need to obtain in order to become competitive and sustainable in the long run. The extended framework covers the natural environment as a factor to create competitive advantages. It is argued that it will be inevitable to preclude the natural environment from a firm's competitive abilities, since sustainable operations in businesses can lead to an increased competitive advantage (Hart, 1995). In order for a firm to obtain advantage, there are requirements that need to be met, which were introduced in the traditional resource-based view. Rarity, non-substitutability, valuable in terms of improving efficiency and difficulty to imitate are the four requirements needed to achieve core competence with competitiveness (Hart, 1995). The Natural Resource-Based View (NRVB) is explained as a way for firms to create competitive advantage while at the same time supporting sustainable development through a specific type

of interconnectedness. By incorporating three capabilities, a firm can contribute to sustainable development without compromising on their key resources and capabilities. By using the three presented interconnected strategies, strategic competitive advantage can be created, based around its relation with natural resources.

2.1.1 Pollution prevention

By reducing and avoiding unnecessary pollution to occur in the atmosphere, companies are able to improve their savings from avoidable costs. In return, it leads to efficiency and increased productivity. In order to utilize a pollution prevention strategy, emissions from greenhouse gasses can be reduced by improving the objectives the firm has created for dealing with environmental topics. It is made clear that pollution usually occurs from badly treated products or services using inefficient measurement systems. By fixing this issue, more resources can be saved and therefore disposal and production costs can be reduced. Two basic strategies presented by Hart (1995) are that firms try to prevent pollution at its source of origin, and the less sustainable alternative “End-of-pipe” technology. It aims at reducing and controlling pollution from its contamination source from water streams, air or waste. As a result, firms gain competitive advantage through lower costs. Further, involving employees to increase the knowledge in the firm is essential in order to adopt a sustainable strategy. Following the pollution prevention strategy also means showing reciprocity to the external environment, as minimizing emissions is not only an interest for the internal board of committee. Transparency in companies is crucial for future success, as local communities and other stakeholders need to be able to get viable information about a company's involvement with negative externalities (Hart, 1995).

2.1.2 Product stewardship

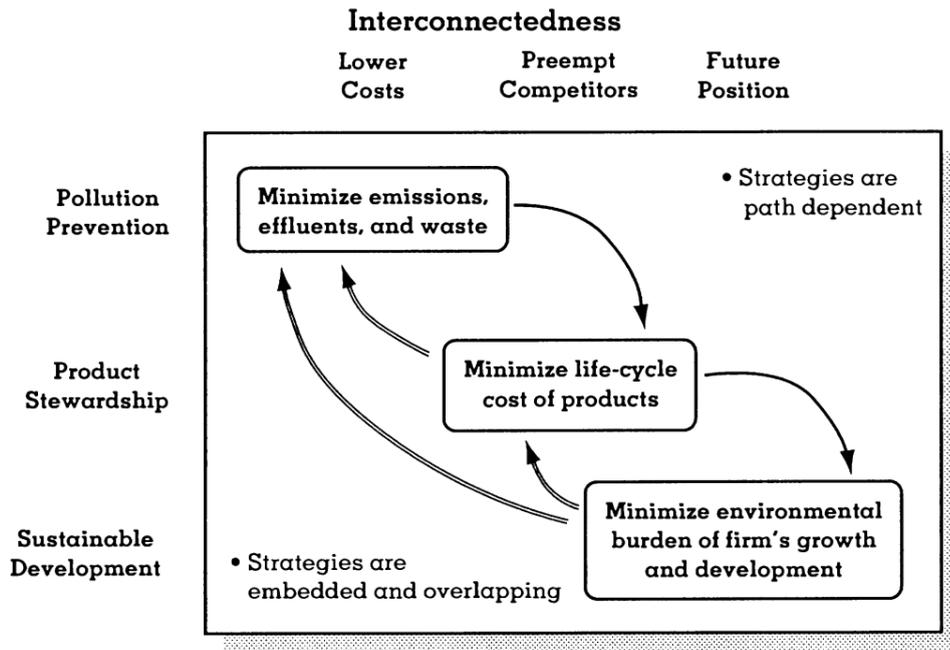
The proposition for creating stewardship in the product development is explained as: *“Firms with demonstrated capability in cross-functional management (socially complex skills) will be able to accumulate the resources necessary for product stewardship more quickly than firms without such prior capability”* (Hart, 1995, p. 1001). Furthermore, in reality this means that companies actively should work with their whole supply-chain, since most activities made in the different product phases will affect the environment. Companies should work with lowering their emissions from the supply chain and as a bare minimum try to incorporate life cycle assessment (LCA) in their operations. As with pollution prevention,

external actors are involved in the process. In order to create a legitimate strategy for the product development, the board needs to work closely with stakeholders such as environmental organizations, media and governmental representatives. The aim with product stewardship is to lower the impact of producing new products, and that it leads to a first-mover competitive advantage on the market. Hart (1995) also discusses that there are differences between startups and larger firms regarding how big part of the strategy formation can be linked to green products. Larger firms can, rather than putting product stewardship in the center of the firm strategy, gain competitive preemption. By creating green products, companies can through the product stewardship strategy improve their rumor while exploring new market opportunities (Hart, 1995). Finally, in order to reach the competitiveness on the market, Hart (1995) argues that new market trends need to be forecasted, as well as building sustainability key resources that build upon the “voice of the environment”, meaning that external actors are being heard.

2.1.3 Sustainable development

Hart (1995) proposes several strong arguments for why sustainable development is a rare resource in firms. It requires a long-term vision and moral leadership practices to achieve it. Nonetheless, having a company built up of employees and leaders who advocate a strong belief in sustainability and environmental purpose is crucial for creating a firm that contributes to sustainable development. The competitive advantage of caring about sustainable development is to get a favorable market positioning in the future. Creating products and services that are environmentally-friendly are challenging, as reaching a sustainable society is a long journey and that a shared vision that leads to commitment needs to be established first. It also requires a long-term commitment to research and development, which can be costly and require vast amounts of resources from firms. However, by acquiring these resources and capabilities, a firm can gain competitive advantage in the long run (Hart, 1995).

The model below proposes how the three strategies are related to each other, and how they overlap and impact each other. If a firm is not making progress in the pollution prevention phase, it is difficult to succeed at product stewardship which in the end will lead to sustainable development. These strategies therefore become dependent on each other, making all three parts important for the functioning of the model (Hart, 1995).



Hart, S. L. (1995). A Natural-Resource Based view of the Firm. *Academy of Management Review*, vol 20, No. 4, 986-1014.

2.1.4 Clean Technology

Sustainable development is a complex term that involves both social, environmental and economic aspects. By understanding the opportunities that will be reaped from dealing with environmental issues and reducing emissions, firms can gain strategic and competitive advantage while creating shareholder value (Hart & Milstein, 2003).

By focusing on creating a sustainable value in firms, Hart & Milstein (2003) points out that companies can create both sustainable development and profitability without compromising on the environmental aspect. In order to find these opportunities, firms can improve shareholder value on several aspects using Hart & Milsteins (2003) Sustainable Value Framework. Clean technology is presented in the framework along with pollution prevention, product stewardship and sustainable development. Disruptive, resource efficient and modern technologies have the potential to solve big environmental issues in society, rather than lowering emissions or make incremental changes. Further, future economic growth will be created by firms who create clean technologies, giving them a repositioning on the market and competitive advantage compared to firms who avoid dealing with new innovation in sustainability. Lastly, clean technology strategies are not as common in larger companies. This is due to a potential bigger risk for firms to invest large sums of money into innovation than on pollution-preventing measurements (Hart & Milstein, 2003).

2.3 Responsibilities

The possibility for firms to completely ignore sustainability issues has decreased over the years, as companies have a bigger impact on the environment. In order to increase corporate responsibility, firms need to first define their commitment to the natural environment (Epstein & Buhovac, 2014). The accountability cycle can be of use when trying to improve corporate accountability in organizations. The model includes internal and external sustainability reporting and other performance measurement systems in order to guide daily management. Further, the board's commitment to environmental problems is important to make strategic changes towards sustainable development and a larger responsibility (Epstein & Buhovac, 2014). Winston (2021) explains that barely any business leaders of large corporations today deny that sustainability is important. This is due to the increasing pressure from external actors as well as new climate science being published about global warming. Winston (2021) makes it clear that large companies have become a much more important part of the sustainability transition, as governments cannot solve the environmental challenges without the private sector. Winston (2021) Further expresses that not only collaborations between the public and private sector are beneficial when addressing climate issues. Great solutions can also be created through collaborations between different organizations.

3. Methodology

In this methodology section, the approach of the empirical study is presented, followed by how the empirical data has been collected. In conclusion, a literature review and validity section will be presented in order to create transparency.

3.1 The Approach of the Study

In order to make a well-balanced and full case study of the agriculture sector, a semi-structured interview method was used during the multiple interviews held. The purpose of holding interviews with participants of different expertise was to research how successful sustainability reporting is within agriculture and what type of improvements there are. It also had a purpose of showing how to legitimize and improve the efficiency of the report in order to reduce greenhouse gas emissions. The reason behind the structure was that the approach allows the interviewer to gain a wider set of answers through follow-up questions, where the interviewee is part of the creation of new questions as a result of their previous answer. By first preparing structured questions for each participant, the interview starts in a preferred direction. This semi-conducted structure gives us a better and wider understanding of the questions we want to be answered (Bryman & Bell, 2018). The questions are as mentioned earlier personalized and the interview guide is therefore more focused on certain topics than fully set questions.

3.2 Data collection

3.2.1 Primary data

The primary data was collected through interviews. According to Bryman and Bell (2018) collecting data through interviews is preferable when conducting qualitative research. Initially the companies were contacted (see contact guide, appendix 3) and scheduled an interview time. The interviews were arranged on Google Meet and Microsoft Teams. The digital interviews contained both video and audio format. The reason behind the digital setting was to be time efficient and to avoid being limited to the geographical area of Gothenburg. In addition, this setup made it possible to interview leaders of big corporations even though they had strict schedules with time constraints.

Prior to the interviews, an interview guide and agenda (see interview guide, appendix 4) was developed. We did not share the questions with the respondents before the interview. According to Bryman and Bell (2018) an interview guide can strengthen the dependability of the study. Due to the respondents' different positions within the agricultural sector, the questions were individually adapted to the interview guide, which was divided into relevant themes and areas rather than being strictly structured with standardized questions. The time span of the interviews varied between 30 - 60 minutes. Our aim was to have interviews around 60 minutes long but due to some of the interviewees strict time schedule, only 30 minutes could be offered. All of the interviews started with a presentation of the authors followed by a presentation of the respondents and their position in the company. The rest of the interview was divided into three themes stated in the interview guide, sustainability reporting, emissions and the future. All respondents agreed to being recorded during the interview and confirmed that the empirical data will be published in the report. The empirical material was transcribed shortly after each interview was conducted to make sure that we had it fresh in our memory. To transcribe shortly after the interviews is according to Patel & Davidsson (2019) called ongoing analysis. Some of the recorded interviews were listened to again when they were difficult to interpret by memory. The study has been peer-reviewed by all of the interviewees before final publications to ensure that the empirical data is correctly interpreted. In addition, the respondents have been able to choose if they want to be published by name or prefer to be anonymous. According to Patel och Davidsson (2019), this is important since the interviewee might not feel comfortable to express themselves otherwise.

3.2.2 Secondary data

The secondary data has been collected from the companies websites to present background information about them in the empirical result. In addition some interviewees have sent relevant articles and data from their companies.

3.3 Selection of respondents

The starting point of qualitative case studies is to try to create a holistic perspective and obtain as comprehensive information as possible (Patel & Davidsson, 2019). When we made the selection of respondents we therefore contacted different actors with different roles in Swedish agriculture. Since the research question affected the selection of actors in order to

find the most relevant ones for the implementation of the study, it has a target based selection which according to Bryman & Bell (2018) is a non-probability selection.

When we made the selection of respondents we contacted different actors with different roles in the Swedish agricultural sector. The selected respondents were contacted initially by phone and secondly through mail (see contact guide). An emphasis has been placed on trying to contact and interview the most relevant person in each company. The contacted actors have been carefully evaluated to make sure that they contribute with valuable perspectives on the agricultural sector. Our aim was to cover the whole sector and get perspectives from the whole supply chain. We wanted to capture the view on sustainability reporting on different levels and get both the cooperative perspective since they compile the sustainability reports and the farm perspective since they are an important part of the supply chain. The chosen interviewees cover the academic perspective on the role of reporting in the sector, the perspective of emissions reduction and emissions measuring tools, the farm-level and cooperative perspective and finally an overall perspective provided by the agricultural community. Regarding the companies interviewed, our aim was to contact the “head of sustainability”, as these individuals have a direct, holistic view over the sustainability work being implemented at their firms. Approximately ten additional companies or actors within the agricultural sector were contacted as potential respondents. However, they either did not respond or declined to participate. When ten interviews were conducted we experienced empirical saturation. Therefore we decided to not continue with the collection of new respondents and further interviews even though our initial goal was to conduct 15 interviews.

Table 1: Respondents and interview information (for further information regarding the respondents see appendix 5)

Respondent	Career title	Organization	Interview date	Interview length
Angelo Demeter & Hanna Tydinger	Co-founder & Product Manager	Volta Greentech	2022-04-04	60 min
Arne Fagerström	Professor in Accounting	Högskolan i Gävle	2022-04-07	60 min
Jens Berggren	Sustainability Expert	Lantbrukarnas Riksförbund (LRF)	2022-04-08	60 min
Claes Johansson	Head of Sustainability	Lantmännen	2022-04-11	30 min
Victoria Olsson	Senior Sustainability Manager	Arla Foods	2022-04-11	30 min
Respondent A	Researcher in sustainability accounting		2022-04-20	60 min
Charlotta Szczepanowski	Head of Sustainability	Coop Sverige	2022-04-21	45 min
Birgit Landquist	Senior Consultant	Research Institute Sweden (RISE)	2022-04-21	30 min
Fredrik Lagercrantz	Entrepreneur and farmer	Tre Bönder AB	2022-05-02	45 min
Stefan Schörling	Entrepreneur and farmer	Hästa Gård AB	2022-05-05	45 min
Daniel Sheridan Ferrie	Spokesperson for EU-UK agreements in financial services, financial stability and Capital Markets Union, taxation and customs	European Commission	2022-04-29	Email survey.

3.3 Literature Review

The main method of finding literature has been through the university of Gothenburg's online library service. By using both the function “supersök” and searching in the databases Emerald, EBSCO and Scopus. All of the used keywords were listed in a separate document. Under the process they were put together in different combinations. The most common keywords used were the following: agriculture*, “sustainability reporting”, measuring emissions and farming. Before we used the sources we made sure that they were peer reviewed. The textbook and articles from the bachelor course in Corporate Sustainability have also been used in order to make sure that our theory is valid. Furthermore, complementary books have been used from *Ekonomiska biblioteket* at the School of Business, Economics & Law, Gothenburg University. This literature has been helpful to write up-to-date background information and foundational knowledge for the problem discussion. The books and some of the articles have been found through the help of the University of Gothenburg’s librarian associates on information search, which both of us attended. This lecture contributed to our ability to find relevant and legitimate sources of information from the databases.

3.4 Reliability & Validity

When conducting a qualitative data gathering it is important to measure the quality of the empirical data and the study in general. According to Bryman and Bell (2018) the quality and trustworthiness can be measured by inspecting four criterias: credibility, transferability, dependability and confirmability. The credibility is related to how feasible the results are (Bryman & Bell, 2018). In relation to our study the credibility has to do with how well the empirical data is interpreted. In order to make an as close interpretation as possible the interviews were recorded and thereafter transcribed. The transcription was made using Microsoft Word's transcription tool. In addition, both grammar and spelling were corrected afterwards by re-listening to the interviews. All respondents have had the opportunity to verify and make changes before the study is published to ensure the accuracy of the empirical findings. The empirical findings are presented as objectively as possible to make sure that the reader can draw their own conclusions. In addition they can make their own estimations on if the findings will hold in other contexts and determine the transferability of the presented empirical data. According to Bryman and Bell (2018), dependability implies that it would be

possible to achieve similar results if the study was reproduced. To achieve dependability a distinct and transparent description of the study process is necessary (Bryman & Bell, 2018). The semi-structured interviews can be problematic in regards to dependability since they are hard to replicate identically. The questions asked to each respondent have varied within the range of our three themes and the supplementary questions have not been consistent. Despite these issues, semi-structured interviews were chosen since they provide profound information about the agricultural sector and sustainability reporting which was needed to be able to answer the research question. The last criteria, confirmability, addresses the objectivity of the authors and ensures that the results of the study are not affected by, or incorrect due to the author's personal values Bryman and Bell (2018). The chosen topic of the study is not considered to be of sensitive nature. Additionally, we did not know much about the agricultural sector in advance which made it easier being objective both towards the theoretical framework and to the collected empirical data.

4. Result & Analysis

In this result section, the empirical data will be presented in the same way as the interviews were structured. Initially, the pros and cons of sustainability reporting will be presented. Secondly, an explanation of the difficulties with reporting and calculating agricultural emissions will be covered. Finally, future improvements in the research area will be proposed, focusing on what measurements and operational activities can be taken to improve sustainability reporting on farm-level in order to reduce emissions.

4.2 Sustainability reporting

To get a food-chain perspective of reporting, Coop, Arla Foods and Lantmännen all to some extent agree that it is very important that companies report their emissions, and that the sustainability performance is as accurate as possible. Claes Johansson, Head of Sustainability at Lantmännen, adds that Swedish agriculture is well positioned when it comes to sustainability, and it is therefore important to disclose this success factor in more concrete terms through reporting. A positive trend in agriculture is that companies are starting to set clear and ambitious sustainability goals, and since they want to follow up on these goals and learn from failures, sustainability reporting becomes important. It has also become more accurate after more and more food companies are using both Life-Cycle-Assessment and Science-based targets in order to reach their climate goals. This makes the topic of sustainability reporting more strongly formulated according to Claes Johansson. Regarding the use of standardized reporting measurements such as GRI and GHG protocol, Johansson is generally positive about its structure. Lantmännen uses both these frameworks, and there are no major flaws regarding the methodology of the two standards. Instead, it is the in-data or the input that Johansson is skeptical about. Since it depends on how relevant the data you use in the standardized framework is, that becomes the bottleneck, according to Johansson. It is therefore important to improve the way companies collect data, and what type of conclusions companies make in the sustainability report. Another implication is also to include the farmer as much and easy as possible into the whole reporting process, as they are the ones directly responsible for the emissions, but also the ones holding the key solutions to improve agricultural sustainability.

Arla Foods Senior sustainability manager, Victoria Olsson agrees that it is positive that sustainability reporting exists, and is generally positive to how Arla is working and has improved its reporting standards over the years. “If you were to ask me 10 years ago, I would probably have said something different to you”, she explained. This is due to Arla’s well structured system and routines in reporting that covers the whole value chain from the farmer to the factory and industrialized process. 10 years ago, the biggest reporting challenge for Arla was how to measure emissions on farm-level, but since they now have a system in place, it is rather how to refine and improve this system that is on the agenda. Olsson adds that what makes accurate sustainability reporting a challenge is the fact that climate calculations often can be vaguely defined and are based on assumptions, emission- and conversion factors and templates that generalize GHG emissions. Sometimes, templates are a must in agriculture, as topics such as how much peat soil emits can be tricky to calculate without using any standardized templates, even though the emissions might vary from farm to farm. What Olsson explains is the biggest challenge with reporting in the food sector is probably climate calculations on product level. In Sweden, you can calculate in multiple different ways, and this makes the product-level reporting different between companies annual reports. If all companies measured with the same structured approach, you would be able to see change over time in regards to reduced emissions. Due to the differentiation in calculations, this becomes a bit problematic for the whole sector according to Olsson.

Coops Head of Sustainability, Charlotta Szczepanowski is a bit more skeptical when it comes to how much value the current model for sustainability reporting in the food sector actually gives. Since Coop is part of the Swedish organization “Hållbar Livsmedelskedja”, they have together with other leading food-chain stakeholders been looking at what factors are important in order to create a sustainable food chain. As far as Szczepanowski knows, no one in the industry is reporting on all areas of the food supply chain. Instead, companies get to pick and choose on what emission factors they want to report. If you solely follow the law around sustainability reporting, it gives nothing of value, according to Victoria Olsson. However, if you as a company decide to report on the most substantial information, it can be of immense value with sustainability reporting. Furthermore, the way companies do their calculations and whether or not companies use similar reporting frameworks are of big importance for the validity of the result, otherwise you are unable to compare it.

Jens Berggren, Sustainability expert at LRF believes that sustainability reporting is very important for many reasons. Regarding LRFs agricultural members, most of them are great at environmental sustainability on most aspects Berggren and his colleagues have been looking at. “Swedish farmers belong to the world elite. The major challenge is how to explain and disclose this in a trustworthy way for customers and other stakeholders”, states Berggren. What he refers to as part of the problem about how to report companies emissions is that regional differences in farming affects the validity. Having a standardized way of reporting that is the same for all actors would be ideal, but since agriculture looks quite different in different parts of the world, the standardized numbers only become estimates.

Volta Greentechs general view on sustainability reporting is that it should be easy, since the amount of companies publishing reports globally must increase. There are a lot of different standards and regulatory approaches that hinders the actual usage. For startups, it is even more confusing. In many industries, it is more straightforward with the reporting process, but for agriculture, there are not any specific standards. Thus, it gets complicated. Regarding the successful part of the reporting process, it is crucial for Volta, as their business model relies on reducing methane emissions using their produced algae greenfeed. Since consumer claims need to be accurate with emission reductions, Volta's use of sustainability reporting needs to be following science based data as well as verified auditing standards.

To get an academic perspective on sustainability reporting, both Respondent A and Arne Fagerström from University of Gävle agree that the original intentions of the development of sustainability reporting is positive and invigorating for people. Arne Fagerström makes the point that reporting is good for most business practices, both public and private. Not everything in society has a monetary value, but sooner or later it becomes translated into economic terms. Current practices that harm the environment will drain financial resources in the future, or even harm all of humanity in the long run. This is also why all groups of society need to work with environmental issues, states Fagerström. He also makes the point that he believes the Swedish agriculture sector generally has a reasonably high environmental awareness that they need to improve. Sustainability accounting can in this case play a role in changing human behavior. Henceforth, Respondent A believes that reporting is fruitful in different sectors, and that regulators need to gather information to different stakeholders about environmental issues. Investors need environmental, social and governance (ESG) in order to make well-grounded investment decisions. Agricultural and food-chain companies

need to invest more sustainably and there is also the important function of reputational and financial gains of dealing with sustainability reporting. Respondent A also makes the point that the intentions in the agriculture sector are probably good, but there are huge potentials for improvements.

On farm-level, the Swedish farmers participating in the interviews see a different reality regarding the use of sustainability reporting. Fredrik Lagercrantz, founder of the KRAV-certified cattle farm Tre Bönder AB mentions that he and his colleagues do not know any farmer who actively measures emissions on farm-level in Sweden. Even if his farm consists of approximately 200 beef cows at its peak and is both KRAV-certified and organic, they do not report emissions. Lagercrantz and other farmers mention that they are not against calculating emissions and utilizing sustainability reporting in agriculture, but there are simply no readily available tools and measurement systems that make it easy for the independent farmer to measure emissions.

To summarize, it is made clear that the functionality of sustainability reporting differs significantly between actors on a large scale production level and small scale farming level. While larger agricultural companies need proper sustainability reporting in order to make well-grounded sustainability management decisions and follow up on their science-based targets, smaller farmers usually do not have an incentive or the right tools to calculate emissions or make reports. The respondents further mentions that the current model for sustainability reporting has aspects that could be improved. This includes improving the comparability level of reporting, locally customized reporting numbers and an increased amount of LCA-analysis in agriculture.

4.3 Emissions reduction and calculations

All interviewees agree that improvements need to be made to reduce agricultural emissions. Calculations are not accurate enough, and several steps need to be taken in order to reach the global climate goals. Although Swedish agriculture consists of mainly smaller farms, Angelo Demeter and Hanna Tydinger from Volta Greentech believe modeling can be of good use on farms, as the Swedish technological level on farms is high compared to the global average. Swedish agriculture is one of the most sustainable in the world, although not perfect. However, it should not become a financial burden for farmers to use new technologies to

report emissions. Governmental services or incentives must be used as well. LCA analysis is another tool that can help farmers pinpoint the feed their cows are eating and how large their farm is. Consequently, LCA enables them to approximate the amount of methane emissions, Demeter and Tydinger state.

Volta Greentech explains that standardized data is not updated to current emission levels. In addition, there are vast differences in how much methane a cow emits between farms. Volta Greentech explains that they got help from climate consultants to measure how much their farms emitted before and after the red algae was fed to the cows in their pilot study. The current existing measurement tool that Volta uses was created by RISE in 2009, and it does not cover all of the farm-level emissions from methane. Therefore, it is time for a new update on the previous standard, especially on the methane numbers, something that is of big importance for both Volta Greentech, the cattle and dairy industry. When it comes to the use of the GHG protocol, Volta believes that the framework could be used in their operations, but the problem with it is that it is too generalized. It does not quite cover the emergence of greenfeed supplements for instance.

RISE has developed a food climate database with specific footprints for about 750 food products. The footprints are collected from literature studies and can contribute to a more general understanding of emissions in the food sector. It is used by many Swedish organizations to follow up on targeted climate goals or sustainability reporting measures. It is not accurate enough at catching the farm-specific perspective however, mentions interviewee Birgit Landquist. All of the climate numbers used in RISEs database follow scientific data from studies that are reviewed, but they are sometimes too general for a certain grain or product since the national averages differ between countries. Furthermore, Landquist mentions that current initiatives are taken to improve the calculations on a farm-specific level. One example of such an initiative is Agronod, a sustainability and digitized farming initiative in Swedish agriculture. It aims at trying to digitize agriculture in order to secure and improve sustainable food production. Coops Head of Sustainability states that the food chain uses RISEs climate database, solely because it is the best one available and the most common one to use in the sector. Charlotta Szczepanowski explains that there are sections of the database that are not perfect, but is also sympathetic to the fact that it is a complex process, and that it is complicated to calculate the emissions. Szczepanowski also points out that she

believes the food industry is lacking behind when it comes to topics such as LCA, on products. She believes that other industries have come further with the integration and knowledge of LCA. This topic is something that is hindering the progress of sustainability reporting in Coop's industry, states Szczepanowski. This is due to the fact that the supply chains in food production are long and complex, and that the concept of sustainability in agriculture contains a myriad of different definitions and issues. This can perplex decision-makers to do what is managerially possible short-term, according to Szczepanowski.

Furthermore, different stakeholders in the sector have different ways of calculating and reducing its emissions. Arla, for instance, has developed an own climate calculating framework on farm-level that their dairy farmers use. Victoria Olsson makes the point that Arla is a cooperative and is therefore owned by farmers. In Sweden alone, Arla has approximately 2400 farmers which fill in a self-assessment form with approximately 200 questions. After that, an external advisor goes to all the farms to make sure that the decimals are correct. Later on, all numbers from the farms go into the company's own system called Arlagården, where farmers can compare its performance with other Arla farms.

When asked whether having an own system for calculating emissions is more favorable than using standardized numbers from GRI or GHG protocol, Victoria Olsson clarifies that Arla follows standards such as the GHG protocol since they use their calculation methods. However, Arla additionally needs to develop a framework that becomes comparable internationally and unique for Arla's own niche. The philosophy around this is to improve the accuracy of calculating emission factors in Arla's operations and production methods, but also that their farms differ between regions in the world. Finally, Victoria adds that she believes Arla has one of the biggest databases of farm-level climate data in their industry, since they have for the third year in a row collected 200 questions from 8000 global farmers in the dairy industry. Adding to the arguments Victoria Olsson makes, Respondent A explains that the small, privately-owned farmers are not required to report, and that a considerable part of farmers are owned by cooperatives. This means that the cooperative is the one responsible for sustainability reporting. The universal and international way of reporting within cooperatives is good for the individual farmer, who might not have financial resources or time to calculate emissions.

Lantmännens Claes Johansson brings up sectoral challenges and explains that the complexity of gathering data for agricultural emissions is the most tough part. The supply chains in the agriculture and food sector are long and it is common that one single chain can consist of over 100 farmers or actors for one product. Moreover, agricultural emissions are not imitable to compare with that of technological or industrial processes. Biological systems are complex and not something an engineer can easily calculate. The emissions are rather connected to biology and agronomy, Johansson states.

In conclusion, the respondents state that calculating emissions in agriculture is a complex process, as it is not fully comparable to other industries. RISEs database works well to some degree, but there need to be more farm-specific models that catch the local differences in emissions. The empirical data confirms that agricultural supply chains often are long, which causes inaccuracy in the measuring process.

4.4 Future improvements of sustainable reporting and farming

In this section, the challenges and possibilities to improve sustainability reporting will be discussed by the interviewees. The potential impact of the EU taxonomy will further be explained, followed by a farm-level perspective of sustainable farming, and how Swedish agriculture can become more resource efficient.

4.4.1 Improvements of sustainability reporting

Jens Berggren at LRF, mentions that the ideal outcome would be to find a way to create a common view on what methods are used in sustainability reporting, and a way to adapt measurement systems after local or regional differences in the future. Berggren elaborates that the information from scientists about emissions calculation is spread all over the world through standardization numbers today. This happens even though there is an awareness that local differences have a big impact. The reason why they still are used is simply because there is no better alternative. For instance, when looking at carbon dioxide sequestration, the standardized numbers are often from the north american prairie, although the conditions are much different from Swedish land. From a Swedish perspective the global averages become misleading as they sometimes differ substantially from Swedish sustainability practices. Jens also points out that it is important for sustainability reporting to be motivating and, in order for it to be so, it would be preferable to involve farmers and agricultural organizations. Then,

it is possible to know the limitations, what and how change can be fostered. He also speaks of transformations in the whole economy, not only in the agricultural sector. “We should not use sustainability reports in analyzes that beat up our opponents, but more as a support in decision-making to choose the right path together. It is harder to hold together, but if we do not do it together, we will not do it at all” Berggren states. He claims that therefore, a way to create a consensus and avoid polarization must be found, even if it is difficult. Furthermore, if the Swedish food industry wants to stay competitive, it has to be less affected by the “jante-law”, Berggren points out. A comparison is made to Danish agriculture, who according to Berggren often are better at marketing themselves as sustainable. It would help Swedish farmers to market themselves as sustainable if they can prove it through, for instance sustainability reporting. By disclosing information, it could strengthen the competitiveness of Swedish agriculture.

In order for sustainability reporting to be able to help in the future development for sustainability within the food chain Charlotta Szczepanowski, head of sustainability at Coop believes in their environmental system with sustainability declarations. In the declaration, important social and environmental features of the products and value chain activities are stated and later on the information can be aggregated and implemented in the sustainability report. She also mentioned that it would be preferable if all actors in the sector worked together to improve the calculation tools. Simultaneously, scientists need to help find ways to quantify important parameters. If everyone counts in the same way, then it is possible to compare the sustainability performance between products and between actors. In regards to improving the calculations, Szczepanowski also points out that adding carbon sequestration as a segment could be of value for sustainability reports.

The potential future improvements stated by Arla Foods Senior sustainability manager, Victoria Olsson addresses calculation improvements on farm level. Olsson sees potential in making the whole process of data gathering and reporting correct numbers easier. She suggests making a more automated system with more efficient and simplified flows, where invoices can be registered immediately in the system. At the same time the products involved are recalculated into carbon dioxide impact. Arla currently has a similar system covering the operations regarding milk production and if it was implemented on farm level it would be time saving for the farmers since they are left with less calculations and reporting of numbers. Furthermore, Olsson claims that this type of standardization and simplification would

minimize the risk of default. Claes Johansson, head of sustainability at Lantmännen also states the importance of gathering more precise data on farm level in order to improve the food chain. By doing so, the individual farmer can show their climate performance and get paid for it on the market as well. Johansson believes that the market has to be prepared to pay for this in order for a transition to occur. From a farmers perspective it will not be profitable to operate a more costly and sustainable production if the market does not want to pay for it.

Birgit Landquist from RISE discusses the many choices that must be made when calculating a carbon footprint, even though a lot of effort has been made to harmonize how such environmental footprints should be calculated and which methods should be used. Further, Landquist comments that national average footprints do not capture all local conditions. They can vary a lot within Sweden and that the methods need to be more adaptable in the future. RISE is working with a project that develops a database for biodiversity since emissions are not the only climate issue. The majority of the respondents have lifted biodiversity as an important factor to address along with emissions and that the biodiversity perspective often is missing in today's sustainability reports. Therefore, this initiative can be considered a valuable future tool. Landquist also points out that the biodiversity indexes will represent three different regions in Sweden, however it will not be possible to capture further local differences, like the ones between farms located next to each other.

Volta Greentech sees a big sectoral challenge in making estimates of the emitted emissions under an animal's entire life length, and how much the emissions are per kilogram of meat or liter milk. Thus, it becomes a product level issue that partly has to do with feed regulations within the European Union that hinders the process. Looking forward, Volta hopes to contribute to the sustainable transition and provide the seaweed at scale to inhibit the potent methane emissions. Together with RISE and feed advisors, among others, Volta are currently developing a calculating tool which will show animal emissions at different ages and at different feed states. This will enable a more precise reduction factor of Voltas algae in net GHG emissions reductions per kilogram of product. In addition, the developing tool can provide more accurate LCA:s. To be able to address GHG emissions, Volta claims that sustainability reporting needs to follow science based data and verified auditing standards. Both interviewees agree that it might require more strict governmental regulations on companies, requiring businesses to disclose its environmental emissions due to the potential

climate crisis that is emerging in a few decades according to scientists. Usually, enforcing people to report is not favorable, but in a crisis it will be unavoidable, according to Volta.

A more academic perspective on future improvements is presented by Arne Fagerström professor at the University of Gävle. Fagerström refers to the main problem with sustainability reporting as: “We begin to build the house on the fourth floor. We must start building the house from the foundation”. The models supporting sustainability reporting are not developed enough. The foundation would be some type of system for handling information gathering and processing. In order to make sustainability reporting more trustworthy, more correct numbers need to be presented. Fagerström suggests that the accounting principles can be updated by adding an environmental classification in the charts of accounts. These numbers can then support the sustainability report. Another improvement area is that most of the tools for reporting emissions are made for national level and not for industry level. Each business can influence its own situation and there are many things the individual farmer can make as well, but the right tools need to be accessible and provided. In addition, Fagerström proposes to introduce a balance sheet in the sustainability report. The balance sheet would contain both the negative and positive impacts created by the business activities. The other interviewees were positive to this suggestion when we asked them about it, but they were not sure in regards to how it would be practiced. Both Fagerström and Respondent A discuss how the reports are verified. Respondent A is speaking of the EU-directive that is currently in the making. It is more strict in terms of making sure published information is correct. Currently, the regulations are only making sure that the information that needs to be in the report is there, but not if it is correct. Furthermore, Respondent A underscores the importance of sustainability data for investments. Sustainability reporting and data are being used more and more to steer investments and design new financial instruments. Moreover, Respondent A expresses the importance of investments. A future area of improvement would therefore be for sustainability reporting to be a tool that influences green investments and a base to receive green loans.

Science based targets is another improvement factor that has been brought up. Claes Johansson, Charlotta Szczepanowski, Respondent A and Volta Greentech have all expressed that it is not enough to report on emissions. Long-term and strategic goals addressing how to reduce emissions must be framed and become more integrated in the report as well. Claes Johansson answers that he sees a positive development of sustainability reporting by

including science based targets since it is a step in the right direction to collaborate within the whole supply chain. It is necessary to take responsibility for the climate impacts which arise, no matter where in the supply chain they occur. “We are all connected,” Johansson states. However, Charlotta Szczepanowski states that science based targets risk to become a commercial product and underlines that it is not enough to make these types of goals. In addition to the science based targets, internal goals must be made to achieve sustainable progress.

4.4.2 Sustainability reporting and the EU taxonomy

Regarding the impact of the EU taxonomy on agriculture, Respondent X explains that the two aspects so far detailed in the taxonomy delegated acts are climate mitigation and adaptation. However, the taxonomy is a new implementation in the union and it is not clear how much investors will be affected by the restriction. Lantmännens Claes Johansson elaborates on the relevance of the topic. “Of course the taxonomy is important”, Johansson states. The foundation of the taxonomy has good intentions, and it is positive that some governmental interaction needs to be used in order to control funding and investments into sustainable activities. Still, there is a heating debate about what the taxonomy will include and how the classification of investments will look like in reality. Johansson thinks local differences in the system depending on what preconditions there are need to be taken into account. That is where the current issues are with the taxonomy, according to Johansson. It needs to be flexible and take the local and geographical differences and what resources are available in a region into consideration. Daniel Sheridan Ferrie, spokesperson for the European Commission, answered that agriculture plays a central role in climate change mitigation, while reversing biodiversity loss, and fostering other sustainable development goals. There are important synergies between the environmental and climate impacts, Sheridan Ferrie states. Finally, it is made clear that the European Commission currently is exploring the appropriate timing for the inclusion of an agriculture criteria in a future taxonomy delegated act. Therefore, it is rather a question about timing for the inclusion.

4.4.3 Improvements of sustainable farming

The last perspective on future sustainable improvements will address the possibilities on farm level. The two farmers Fredrik Lagercrantz from Tre Bönder and Stefan Schörling from Hästa Gård agree on being limited by the economic pressure and means that a further

sustainable development within the agricultural sector is dependent on economic contributions. The farmers will need grants from either the European Union or the Swedish government, economic incentives or a price increase on their produced products. This is not due to a lack of interest in sustainable development, but simply because farmers often do not have the financial resources to make major changes, both farmers agree on. In addition to the economic contributions, Fredrik Lagercrantz believes that both regulations and more locally adapted science-related solutions will be needed in order to change the agricultural sector. Moreover, he is not against making calculations on farm level, but if farmers were to make it he would like to see stencils which take Swedish conditions into account. Stefan Schörling underlines the circularity as the most important driver for a sustainable future development within the Swedish agricultural sector. Regenerative farming must be the norm and conventional farming needs to fade out, otherwise there will be no nutritious soil left to grow food in the end. Moreover, Schörling believes that the people with academic background working with sustainable development issues in the agricultural sector need to be more involved in the practical work and solve the problems on entrepreneur- and farm level.

To sum up, several steps can be taken to improve sustainability in Swedish agriculture in the future. Standardized frameworks are being used today, as no customizable alternatives exist. Sustainability reports need to become more functional as a guidance tool for reaching climate targets. More correct climate data using automated calculation systems is one suggestion that is brought up. Verified auditing standards, stricter governmental regulations and more integrated long-term goals are other improvement areas that are mentioned. The EU taxonomy could soon be implemented on agriculture as well, which could lead to an increased amount of green investments in the industry, according to the empirical data. Lastly, individual farmers are often creative on how to change their own agricultural practices, but in order to increase the level of environmental sustainability in Swedish farming, external support and guidance from the larger corporate stakeholders is crucial.

5. Discussion

In this section, the empirical data from the collected interviews will be discussed and analyzed. The section will begin with a perspective of sustainability reporting and its issues today. The second part focuses on how competitive advantages can be achieved through sustainable strategies and by lowering emissions. Lastly, a section explaining the responsibility that agricultural actors bear in order to improve sustainable development. The collected data will be linked to chosen literature from the theoretical framework, as well as the background and problem discussion.

5.1 Sustainability Reporting

Of the six main issues Pucker (2021) brings up with reporting, the complexity issue is mainly addressed by the interviewees. They experience lack of access to the data needed to complete a comprehensive emissions profile. The complex flows within the agricultural value chains are difficult to measure and there is an absence of non-standardised tools that are capable of capturing and taking geographical differences in consideration. Despite the issues, the respondents have ideas on how some of these problems can be solved. Initiatives to develop new measurement tools are being taken. The biodiversity database that RISE is currently making and the calculation tool specifying how much animals emit at different ages and at different feed states that Volta and RISE collaborate on are examples of this. The problem of opaque supply chains in regards to deriving emissions seems to be common within the food industry. Based on the empirical data from Coop, it is problematic to measure the emissions from each grocery in the store. They rely on standardized numbers from the climate database that present an impact number based on what classification of groceries it is and from which country of origin it has. The insight Coop has in all production processes is therefore somewhat limited. When speaking about the lack of mandates and auditing, Pucker (2021) highlights that the majority of all companies can freely choose what standard setting framework and what information they want to expose in their sustainability reports. The empirical findings indicate that this is an issue. Respondent A especially points out the lack of validation by third parties as a problem since it is important that financial information needs to be correct in order for it to work as a basis for decision making and investments. Stricter regulations and a more harmonized way to report is requested by several respondents. This is because it would make the reports more comparable, ensuring the organizations who

actually do a great sustainability work to stand out more and get a legitimized competitive advantage. Puckers (2021) postulation that companies still set their goals based on their capabilities or aspirations, not the limitations of the earth's capacity even though science based targets have become more common is reflected in the empirical findings. Goal framing is an improvement area for the sustainability report that will be addressed further under sustainable development in the discussion.

5.2 Competitive Advantages & Sustainable Strategies

5.2.1 Pollution Prevention

Pollution prevention means that a firm can increase its efficiency through reducing GHG emissions and other waste products such as effluents. It is based around the argument of the Natural resource-based view, where Hart's (1995) idea is that pollution and environmental problems often occur from inefficient systems and management of products and resources. Hart (1995) means that the key resource in pollution prevention is continuous improvement. When implementing this strategy, firms gain competitive advantage which significantly lower costs, leading to a cost advantage compared to competitors. Likewise, involving employees in the process of education is an important part of adopting a pollution prevention approach, where sustainability becomes central in a firm's operations. The argument to involve stakeholders and employees in the process is confirmed by the empirical data. Several respondents mention that it is difficult to make a positive change with the prevention of emissions if not all stakeholders are involved in the process. This means that when dealing with environmental issues, employees further down the hierarchy need to be aware of the consequences of their day-to-day decisions. The bottom-up management style is crucial to make farmers involved in emissions reduction due to internal purpose and personal gain. For instance, the thousands of dairy farmers in the Arla cooperative are given economic incentives and advisory to care about emission calculations and reporting data. In order to motivate the dairy farmers, Arla gives the farmers a price increase on dairy products being sold. On top of that, there are benefits to be made through preventing emissions and being resourceful according to Hart's (1995) statement. Besides an economic incentive through increased milk price, farmers additionally get individual advice from external advisors who visit the farms and help them to correctly fill out the climate questionnaires. This, since it can be a time consuming task for the already occupied farmer to handle. By doing this, farmers

can improve their efficiency in the production process, giving them an understanding of what farming activities that are polluting and resource intensive. Further, this can ultimately lead to a financial upside through feed- and protein efficiency in the agricultural value chain.

5.2.2 Product Stewardship

Product stewardship addresses the operations concerning the whole supply-chain, since most activities made in the different product phases will affect the environment (Hart, 1995).

According to Hart (1995) organizations should work with lowering their emissions from the supply chain and as a bare minimum try to incorporate life cycle assessment in their operations. However, the data collected from the respondents indicates that life cycle assessments are often made on linear flows. The supply chains containing agricultural activities are often complex, include circular activities and are affected by factors like weather that lies beyond human control, making the process of LCA much harder. In order to be able to do correct life cycle assessments on products the tools and measurements that are used to calculate the sustainable impacts need to be accurate, otherwise it is hard to find out which parts of the processes are the most urgent improvement areas. Based on the empirical data, it is clear that the tools need to be updated. They need to be able to take geographical circumstances on a regional or local level into consideration since national numbers are not accurate enough. Moreover, there is a need for new tools addressing other external impacts than solely carbon dioxide. Methane emissions need to be updated to new stencils in order to cover more vast areas of agriculture. Biodiversity is a present topic and RISE is currently making a database that hopefully will be of value for companies involved in the agricultural sector. The data gathering on farm level can potentially be favored by an automated system which can help farmers collect emission related information instead of calculating everything on the basis of stencils. Nonetheless, it will be time-efficient and not require extra work for the farmers. Another part of the product development is the production processes on farm-level. All supply chains must become circular and the most sustainable way of farming, regenerative and organic farming, is currently not common at all compared to conventional.

5.2.3 Sustainable Development

As Hart (1995) states, pollution prevention activities and strategies are necessary to integrate in a firm's operations to succeed at product stewardship. If the sustainable work regarding pollution prevention and product stewardship is well functioning, it will ultimately lead to

sustainable development and competitive advantages. However, it is important to continue the development in the long run which can be done by further research, development and collaborations. The interviewees agree that the scientific and academic workforce must have a better dialogue and collaboration with businesses and farmers to develop better measurement and reporting systems, leading to a more sustainable food supply-chain.

Another key point of sustainable development is according to Hart (1995) setting long-term goals. The data from the interviewees also underlines the importance of science based goal setting. However, the interviewees claim that this type of goals are a missing part in many sustainability reports. Adding science based targets is therefore mentioned as a factor of potential improvements to strengthen the reports. The sustainability report itself can potentially develop and become a basis for goal framing if it can provide truthful numbers and relevant information. Stricter rules on the published content within reporting and requirements on third party auditing would increase the credibility and legitimacy of the reports.

Moreover, data from the interviews of academicians underlines that there are issues with how reporting has been established globally. Voluntary reporting frameworks such as GRI and GHG protocol have helped to create a more standardized way of reporting. To some extent it prohibits companies from writing freely and “cherry picking” reporting numbers. On the other hand, there are still problems linked to the sustainable development-aspect of reporting. Companies can still decide to set climate targets without necessarily reaching them or having a planned strategy, and there are no regulations for sustainability reporting, unless you reach a certain turnover- or employee rate. Our empirical data confirms that more regulations might be required on the financial market in the European Union in order to reach the science based targets that a number of large companies and industries have set. Further restrictions might also be crucial in order to reach the European Union's ultimate goal of creating a carbon neutral continent to cope with climate change. The EU Taxonomy is an example of solutions that make sustainability reporting become more transparent and in line with scientific climate data. Since emissions from agriculture account for a considerable amount of the global GHG emissions, excluding agriculture completely from the taxonomy system would make no logical sense long-term. Agriculture should, according to the findings, be included in the taxonomy as soon as possible in order to direct green capital flows towards a more

sustainable agriculture and provide a dynamic framework that creates reliability in sustainability reporting.

5.2.4 Clean Technology

Clean technology refers to the fact that incremental sustainability strategies and adapting is not enough in order to create real sustainable development (Hart & Milstein, 2003). It aims to develop new, innovative technologies that catalyze and disrupt industries from a fossil to a sustainable era, with significantly less environmental impact. In the empirical findings, several actors from Swedish agriculture mention that new technologies have the potential to change the status-quo of agriculture. Globally, Swedish agriculture is often seen as sustainable compared to many other countries, but there is much room for improvement. For instance, Volta greentech's core existence is based on the concept and need of developing new technological solutions to the climate crisis. The startup is therefore correlated with the concept of clean technologies that Hart & Milstein (2003) discusses in their paper. By industrially scaling seaweed production in order to feed cattle, there is a potential in reducing methane emissions both in Sweden and globally. By creating new technological solutions, firms can be given a new repositioning on the market and new ways to create profitability out of sustainability (Hart & Milstein, 2003).

Another example of clean technology from the empirical data is the digitization of Swedish agriculture. Organizations can get a much more updated picture of the climate footprint in the whole value chain. Precision farming is a solution that is built upon this technology. It is currently becoming more and more important in agriculture. It aims at making use of resources such as fertilizers and seeds more efficiently and only uses the exact amount needed in order to optimally maximize harvesting using technology such as drones and sensors. In the empirical data, Agronod is mentioned several times as an example of how Swedish initiatives can contribute to agriculture using data-driven farming methods.

Hart & Milstein (2003) make the point that clean technology can deal with how companies build new competence while gaining competitive advantage due to a constantly changing sector such as agriculture. This proposal aligns with the empirical data. Companies need to care about sustainability reporting and reduce emissions, not just for regulatory reasons such as the EU taxonomy or the NFRD. The aspect of creating competitive advantage out of new

climate solutions and innovation is a perspective that is worth to underline. As more stakeholders require valid information about companies' sustainability work, it becomes clear that clean technologies are crucial in the agriculture sector in order to reduce emissions and further maintain companies' market position. Additionally, technological innovations can play an important part in the strategic movement in order to gain a sustained competitive advantage.

5.3 Responsibility

It is clear that reporting and calculating emissions in Swedish agriculture is complex and includes a wide variety of stakeholders in the supply chain. It is neither fair nor reasonable to think that the biggest changes and responsibilities will be pressured on to the smallest actors in Swedish agriculture. Local farmers and producers might have several agricultural practices that are unique and more sustainable, which could be implemented as solutions on a larger scale in Swedish agriculture in order to reduce emissions. According to the empirical data, the small agricultural businesses have limited financial resources and are therefore not able to implement and invest in all sustainable practices. The respondents agree that major changes will need to come through initiatives and collaborations including agricultural actors operating in different parts of the value chain. Collaborating and taking responsibility in regards to finding sustainable solutions is in accordance with Winston (2021).

As Epstein & Buhovac (2014) mentions, the sustainability commitment from the board of committee affects how environmental management in companies is implemented. Large companies' responsibilities can only be increased through defining how much value the environment has for their business. This also includes looking at what potential risks there are with sustainability or climate change. Likewise, as the empirical data brings up, it is difficult to ignore sustainability in practically any industry today, as the topic has become more morally unacceptable to ignore in business. By improving the way companies in agriculture collect and publish emissions data, the whole sector benefits. Not only will it become more relevant for stakeholders who need valid information, but farmers and larger cooperatives could increase their own efficiency as well. Since the farmers' resources are limited, a larger responsibility to enable further sustainable development falls on the larger companies in the agricultural sector and the food industry. They need to support the smaller agricultural businesses by investing more resources into sustainable farming methods. In addition, the

large actors are bearing the whole responsibility for the sustainability reporting in the sector since the small businesses do not report. In accordance with the accountability cycle (Epstein & Buhovac, 2014) legit and correct internal and external sustainability reporting is a part of improving corporate accountability. The larger actors in the agricultural sector and the food industry need to take responsibility and include the farmers in the best way possible. If they contribute to improved measurement systems and tools improving the gathering of emissions data, smaller agricultural businesses have the possibility to measure accurately.

6. Conclusion & future research

In the conclusion section, the text has been divided into three parts. The first addresses how sustainability reporting can work as a tool in order to reduce emissions. The second describes how sustainability reporting can create competitive advantage and the last one underlines which responsibility the agricultural actors have in order to make sustainable development. Furthermore, we will explain what contributions can be made from the research area. Finally, room for future research in the area will be explained in order to further improve the discussed subject.

6.1 Conclusion

6.1.1 How can sustainability reporting work as a tool in the Swedish agriculture sector in order to reduce emissions?

It can be concluded from the empirical data that all respondents agree that sustainability reporting is an important tool to use when reporting emissions. In order to lower the GHG impact, it would be favorable if the sustainability report was communicated more clearly to key stakeholders. As several of the interviewees mention, lack of data access is the biggest issue with reporting today. By shortening the communication gap between stakeholders in the food supply chain, farmers' competence can get more closely attached to the managerial decision-making in large firms and cooperatives. The improved dialogue between stakeholders would make the emission-reducing activities and goals easier to align. This would benefit the overall trustworthiness of reporting.

Moreover, the reporting standards used today do not consider local and regional differences, where the emissions can differ significantly between the natural surroundings. By customizing and improving the gathering of emissions data that create the basis for the sustainability report, agricultural companies can benefit, giving them competitive advantage through sustainability. Apart from the fact that companies can gain an improved reputation from caring about sustainability, increased productivity and efficiency can be a result of newly discovered, preventable emission sources. It is also important for Swedish agriculture to stay competitive internationally in a globalized age. Sustainability reporting can thus play an important role in this maintenance of strong competition.

Our research shows that informative sustainability reports might increase in value, as the EU taxonomy for sustainable investments will be thoroughly completed in the coming years. Since the EU taxonomy is affecting sustainability reporting, the content of the report can be further improved. This will be more valuable for stakeholders and investors, who need relevant information for investment decisions.

Finally, emissions can not be the only environmental factor that is reported on. The agriculture sector has a great impact on biodiversity and it would therefore be relevant if a biodiversity index was formed and utilized in reporting. The biodiversity factor is more complex since it can be affected both negatively and positively by agricultural activities. In addition, we conclude that a balance sheet accounting for climate impacts would be valuable to include in the sustainability report. This updated accounting method has a potential, as the positive impacts generated by circular flows and sustainable activities like increased biodiversity and carbon sequestration will be reported alongside with negative impacts.

6.1.2 Competitive Advantages

Based on the empirical findings and the discussion it is possible to conclude that the way of conducting sustainability reports needs to harmonize in order to make them comparable. Additionally, more precise data needs to substantiate the report and together with demands on third party auditing, credibility and legitimacy will increase. Precise, legitimate and comparable reports have the ability to promote businesses engaged in sustainability work and ensure the ability to gain a sustained competitive advantage if the reporting is done properly.

Furthermore, sustainability reporting can create sustainable improvements if companies are acquired to report on long term goals and science based targets. It will increase the possibility that companies link the goals to operational activities and make sustainable strategies. Including long-term sustainability goals and science based targets in the reports can lead to competitive advantages and add value to stakeholders and investors since it will function better as a decision-making tool for the owners and attract investors who want to invest in sustainable operations.

Sustainability reporting can work as a basis for strategy making, including pollution prevention, product stewardship and sustainable development using clean technologies.

However, in order to develop a sustainable strategy that becomes a competitive advantage, the report has to be based on precise emission data. In addition, the published data need to be transparent and followed up. The measurements can show where in the value chain climate impacts occur and which products or processes cause major emissions. In this way, measurements can provide guidance when strategies are formed. By understanding where the emissions occur, it is possible to form emission reducing activities in the operation that aligns with the long term goals or science based targets.

6.1.3 Responsibility

It can be concluded that the responsibility of improving emissions data and sustainability reporting and driving change in the agricultural sector cannot be left on smaller agricultural businesses and farmers. Instead, larger companies in the agricultural sector and the food industry need to include the farmers ecological footprint in their sustainability reports. If the smaller businesses are involved in the reporting and provided with simple and automated emission calculating tools, more accurate emissions data can be captured and local circumstances affecting the emissions can be taken into account. However, the most favorable way to reduce emissions and create further sustainable improvements would be if actors in the agricultural sector work together, sharing their knowledge and resources with each other.

6.2 Contributions & Future research

This report contributes to an increased understanding of how actors in the agricultural sector are related to each other. Further, the report highlights how farmers can be involved in sustainability reporting in general. Finally, it increases the knowledge of sustainability reporting in the agricultural industry and the problems that exist with collecting emission data and presenting future measures.

The scope of the study was delimited due to the limited time and resources for this process. We let ten respondents represent the whole agricultural sector making it difficult to conclude general conclusions since the range of the empirical data was limited. However, the result and conclusion can be an indication of how the situation in society and in the agricultural sector is. To be able to draw more general conclusions, the empirical data would need to be more comprehensive. The study is limited to Swedish agriculture which means that conclusions are drawn on a national level. In other countries, the agricultural sector often has different

structures and regulations. What becomes clear however, is that Swedish agriculture is at the forefront of sustainable farming techniques. Additionally, many of the regulations in the sector are based on EU directives and regulatory circumstances are similar between the member countries. The findings in the study are therefore not entirely irrelevant beyond national level.

To further investigate the research area of how reporting can work as a tool in agriculture to lower emissions, a way to integrate more agricultural emissions data for sustainability reporting would be of relevance. Additionally, it would be of value to investigate how the new calculating tools regarding feed states and the biodiversity index will improve the content of sustainability reports. Finally, it would be of relevance to investigate how much the EU taxonomy will impact sustainability reporting in the agriculture sector when it is fully implemented.

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Appendix

1. Global Reporting Initiative (GRI)

GRI has since 2000 launched new versions of their sustainability reporting framework to ensure that stakeholders are provided with more transparent, credible, and understandable sustainability reporting. The GRI guidelines simplify the process as it offers organizations a framework for sustainability reporting, regardless of size or nationality. GRI reporting includes economic, environmental, and social performances of corporations, governments, and NGOs. The standardized reporting framework GRI also contains guidance on reporting such factors as local community impact, human rights, and gender issues as well as structuring a guidance on what is material (Epstein & Buhovac, 2014). According to Bebbington et. al (2021) GRI is the most influential and widespread voluntary framework for sustainability reporting and provides the most detailed and structured guidelines. However, it is important to bring up that not all topics mentioned in the guidelines need to be included in the report. It is up to companies to choose by themselves but they need to conduct a materiality assessment in order to identify the most significant topics. It means in principle that GRI take important impacts or activities on the environment, economy and society into consideration, and that these become dimensions of materiality in the reporting. Questions regarding the quality and reliability of the information provided by the guidelines have been raised. In addition, it is difficult to know if the companies actually comply with the guidelines which results in doubts on if the information is sufficient enough to be the basis for decision making and stakeholder valuation (Bebbington et.al, 2021).

2. Greenhouse Gas Protocol

The greenhouse gas protocol provides a framework of greenhouse gas accounting standards, tools and online training both for enabling company- and governmental calculations (GHG Protocol, n.d.a.). The guidelines are divided in different scopes in order to separate the direct and indirect sources of emissions. It also makes goal setting easier for the companies utilizing the greenhouse gas protocol at the same time as corporate transparency increases. The GHG protocol states that companies at a minimum need to account for scope 1 and 2. The first scope addresses direct emissions that come from sources and operations that the company reporting is directly involved in. This can be emissions from company facilities or owned

vehicles. Scope 2 accounts for the consumed electricity that a company purchases and uses and means that it accounts for the emissions created from its generation. Scope three on the other hand addresses the whole value chain, including all the emissions the companies are responsible for outside their own walls, and includes more vaguely defined negative externalities that occur as a consequence. The third scope is also voluntary, and it is therefore not mandatory to report these emissions. This standard is in fact the only internationally accepted method when it comes to accounting value chain emissions (GHG Protocol, n.d.b.).

When it comes to the agricultural sector there is an existing gap in corporate climate accounting. GHG Protocol has an agricultural guidance developed to specifically understand the value chain of GHG impacts from agriculture. In addition GHG Protocol is currently developing an extended land sector and removal guidance for companies with land sector value chains. (GHG Protocol, 2021).

3. Conversation and mail guide

Hej!

Vi är två studenter från Handelshögskolan i Göteborg som skriver kandidatuppsats i Corporate Sustainability. Vårt ämnesområde är "hållbarhetsrapportering i jordbrukssektorn - med fokus på beräkningsproblem av utsläpp". Utsläppen är främst växthusgaser, men vi är också öppna för att ta reda på andra former av miljöskador som är svåra att beräkna/rapportera om.

Vi är intresserade av att höra olika aktörers perspektiv inom området, vilka problem ni står inför samt om/hur dessa kan åtgärdas genom förändringar inom hållbarhetsrapportering. Skulle du vilja ställa upp på en kortare intervju? Detta skulle vara väldigt värdefullt då ... är en stor aktör i branschen.

4. Interview guide

Before we start asking for information:

Is it okay if we record the interview? And that we use and publish the empirical data in our bachelor thesis?

Theme 1 - Sustainability reporting

In this section, the aim is to get insights and answers about sustainability reporting as a tool for organizations and how functional the reporting systems are today.

- How important do you (the respondent/company) think sustainability reporting is in the agricultural sector?
- What do you (the respondent/company) see as good or successful with sustainability reporting in the agricultural sector as it is constructed today?

Theme 2 - Emissions

In the second theme, the aim is to collect information about the greenhouse gas emissions coming from agriculture, and how well and to what extent companies report its emissions from these sources.

- What obstacles do you (the respondent/company) see in reporting emissions in your industry?
- Who benefits from the agriculture sectors reporting emissions? Is it the farmers? companies? stakeholders? The government?
- Would you say that the emissions caused by the agricultural sector are correctly calculated today?
- Does the standardized numbers that are available from tools such as ghg protocol work when calculating the emissions on farms?

Theme 3 - The future

In this section we aim to collect answers about what improvements could be done with sustainability reporting and the agricultural sector and how they can create change together.

- How do we drive change in the agriculture sector and how can sustainability reporting help?
- Sustainability reporting today lacks a balance sheet, would it be a valuable part to include into the sustainability report for the agricultural sector?

5. Background of the respondents and companies

Lantbrukarnas riksförbund (LRF)

Lantbrukarnas riksförbund is a non-political industry organization, including both agricultural, forestry and companies involved in the Swedish agriculture sphere. LRF has around 140 000 individual members and is one of the larger movements in Sweden, supporting farmers for a sustainable future (LRF, n.d). The interview was held with Jens Berggren, Sustainability Expert at LRF.

Lantmännen

Lantmännen is an agriculture cooperative owned by 19 000 Swedish farmers. Its core operations are in farming, but the cooperative also does business in machinery, the energy sector and food production. (Lantmännen, n.d). The interview was held with Claes Johansson, Head of Sustainability at Lantmännen.

Arla Foods

Arla is a Swedish-danish multinational cooperative of dairy farmers. Sizewise, it is the seventh largest dairy company in the world, considering its amount of turnover (Reuters, 2017). In Sweden, Arla is owned by 2200 dairy farmers and operates 12 dairy production facilities (Arla, n.d). The interview was held with Victoria Olsson, Head of Sustainability at Arla.

Coop Sverige

Coop is a Swedish cooperative and food chain, owned by 3,7 million members. Coop operates roughly 800 unique grocery stores all over Sweden. In 2021, Coop was awarded the most sustainable brand in Sweden according to the Sustainable brand index (Coop, n.d). The interview was held with Charlotta Szczepanowski, Head of Sustainability at Coop.

Research Institute of Sweden (RISE)

RISE is a Swedish innovation partner and Sweden's scientific institute. The organization has around 3000 employees and is a governmental and non-political institute that contributes to a sustainable society through knowledge and innovation. RISE provides knowledge and expertise in a wide range of industries, including agriculture, where systems for climate

calculation have been developed. The interview was held with Birgit Landquist, Senior Consultant at RISE within the area sustainable food production.

Volta Greentech

Volta Greentech is a Swedish startup company. Their focus is to reduce methane emissions from cows. By producing a variant of the red seaweed *asparagopsis* that is added to the cattlefood, the cows methane emissions are reduced by a significant amount. The startup is currently running its operations in Lysekil, where its algae pilot factory is situated, and in Stockholm, where the headquarters is located (Voltagreentech, 2022).

Tre Bönder AB

The company is running an ecological and KRAV-certified cattle-farm in Västra Näshulta, Sweden. The farm has also been part of a pilot study of reducing methane emissions using seaweed together with Volta Greentech. The interview was held with Fredrik Lagercrantz, one of the founders of the family-run farm business Tre Bönder AB.

Hästa Gård AB

Hästa Gård is a gluten-free cereal farm, focusing on regenerative and circular farming. The interview was held with Stefan Schörling, entrepreneur and founder of Hästa Gård. Stefan won the prize “Farmer of the year 2021 - cereal category” in Sweden (Hästa Gård, n.d).

Respondent A

This respondent has chosen to remain anonymous. However, the individual is a researcher in sustainability accounting.

Arne Fagerström

Arne Fagerström is a Senior professor who is active in the accounting field, on topics involving the development of sustainability accounting. He teaches financial accounting on Master level at Högskolan i Gävle, and simultaneously holds a course on the Swedish University of Agricultural Sciences (SLU) in financial and sustainability reporting.

European Commission

The European commission works with initiating and implementing EU policies. Through email correspondence with Daniel Sheridan Ferrie, spokesperson for EU-UK agreements in

financial services, financial stability and Capital Markets Union, taxation and customs, we received information on which role the taxonomy plays in the agricultural sector.