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TITLE OF WORK PROJECT

Improving Yara International's Competitiveness Through Low Carbon Footprints

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ABSTRACT

Nowadays, companies increase their competitive advantage by reducing their environmental impact. Correspondingly, Norwegian fertilizer company Yara International plans to improve its competitiveness through low carbon footprints. In order to conduct the best possible strategy for Yara to do so, a thorough understanding of the sustainability of Yara's operational context, i.e. the food value chain, is required. Therefore, this project mapped the sustainability developments in the chain and their impact on both the agricultural industry and Yara's competitiveness. The same type of analysis was carried out on the influencers alongside the chain. Consequently, several strategic recommendations for Yara were conducted.

Keywords: agriculture, environmental impact, food value chain, sustainability

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1 BRIEF CONTEXT

1.1 Client

Yara International is one of the world's largest fertilizer companies (Insider Monkey 2016). Established in 1905 in Norway, the company nowadays has strong global presence, approximately 13,000 employees and business operations in 160 countries (Yara 2016a). At the moment, Yara is responsible for the largest production of multi-nutrient fertilizers in the world (Yara 2016a). Yara processes raw materials, such as minerals, into fundamental products for farmers and other manufacturers. Herewith, Yara's core product is fertilizer, but environmental-focused solutions are also included into their product portfolio (Yara 2016a). Aligned with this, Yara is dedicated to make the environmental impact of its products as low as possible (Yara 2016a). To illustrate, Yara's fertilizers refill the minerals in agricultural lands, which eventually results in faster growing plants and more profit-yield, and that is the foundation of a more effective and sustainable agriculture (Yara 2016a). In addition, Yara developed a new technology that decreases the company's emissions by more than half (Yara 2016). Since farmers are Yara's main customers, the company plays a role in the global food and beverage value chain (Climit 2016).

1.2 Market overview

Since fertilizers are easy transportable, the fertilizer market is highly globalized (Yara International 2014). Hence, regardless of location, the price for the general types of fertilizers is largely commoditized (excluding transportation costs) (Yara International 2014). This makes it necessary to consider the global market and demand, instead of the regional values of these. The competition in the global market consists of several large players, wherewith Yara shares the first place in terms of revenues with competitor Agrium (Yara International 2014). Globally, Asia is the market with the largest demand for fertilizers, wherein China is responsible for 62 percent, but the demand is growing fastest in Latin America (Yara International 2014). The

demand in more developed markets, such as the North American and European market, is also expected to grow, with respectively 0.8 and 1.0 percent (Yara International 2014).

Besides the positive forecasts on growth of the market, also the forecasts for the demand of the fertilizer market have been positive. A report of the Food and Agriculture Organization of the United Nations (2015) suggests that the global demand for fertilizers is expected to increase with approximately 2 percent per year, from 2014 to 2018. Both the nitrogen fertilizer and the urea fertilizer, are expected to have an annual increase in demand of at least 1.4 percent, until 2017 (Yara International 2014). Moreover, in the time-span from 2014 to 2018, the global production capacity for fertilizers, fertilizer-related products and raw materials will also increase (FAO 2015). To conclude, all the previous suggests that the fertilizer market is expected to increase its important and grow larger in the future.

1.3 Current client situation

Fertilizers enable lower land usage and higher crop yields, but, nevertheless, high levels of greenhouse gas (GHG) emissions can derive from their production and incorrect application (Mole 2014). As mentioned before, Yara has developed an innovative technology, that strongly decreased its emissions (Yara 2016a). In order to promote its products' lower environmental impact and create new business opportunities Yara employs sustainability initiatives and sustainability reporting frameworks, while constantly assessing other eco-friendly practices and instruments to increase its competitive position (Yara 2016a). This makes it necessary for Yara to examine how the company can use its value proposition, comprising both higher product quality and lower GHG emissions, to generate an increase in demand for its products. Yara is dedicated to reduce emissions and contribute to the sustainability of the food value chain (Yara 2016a). To illustrate, Yara helped to develop the Life Cycle Assessment (LCA) Database, which is exclusively directed to food and beverage cycles, and the company offers help to farmers to assess their activities through LCAs (Yara 2016b). Yara also uses LCA to assess its

own environmental impact (Yara 2016a). Furthermore, in 2005, the company developed a catalytic technology that decreased the N_2O (nitrous oxide) emissions of its production processes with 90 percent, which led to the overall reduction of its production's GHG emissions by 50 percent (Yara 2016c). After the technology's success for its own emissions, Yara now globally markets and sells the technology, so that the company can also interest other stakeholders in the fertilizer industry to reduce their emissions (Yara 2016b). In order to assure its customers of its products' lower environmental impact, Yara provides its products with a low carbon footprint guarantee (Yara 2016c).

1.4 The Business Project challenge

In order to see how a low carbon footprint impacts Yara's competitiveness, it is necessary to investigate what the place is of low carbon footprint's in the food value chain, as well as what other sustainability developments take place in the chain and how they could impact Yara. Consequently, an overview will be given of the sustainability applications in three industries that are interconnected with Yara's business: The food, beverage, and food retail industry. Moreover, the influencers alongside the food value chain are identified and evaluated on both their impact on Yara's competitive position and future forecasts. Hence, this project answers the following research question:

RQ: *Which developments in and influencers alongside the food value chain are impacting both the agricultural manufacturers and the fertilizer industry, and how will these impacts influence the competitiveness of Yara International?*

The analyses outcomes are integrated into overall recommendations for Yara, that comprise suggested strategies to cope with and benefit of these developments and influencers, in order to increase Yara's competitive position in the future.

2 PROJECT REFLECTION AND INDIVIDUAL CONTRIBUTION

2.1 Problem definition

As the food industry is accountable for 15 percent of the world's total CO_2 emissions (The Guardian 2016a), Stakeholders demand food industries to decrease the environmental impacts of their business operations (McMichael et al. 2007). In addition, eco-friendly farmed food, openly disclosing information about its ingredients and supply chain, is increasingly becoming the preferred choice of the consumer (The Guardian 2016b). This pressures the food value chain to employ sustainability practices throughout the chain (The Guardian 2016b). Often, these employed practices also impact Yara's business. For example, many food companies that have agricultural processes in their value chain, e.g. Coca-Cola, obligate their entire supply chain to comply to a certain sustainability practice (Carbon Disclosure Project 2015). This pressures farmers to comply to the obligation in order not to get excluded from Coca-Cola's supply chain. Consequently, the farmers feel pressured to comply their processes and therefore search for fertilizer companies that also comply to the obligation. However, the problem is that currently there is no clear overview of best-practices, caused by the high amount of practices available and the divergent environmental aspects each of these practices take into account (Forster 2013). This also holds for Yara. In order for Yara to get a better overview, thorough mapping of the sustainability developments in and influencers alongside the food value chain is needed, so that the company can understand their impact on its business and adapt its business strategy accordingly.

2.2 Methodology

2.2.1 Hypothesis

Since a hypothesis is an explicit prediction and this Business Project has a highly explorative nature, the conduction of a hypothesis would not have been suitable (Social Research Methods 2006) and was therefore not conducted. This project's aim has been to map the food value chain

thoroughly and derive its outcomes hereof. Aligned with other explorative studies, these outcomes could then be used to give direction to future research (Social Research Methods 2006).

2.2.2 Methodology

The methodology of this project can be divided into two separate parts. The first part regards the analyses of the food, beverage and food retail industry. For these industries the 20 largest companies, based on global revenue, were identified (MarketLine 2016a, MarketLine 2016b, Food Retail World 2016), so that the most common sustainability practices within these industries could be subtracted. These practices were found through the evaluation of the companies' sustainability reports. Since these companies have a strong presence in the global market and are together accountable for relatively large shares of the industries (MarketLine 2016a, MarketLine 2016b), it is assumed that the found information provides a comprehensive sketch of the industries' overall sustainability. The second part of the methodology, regarding the analysis of the influencers alongside the food value chain, is based on the findings in the first part, Yara's personal input and information found in literature. After identification of the influencers through the previous sources, their relevance for both the agricultural industry and Yara was analyzed. An influencer was labeled relevant, if the influencer could require Yara to adapt it products, and lead to changes in Yara's demand or costs. Influencers can have both direct and indirect impact on Yara: The latter is passed on by the agricultural industry to Yara's business (see the example of Coca-Cola in Section 2.1).

2.2.3 Analysis

The food value chain covers the entire farming-to-consumer process. It starts with fundamental input materials such as fertilizer, that transforms through the stages of farming, processing, distribution, retail and ends with the consumer (see Appendix I). In order to map the impact of the developments in and the influencers alongside the food value chain as thoroughly as

possible, separate analyses are done on sustainability means. The first analysis looks into the food, beverage and food retail industry, the second focuses on the influencer groups alongside the chain. Starting with the food industry, this industry is made up of companies that operate in agricultural goods and packaged food. Until the year 2018, the global food industry is expected to grow with approximately 4.5 percent per year (MarketLine 2016a). The beverage industry, on the other hand, consists of companies that generate and sell soft drinks, beers, ciders, spirits and wines. Currently, this is one of the fastest growing global industries, with an expected revenue growth rate of 22.3 percent by the year 2019 (MarketLine 2016a).

After analyzing a set of companies within these two industries, it has been found that all companies perceive climate change to be of significant risk for their future business operations, which widens the scope of the research question. Other findings are that an increasing amount of practices aim to improve the efficiency of water usage; the sustainability of packaging; the reduction of GHG emissions; the engagement of the entire supply chain; the sustainability of resources; and the transparency on emission impacts. Furthermore, the nine most common environmental practices in these industries could be determined, as presented in Appendix II. A complete outline of all practices carried out by the set of companies in the food and beverage industry is presented in Appendix VI[1].

The food retail industry was also analyzed on its most commonly used sustainability practices. This industry is embodied by companies that sell both packaged and unpackaged food and beverages (MarketLine 2016b). These sales can be done either in a traditional manner, through stores and distribution points, or online (Morganosky and Cude 2002). The global food retail industry has shown an annual growth of 5.5 percent in the period of 2010-2014 (MarketLine 2016b).

[1] In order to make the spatial composition more convenient, the Appendices (Appendix I up to VII) are not numbered chronologically, i.e. according to their appearance in the text.

The most important finding in this industry was that companies have established various types of programs aimed to reduce their carbon emissions, yet mainly targeting the emissions of their own processes. The finding that these companies not often go beyond the boundaries of their own processes, might be due to the fact that it can be a time-consuming and extensive process to make farmers aware and willing to alter their methods (McKinsey&Company 2013). Only a minority of companies have found to obligate their programs throughout their supply chain, such as Walmart (Walmart 2016), possibly presenting a niche market of firms with an organic focus. Other findings are that companies in the food retail industry increasingly use regional sourcing initiatives; reduce the GHG emissions of their best-selling products; support environmental expert networks; and support eco-labeling. Appendix III[2] shows a summary of the key practices in the food retail industry, while Appendix VII provides the outline of all carried out practices in this industry.

There were also findings that accounted for all three industries. First, the reduction of emissions is often target of the sustainability practices in these industries. In addition, even though still in a development stage in the food retail industry, there is a deviation visible from having sustainability practices only applied on in-house processes towards requiring these practices for the entire supply chain.

The third area of analysis entails the influencers alongside the food value chain. According to Morris (1992, cited in Hitze 2014), these are the actors that affect the (sustainability) decision making within the chain, regardless whether they are responsible for the production of goods and services themselves. The following influencer groups and key influencers (i.e. the most relevant to Yara's business) were identified:

Industry initiatives

[2] Likewise, also here the practices' impact will not be as thoroughly discussed as is the case in the original business project report. More information can be found in Section 2.4 of the business project report.

Two industry initiatives are found to be highly relevant to Yara. The first one, the Sustainable Agriculture Initiative (SAI) Platform is a company-driven initiative aiming for sustainable agriculture in the global food industry (SAI Platform 2016). The platform's central idea is the exchange knowledge and best practices, so that shareholders, especially farmers, within the food value chain are engaged in more sustainable agriculture (SAI Platform 2016). According to Foodbev Media (2016), the SAI is highly impacting the agricultural industry, as it puts the farmers and more sustainable agricultural practices in the central focus of member companies (which are part of these farmers' supply chains). The objective of the platform is to create a global standard for farmers to environmentally assess their products, by engaging the entire food and beverage industries (Foodbev Media 2016). In order to stay up to date of the standards of the agricultural industry and the desired practices of the member companies, this SAI platform is very relevant to Yara. The second one, the Consumer Goods Forum (CGF), is a network within the food industry consisting of 400 companies, such as manufacturers and retailers, in 70 countries (The Consumer Goods Forum 2016). The CGF also aims to create partnerships between manufacturers and retailers based on knowledge and best practices sharing (The Consumer Goods Forum 2016). The CGF states that a deviation from the traditional, linear value chain is needed, towards a modern one that looks more like a value network (Capgemini and The Consumer Goods Forum 2015). Hereby consumers take the central role, due to their increased requirement for transparency of e.g. products and environmental impacts (Capgemini and The Consumer Goods Forum 2015). This confirms what has been found in the research done to the three previous mentioned industries, referring to the CGF's research done in fields that are important to Yara and therewith its relevance to the fertilizer company.

Tools for environmental analysis

Yara's business is found to be impacted by two commonly used tools. The life cycle assessment (LCA) analyses the environmental impacts derived from the 'life cycle' of a product of service, hence, from the extraction of its raw materials until its disposal, and opts to reduce these impacts (ISO 2006). Resulting from the research done in the three related food-industries, the LCA is a prevalent used tool in the food and beverage industry (see also Appendix IV) and is also often used to assess the environmental impact of agricultural goods (Basset-Mens and Van der werf, 2007). The LCA is expected to expand the scope of its measurements and to enhance its presence in other food-linked and agricultural-linked industries (McManus and Taylor 2015), which suggests it to become also even more important in the food value chain. Today, LCA is already used by Yara to assess its products impact (Yara 2016d). Carbon footprint, in contrast with LCA, only refers to the carbon emission output of a person, household or company (GoGreen 2016). As mentioned before, the agricultural sector is accountable for 15 percent of the planet's total carbon footprint (The Guardian 2016a), which is the largest contribution of all sectors and makes carbon emissions an often targeted environmental impact in agricultural processes (Pandey and Agrawal 2014). Likewise, a rising amount of consumers demands to know about a product's or service's carbon emissions (EEM 2016). In addition to this, decreasing the level of carbon emissions is considered a simple method to increase a company's public sustainability (Callan and Thomas 2007), which has led to a rising amount of farmers aiming to do so (Pandey and Agrawal 2014). Partly due to governmental legislation, carbon emission assessments are expected to only have a stronger presence in the future (Energy Saving Trust 2014). This is expected to be reflected in the food value chain too, as can be seen from the research findings in the three food-related industries, and the given that animal farming is already obligated by law to assess and disclose its carbon emissions (Extension 2016).

Sustainability reporting frameworks

The two most commonly used sustainability reporting frameworks were found to be the Global Reporting Initiative (GRI) and the Carbon Disclosure Project (CDP). The GRI is a global reporting framework that focuses on disclosing the company's triple bottom line activities – the social, economic and environmental activities (Isos 2016). Its standards are used in over 90 countries, often by multinationals, and it is the world's most used sustainability reporting framework (GRI 2016). The GRI can be seen as an all-in-one method to be transparent about the companies triple bottom line activities to stakeholders, strengthening the relationship with them (AcountAbility 2016) Nevertheless, it is considered to be too complex and extensive to be properly applied by farmers and it only enables certain types of agricultural companies to use its framework (AccountAbility 2016). Therefore, it is not favored by farmers (Globalreporting 2013). Prospects, however, suggest that the GRI will continue its strong presence in the future, e.g. by recently establishing the GRI GOLD Community: A new membership program to increase engagement of its shareholders worldwide (3BL MEDIA 2016). The other reporting framework, the CDP, provides both a database on corporate carbon emissions as well as reporting principles on how to disclose these (CDP 2016). The CDP is, similar to GRI, one of the most used frameworks worldwide[3], and accounts for the reportage of approximately 20 percent of the world's total emissions (PWC 2013). Companies share their data on their carbon emissions and reduction practices with the CDP, in order to publically disclose their reduction targets and improved environmental impact (TriplePundit 2016). Today, CDP is one of the sustainability practices that is increasingly demanded by companies in order to become part of their supply chain (Carbon Disclosure Project 2015), e.g. urging farmers to purchase CDP-oriented fertilizers (Planet Earth Online 2016). Prospects of CDP are positive: the majority of the world's stock exchanges reports through CDP and investors

[3] Paul Simpson in the Huffington Post, http://www.huffingtonpost.com/paul-simpson/carbon-disclosure-the-new_b_9777568.html (accessed 23 April, 2016)

increasingly require CDP reporting[4]. In addition, CDP Europe has recently developed a sustainability framework tailored to the needs of the value chains in the food, beverage and agricultural industries (Duke, Colombo and Kutner 2015), suggesting that CDP's presence will only strengthen further in the food value chain.

Think tanks and consultancies, non-governmental organizations and legislation

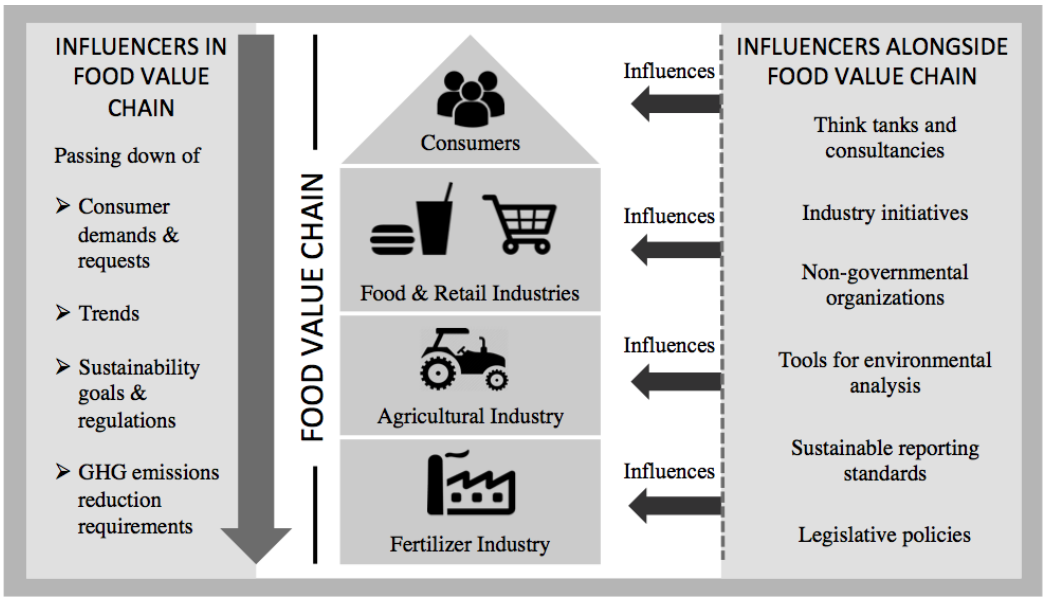
Think tanks and environmental consultancies have a more indirect impact on the food value chain. They can function as valuable information providers to companies that are part of the food value chain. Non-governmental organizations (NGOs) can establish sustainability practices and programs, e.g. initiate sustainability practices and push them until used globally (IISD 2016). Policies can both directly or indirectly influence the sustainability decision making in the agricultural sector (OECD 2015), e.g. by mandating certain industries, such as the animal farming industry, to report through CDP (Extension 2016). Even though the importance of the previous influencer groups is acknowledged, due to the corporate and industrial nature of Yara's request, they did not fall within the scope of this project. Therefore, they will not be discussed further.

2.2.4 Recommendations to the company

The analyses done to the developments in and influencers alongside the food value chain, showed that sustainability practices in the chain are not only influenced on an internal level, but also on an external level. Figure 1 shows a schematic representation of the various developments and influencers as analyzed in the previous paragraph.

[4] Paul Simpson in the Huffington Post, http://www.huffingtonpost.com/paul-simpson/carbon-disclosure-the-new_b_9777568.html (accessed 23 April, 2016)

Figure 1. Overview of influencers in and along the food value chain.



NB. Based on research outcomes in paragraph 2.2.3.

As can seen from the representation in Figure 1, it is suggested that influencers in the food value chain down-stream demands, trends, regulations and requirements along the chain, to the agricultural industry, that will transfer them to the fertilizer industry. Additionally, influencers alongside the food value chain also affect the food value chain, influencing the sustainability decisions and business strategies of the players in the chain. Considering the previous model, there are four prominent trends and several findings for Yara to inquire further in the future. The first two trends are directed to the more general industry level, while the latter two are more bound to specific areas.

Trend 1. Transformation of the value chain

As mentioned before, Capgemini and The Consumer Goods Forum (2015) forecast the traditional linear, single-way value chain to change into a more integrated, cooperative value network, wherein the end-consumer is centralized (see Appendix V). Likewise, the FAO (2014) also suggests the rise of more sustainable food value chains, that are strongly steered by markets and aim to combine profitable business with social and environmental programs. This makes it necessary for Yara to discover how to profit best from this transformation and how to cope with the accompanying challenges:

1. Yara should proactively participate in an integrated food value chain network, that focuses on the end-consumer. While the traditional value chain is developing into a value chain network, this brings along new possibilities for Yara. Namely, if Yara would be more involved in the network, it could educate consumers further on the importance of low carbon footprints, making it a stronger requirement to farmers and the fertilizer they use. Since Yara leverages on its products' low carbon footprints, this could increase the demand of its products and eventually its competitive position. **2. Yara should more proactively take part in the knowledge-sharing initiatives in the food and food retail industry.** As seen from the industries' analyses, companies are increasingly educating and sharing best practices throughout their entire value chain, strengthening their corporate relationships (Helmke Uebel and Dangelmaier 2008). Stronger relationships, with e.g. suppliers, often lead to the possibility to influence the value chain requirements (i.e. upstream) as they enable decision makers to be introduced to own practices and goals. Moreover, it could be beneficial for Yara to educate farmers and suppliers more on its products, so that a better understanding towards their importance can be created (Helmke Uebel and Dangelmaier 2008). **3. Yara should collaborate with the industry initiatives the CGF and the SAI Platform, so that food-related manufacturers and retailers can be more effectively reached.** Not only suppliers and consumers are highly involved in these initiatives, also companies team up in industry networks to create industry standards, such as standards for sustainable agriculture. This makes it highly relevant for Yara to audit the CGF and the SAI Platform, in order to keep up with competitors' sustainability activities, identify trends and influence upcoming industry standards. Moreover, the CFG has more than 400 corporate members and is one of largest networks in the food, beverage and food retail industry. Yara could establish a valuable corporate network through CGF and interconnect with other members in the food value chain. The SAI Platform, on the other hand, strongly impacts the requirements of farmers to Yara's business, due to its focus on

sustainable agriculture and assessment standards. Hence, if Yara would participate in the platform, the company would be enabled to work closely together with farmers and other members, while mutually exchanging ideas for the assessment standards. This would make it easier and less time-consuming (by continuously being up to date) for Yara to comply with the standards, adapt its products accordingly, improving its competitiveness. All in all, participation in both initiatives would enable Yara to have input on all developments in the industries while gaining valuable consumer information. **4. Yara should focus more on carbon footprint reductions to meet supply chain demands, but also continue to use LCA.** The LCA is already commonly used and is expected to more important to food-related industries (McManus and Taylor 2015), increasing its importance to Yara's business. Used by more players in the food value chain, LCA might be developed into an industry requirement or standard. Therefore, Yara should continue to use this assessment tool in the future to assess its products. As mentioned before, carbon footprint reduction is a key target for agricultural companies, in particularly for farmers (Pandey and Agrawal 2014). This, together with an increased consumer awareness of carbon footprints (EEM 2016), might lead farmers to prefer low emission fertilizers, making Yara's low footprint guarantee even more valuable and it necessary to maintain this competitive advantage.

Trend 2. Sustainable reporting

Sustainable reporting frameworks are increasingly used throughout the food value chain, especially the GRI and CDP frameworks. After assessing their importance for Yara and other players in the food value chain, two recommendations were established:

1. Yara should sustain the usage of the GRI framework to report its own environmental impacts. Yara should continue using the GRI framework to give a comprehensive overview of its triple bottom line activities to its stakeholders (AccountAbility 2016) and because its importance is expected to increase further in the future (3BL MEDIA 2016). However, the GRI

is unsuitable for farmers, due to its complexity, extensiveness and the requirements they have to fulfil in order to use it (Globalreporting 2013). This makes the GRI framework unsuitable for Yara to report its impacts on a value-chain level, even though, it has shown to be an effective manner of reporting on the in-house level. **2. Yara should also use the CDP framework to align with competitors and unlock new business opportunities.** The CDP seems to be more suitable to report on the value-chain level. Namely, CDP's presence in value chains is growing by an increasing number of companies announcing it as a prerequisite to be included in their value chain (Carbon Disclosure Project 2015). If Yara then continues not to use the framework, the company could be excluded for business by players in the food value chain, eventually missing out on new business opportunities. Moreover, as can be seen from the CDP analysis, there are strong reasons to assume the framework will only become more required and used in the future. For these reasons, Yara is recommended to comply to the CDP framework. Adopting the CDP, might result in the beginning in an increased amount of emissions, since the company's activities are currently not in line with the CDP's guidelines. Even though the process to the CDP could generate high costs and much time, it is highly likely that there will be a positive return on investment in the future. Adopting the CDP could, as explained before, create new business opportunities, hence, an increased market share and amount of revenues. Finally, also in order to maintain its competitiveness, it is essential for Yara to adopt the CDP, since some competitors already did too (CDP, 2016).

Trend 3. Abatements costs

Yara should actively promote the cost saving potential of its products. The industries analyses McKinsey&Company (2013) found that, even though practices to improve agricultural nutrients might not have the most impact, they can lower costs, e.g. by resulting in larger yields and more efficient land use (see Appendix VIII). Likewise, prices of agricultural goods can be decreased by proper use of fertilizers (Diao 2010). If Yara would proactively market this

finding, linking the environmental potential with the saving potential, the value of Yara's low carbon footprint products will increased.

Trend 4. Sustainable water usage

As shown from the analyses, water is an important resource in the food and beverage industry. Today, around 85 percent of the water used, is used by the agricultural industry (International Food Policy Research Institute 2016). Consequently, many companies in these industries have developed programs for more sustainable water usage, e.g. water recycling. In order to align Yara's business with these developments, Yara should more proactively take part in the debate on sustainable (fertilizer) water practices. Especially, since Yara's fertilizers impair the quality of water, e.g. through nitrate draining, making recycle processes harder.

2.2.5 Concerns

Even though all recommendation were made after thorough analyses and consideration, the recommendations cannot be guaranteed to be 100 percent effective, i.e. unconditionally leading to increased competitive advantage, after their implementation by Yara. Namely, as predicting future events always has a certain level of risk for undesirable and unforeseen events to occur, the recommendations should therefore be considered with caution from Yara's side. An example of this, would be if Yara chooses to implement e.g. the CDP reporting framework, while a new and unforeseen framework rises, towards the industry standard, Yara could have a lower Return on Investment in CDP than was expected. Limitations to the data collection of the research, i.e. only information provided through public sustainability reports and a specific set of companies in the food value chain included in the analysis, also supports a cautious attitude when considering the provided recommendations.

2.2.6 Individual contribution

In this project, my responsibility consisted out of several tasks. However, there are four specific and important tasks to mention here. First of all, already in the beginning of the project we

divided the analyses of the three food-related industries and the influencers alongside the food value chain. My first task was to analyze the influencers and to describe them in a comprehensive, yet thorough manner. At this point in time, we just thought of influencers in terms of economical assessment tools and sustainability reporting frameworks. Based on input of Yara and literature, twelve tools and two sustainable reporting frameworks were identified, which I assessed and described according to their role, relevancy, benefits and boundaries (as thoroughly as possible, since we were planning to cut irrelevant parts later). However, after getting deeper into the literature, we understood that there are more influencers alongside the value food chain, and that some of the analyzed (criteria of the) tools were not relevant to our project. For this reason, in the original business project, much of my contribution in this task did not make it into the final report. Nevertheless, since all team members analyzed a different area, every member was responsible to derive recommendations from his or her own analysis (i.e. 'area of expertise'). This made me responsible for the recommendations on the environmental tools and sustainable reporting frameworks, that have shown to be part of the most prominent industry trends identified.

After deriving our outcomes, the team decided these could become more clear when mapped in a model. Hence, it was my task, together with one other student in the project, to come up with a model for the overview of the influencers in and along the Food Value Chain. We used the outcomes of the research and sketched together several models, where with both of us had the opportunity to give direct feedback and suggestions. While my partner thought it would be better to more specifically name to the influencers in the food value chain (e.g. sustainable water usage trend) to make the model a more specific outline, I suggested it to stay more on a general level, so that its adaptability scope could increase and its complexity reduced. After consulting the rest of the group, we agreed to make the model more specific, as it is now presented in Figure 1 (see Section 2.2.4).

A less report-related task I had, was to function as the contact person between the representative of Yara, Bernhard Stormhyr, and the business project team. If the team had any questions about the project or wanted to request a video conference, it was my responsibility to ensure that this was smoothly and timely communicated to Bernhard. In addition, any changes in the strategic approach of the report had to be communicated by me to Bernhard, so that he was continuously up to date of our progress.

The less significant tasks I had entailed more the writing of general parts, such as the abstract, a part of the introduction (i.e. the research question), the research methods paragraphs for, the paragraph regarding legislative policies and the conclusion and future outlook. As someone who likes to do literature investigation, I was also in charge of searching suitable sources that could help strengthen our statements and assumptions when my team mates did not have time to do so. Finally, since the industries analyses were so important for our report, another task of mine was to assist the two students who were responsible for this part. I helped them by analyzing some company's sustainability practices in the food industry, noting down the relevant practices and passed them on to my team mates. Nevertheless, all credits for this part should go to them, since I only was asked to help with the analysis of two companies: Unilever and Mars Inc.

3 ACADEMIC DISCUSSION

3.1 Link with management

In the MSc. Management is taught that corporate strategies are an important component of business management. If the right strategy is chosen, the company will see its profitability increase. This makes analyzing the company's specific context extremely important for strategic decision making (as was also the challenge in this business project). Over the years, many management analysis models were developed to do so. One of the most fundamental

analysis frameworks is Porter's Value Chain Analysis (VCA) (ManagementStart 2016), which focuses on the organizational internal value chain (see Appendix VIIII).

Porter's VCA sees companies from a process-based view, wherein their internal systems and accompanying activities are key components (Porter 1985). According to Porter (1985), a value chain is the sequential set of activities performed by a company to increase the value of a product for its customers, and consequently, increase the company's competitive advantage (either based on lower costs levels or differentiation). The value is measured as the output's generated positive value in comparison with that of competitors, presented in terms of costs and profits (Porter, 1985). Value chain activities can comprise the design, production, marketing and distribution of the product or service (Porter 1985). All activities, require activity-specific inputs to be carried out, such as money and materials (Porter 1985). Moreover, Porter distinguished two categories of activities: Primary activities, which are 'core' activities that directly add value to the product (e.g. marketing activities), or help to produce and sell the product (White 2004), and support activities, that assist in the execution of the primary activities (e.g. HRM activities for skilled marketing employees) (White 2004). An overview of the value chain's primary and support activities are presented in Appendix X. Porter's VCA connects the separate activities and shows the exact impact each one has on outputs (Porter 1985). This enables to locate in which chain activities value is added and lost throughout the organization (Porter 1985), so that adjustments can be made accordingly (MindTools 2016).

3.2 Relevant theories and empirical studies

Porter's VCA framework is both praised as well as criticized. First of all, Porter is praised for the modest number of differentiation strategies he appoints in his model (costs versus differentiation), which makes the framework clear and attractive for consultants and decision makers (Brandenburger 2002). Another benefit of the framework is that it enables companies to simultaneously analyze their sources of costs and opportunities for differentiation (Kaplan

Financial Knowledge Bank 2016). In addition, it makes managers aware that a company is multifaceted, the relationship between its activities needs to be understood and that these activities in a holistic manner form the companies competitive advantage (Kaplan Financial Knowledge Bank 2016). The framework sketches a picture for managers to consider when making strategic decisions.

The most evident critic on the framework is that it is fairly difficult to employ the model on service companies (Stabell and Fjeldstad 1998). Namely, Stabell and Fjeldstad (1998) state that these type of companies are rather value shops, than value chains (see Appendix XI). In other words, they are companies that do not particularly create value through their input-output process, but by providing their customers with solutions to problems (Stabell and Fjeldstad 1998). This means that these companies have no vast sequential activity stages nor fixed resources to generate value (Stabell and Fjeldstad 1998). The company's value shop activities and resources are tailored to the needs of each specific problem, and the process of doing so can be iterated repeatedly until the right solution is reached (Stabell and Fjeldstad 1998). The primary activities in a value shop, therefore, are more focused on problem and solution evaluation (Stabell and Fjeldstad 1998). In addition, it is also suggested that the model is outdated (Antoniou, Levitt and Scheihans 2011). According to Antoniou, Levitt and Schreihans (2011), in the 80s, it was rare for two companies to be on the exact same level of competition, while today, many competitors are present at all levels of competition. Therefore, the framework accurately accounts for a static economic environment, but not the influences and dynamics of the economy today: e.g. influencers such as consumers, make companies anticipate and rapidly response to their needs (Aktouf 2004). The prevailing goal of companies has also changed over the last 20 years: It has shifted from higher levels of production, to more satisfying customer services (Antoniou Levitt and Schreihans 2011). Instead of anywhere in the

value chain, product differentiation now increasingly takes place closer to the customer (Antoniou, Levitt and Schreihans 2011).

3.3 Implications for theory and future research

One of the main findings of the previous literature review on Porter's VCA, is that the framework does not account for the impact of modern dynamic economies and value chain influencers on competitive advantage (Aktouf 2004). Thus, Porter's VCA framework seems to need some adjustment in order to be suitable to analyze modern value chains. This statement finds support in the findings of the business project, that there are many influencers alongside the food value chain, impacting competitive advantage (see also Figure 1 in Section 2.2.4). For this reason, especially in the lights of a relatively new topic as sustainability, it would be interesting to investigate how the influencers fit in Porter's VCA framework, e.g. affecting or even establishing new activities in the chain. This would help to give companies a more complete overview of the relationships and impact of their internal value chain activities on their competitive advantage, and would lead to more elaborated strategic decision making. This is especially relevant, since the outcomes of this project suggest sustainability activities to play a large role in the determination of competitive advantages. For this reason, one might consider it to be intolerable to exclude these type of activities in any strategic value chain analysis framework.

4 PERSONAL REFLECTION

4.1 Personal experience

My participation in this project has learned me a lot. First of all, the project showed me both my strengths and weaknesses on a magnified level, and how to cope with these, which will be discussed in the second section (Section 4.2). Second, there were several process-related challenges to overcome, which taught me how to cope with similar situations in the future. First

of all, there were times I felt unconfident about my expertise in this area, due to its fairly unknown topic, i.e. the fertilizer and agricultural industry. This made it necessary to recapture this confidence, by focusing on the areas I do have experience in, such as in doing academic research and finding relevant information. I also talked a lot about it with my team members, who were in the same situation, which made us relativize the situation together and feel supported by each other. Second, specifically in terms of the team, I learned a lot about clearly communicating what the group needs without hurting someone's personal feelings. Namely, one team member had no previous experience in academic writing, which made her contributions to the project inferior to the standard the rest of the team had set. In a situation like this, it can be difficult to not connect this to the team member's motivation, since it was not her intention but her lack of experience causing the lack of quality. Nevertheless, at the same time it is needed to make clear where the boundaries are and that changes have to be made. For this reason, I met with her, one-to-one (so that she would not feel attacked by the group), wherein I communicated the feelings the group had about her work. I also explained these feelings were not personal. After that meeting, she did more her best to meet the group's needs. All in all, the project underlined the importance of confidence, team work and effective communication.

4.1.1 Key strengths and weaknesses

The key strengths that I observed during this project were definitely my orientation for detail (e.g. is the formatting aligned? Is information based on sources? Is this manner of writing too informal?) and my engagement in the project (e.g. I constantly updated other team members of my progress and asked them about theirs). In addition, a strength that really developed during the project, was my assertiveness towards the team member that underperformed (see Section 4.1.1). It was the first time that I had to express dissatisfaction about a group member and I was

afraid to damage the group's harmony. However, as explained before, I discovered that, when expressed with respect, assertiveness can solely be of benefit the whole group.

A key weakness that I have observed in this project is my lack of time management. Due to an inefficient planning, it often has led me to work until the early mornings to meet (informal) deadlines. In addition, working in these late hour facilitates inefficient manners of work (i.e. due to lack of sleep, tiredness). This lack of planning and consequently the inefficient way of working, in their turn, have led to high levels of stress, increasing the psychological workload. When I realized the causes of the stress I was experiencing, I decided to plan my project contributions over a larger timespan (taking into account the time investment in other activities, e.g. assignments, more widely than they were actually expected to be) and write the new schedule down, keeping it in a place where I can see it daily to be remembered of my progress (i.e. the wall behind my computer).

4.1.2 Areas for further improvement

The area this project that needs further improvement is definitely my lack of time management. It would make the execution of similar projects easier (mentally and physically) and help me to work more efficiently. For this reason, and since it has shown to be a successful strategy for me, I am planning to work more with extensive and explicit time-plans, that I will keep in places where I can easily be reminded of them. I hope this will eventually lead me to improve my time management in such a manner, that I will be able to work without these explicit plans in the future.

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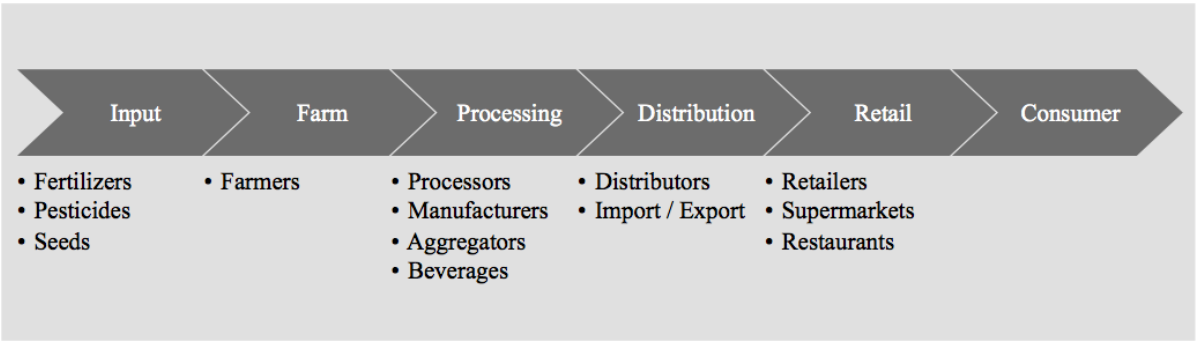
6 Appendices

6.1 ***Appendix I.*** *Representation of the food value chain.*



NB. Adjusted from Garnett (2011).

6.2 ***Appendix II.*** *Summary of sustainability practices in the food and beverage industry.*

		Impact on Farmer	Impact on Yara
1	Improvement of water use and water efficiency, including waste water management		
2	Waste solutions, especially with focus on decrease in waste to landfill		
3	Sustainable packing solutions		
4	Reduction of GHG emissions, both within the company and within the whole value chain		
5	Reduction of energy consumption or shift to renewable energy sources		
6	Introduction of supplier engagement programs, to comply with certain standards (e.g. to improve yields and protect natural resources across the supply chain) through best practice sharing (e.g. through self-established platforms) or within external industry-wide collaborations		
7	Quota-setting for sustainably sourced raw materials		
8	Transparent disclosure of emission data		
9	Reduction of transportation fuel usage		

NB. Own elaboration based on Appendix VI.

NBB. The shape of these assessments were not similar in all companies, and can differ, depending on the company.

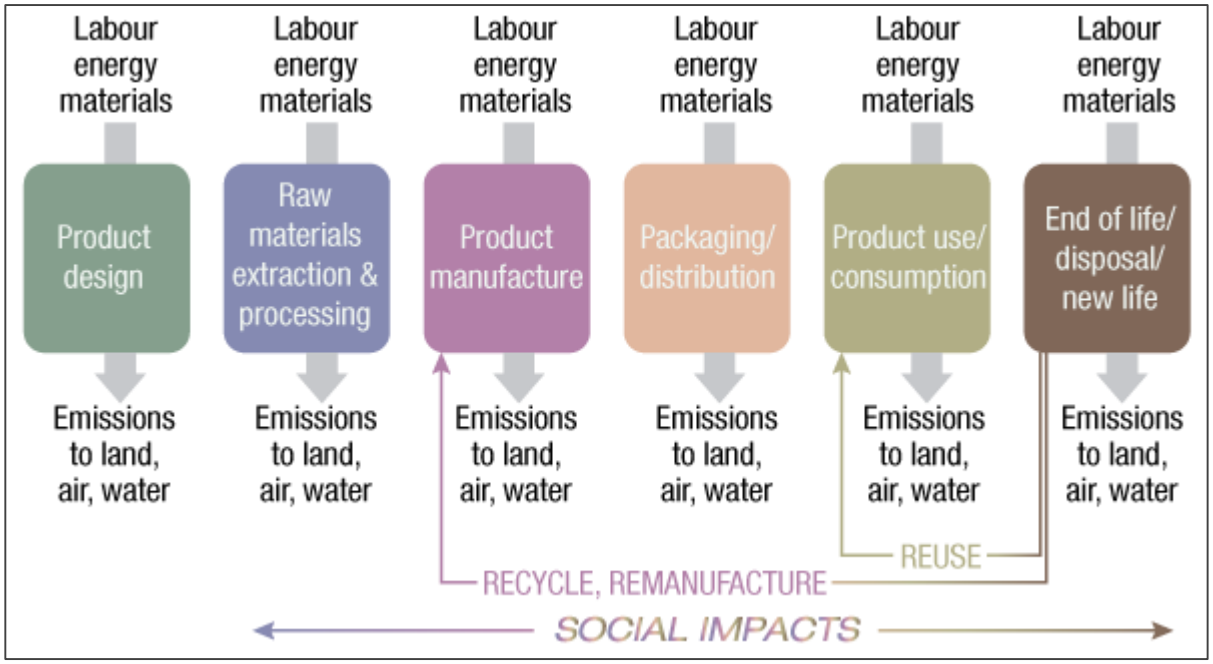
6.3 ***Appendix III.*** *Summary of sustainability practices in the food retail industry.*

		Impact on Farmer	Impact on Yara
1	Reduction of energy consumption in stores and warehouses through changes in heating, refrigeration, insulation, lighting, etc.		
2	Increase of share of renewable energy within the energy mix (sourcing or installation of rooftop solar panels, etc.)		
3	Reduction of waste / waste management through better sourcing strategies, intelligent packaging, etc.		
4	Reduction of fuel consumption for transport through more fuel efficient fleet or local sourcing		
5	Commitment to reduce GHG emissions with a focus on the product categories with the highest embedded carbon (defined as the amount of life cycle GHG emissions per unit multiplied by the amount the company sells)		
6	Establishment of a network of suppliers, industry experts, NGOs and vendors to determine potentials for GHG emission reduction		
7	Support of eco-labeling approaches to assure certain standards		

NB. Own elaboration based on Appendix VII.

NBB. The shape of these assessments were not similar in all companies, and can differ, depending on the company.

6.4 ***Appendix IV.*** *A schematic representation of LCA (Life Cycle Initiative 2016).*



6.5 ***Appendix V.*** *Future value network (Capgemini and The Consumer Goods Forum 2015).*

*6.6 **Appendix VI.** Outline of the food and beverage industry.*

	Initiative	Companies involved	Impact on Yara	Impact on Farmers	Impact on Processors	Impact on Distributors	Impact on Retailers
1	Improving overall water-use efficiency	Coca-Cola, PepsiCo, Heineken, Pernod-Ricard, SAB Miller, JBS, General Mills, Mars,					
1a	100% of our production units in water-scarce and water-distressed areas will have a Source Water Protection Plan by 2020	PepsiCo, SAB Miller					
1b	Cut Water use in manufacturing by 15%	Mondelez, Kellogg's					
2	Managing own waste water more efficiently	Coca-Cola, JBS					
3	Sustainable Packaging	Coca-Cola, PepsiCo, General Mills, Mars					
3a	Work to eliminate solid waste to landfills from our production facilities.	PepsiCo, General Mills, Kellogg's , Mars					
3aa	Make 60% of production sites zero waste to landfill sites	Mondelez					
3aaa	Achieve zero waste for disposal in 10% of our factories until 2015, and zero waste disposal within the sites by 2020	Nestle					
3b	Waste Management (Organic waste used to produce organic fertilizer)	BRF					
3c	Reduce Waste from manufacturing by 15%	Mondelez, Kellogg's					
3d	Eliminate 50 million pounds (22,500 tons) of packaging material	Mondelez					
3e	Reduce package weights by 10%	Mars					
3f	Program to reduce agricultural waste	Danone					
4	Reduce the carbon footprint of final product	Heineken					
4a	… by 25% by 2020	Coca-Cola					
4b	… by 25% by 2020 (50% production, 25% packaging, 25% refrigeration)	SAB Miller					

5	Absolute reduction of GHG emissions…	PepsiCo					
5a	Across production by 2020 by 40%	Heineken					
5b	From manufacturing by 15%	Mondelez, Kellogg's					
5c	By 28% by 2025 across the full value chain	General Mills					
6	Increase the use of renewable energy	Coca-Cola, BRF, Mars					
6a	Reduce GHG emissions from energy use by 35% between 2008 – 2015	SAB Miller					
6b	Reduce energy consumption per ton of produced product in every product category to achieve an overall reduction of 25%	Nestle					
7	Develop a supplier engagement program to achieve compliance with certain standards (e.g. sustainable agriculture guidelines)	Coca-Cola, Heineken, Pernod-Ricard, Nestle					
8	Embedding sustainability into ingredient-procurement decisions.	Coca-Cola					
9	Developing and implementing crop-specific programs to enhance the economic well-being of farming communities, improve yields and protect natural resources across the supply chain.	Coca-Cola, Mondelez					
10	Building industrywide collaborations to gain alignment and effect change in the agricultural sector (e.g. through best practice sharing, etc.)	Coca-Cola, PepsiCo,					
11	Driving change through partnerships.	Coca-Cola					
12	Raw materials supplied from sustainable sources						
12a	50% by 2020	Heineken					
12b	Source 100% of the 10 priority ingredients by 2020 (more than 50% of annual raw material purchase)	General Mills					

13	60% of agricultural raw materials used in Africa to be locally sourced within the continent	Heineken					
14	Best Practice Sharing	BRF					
14a	Setting up a supplier-wide platform and best practice sharing network to bring together expert and enhance soil management and sowing techniques, development of improved crop protection methods, water conservation, nitrogen sensors, satellite forecasting and other sophisticated approaches.	Anheuser InBev, Danone, Unilever					
15	Ensure the sourcing of crops measurably improves both food security and resource productivity	Sab Miller					
15a	Setting up of a program to assess and transform sustainability of crops, including deforestation, economic sustainability, fertilizer (nitrogen) use, GHG emissions, soil loss, water quality and water use	Unilever					
16	Development of new technologies, products and processes with low environmental impact	BRF					
17	Disclose emission results transparently						
17a	… via CDP	BRF, JBS					
	… in GRI format	JBS					
18	Guarantees the responsible origin for its raw materials and will not purchase from vendors involved in illegal deforestation.	JBS					
19	Zero Deforestation by 2020	Danone					
20	GHG Reduction target in absolute value by 2030 on full scope of responsibility.	Danone					
21	Reduce transportation fuel usage	General Mills					

(Anheuser InBev, 2015; BRF, 2015; Coca-Cola, 2015; Danone, 2015; General Mills, 2016; Heineken N.V., 2016; JBS, 2014; Kelloggs, 2015; Mars, 2015; Mondelez, 2015; Nestlé, 2015; PepsiCo, 2015; Pernod-Ricard, 2015; SAB Miller, 2016; Unilever, 2015)

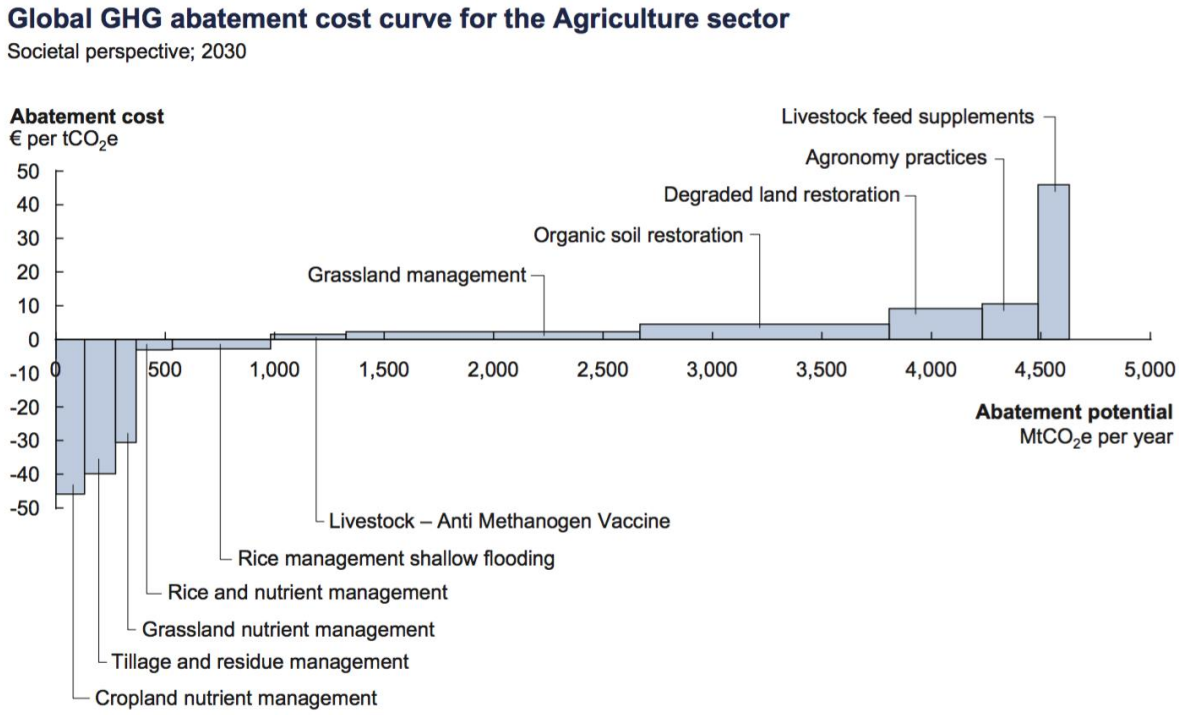
*6.7 **Appendix VII.** Outline of the food retail industry.*

	Initiative	Companies involved	Impact on Yara	Impact on Farmers	Impact on Processors	Impact on Distributors	Impact on Retailers
1	Absolute/Relative GHG emission reduction target	Walmart, Tesco, Carrefour, Metro Group					
1a	Decrease of 20m metric tons from 2010-2015, with focus on products with highest embedded carbon.	Walmart					
1b	40% reduction until 2020 with focus on scope 1 and 2 (possibility to influence) and transport (scope 3)	Carrefour					
1c	20% reduction from own business by 2020	Metro Group					
1d	27% reduction by 2020, mostly through energy efficiency topics.	Aldi					
1f	Reduce Scope 1 and Scope 2 greenhouse gas emissions by 20 percent per million dollars of retail sales by 2015.	Target					
1g	Reduce GHG emissions from transport, energy and stores by 50% until 2022	Rewe					
1h	reduce operational carbon emissions by 30% absolute and 65% relative (to 2005)	Sainsbury's					
1i	Reduce absolute emissions by 25% by 2020 based on 2010 baseline, especially within Electricity (solar and wind power, LED lights, control tech humidity sensors), Refrigerants and Transportation	Safeway					
1j	Reducing CO_2 Emissions at Stores, especially within transportation and electricity usage.	7 Eleven					
2	Be a zero carbon business						

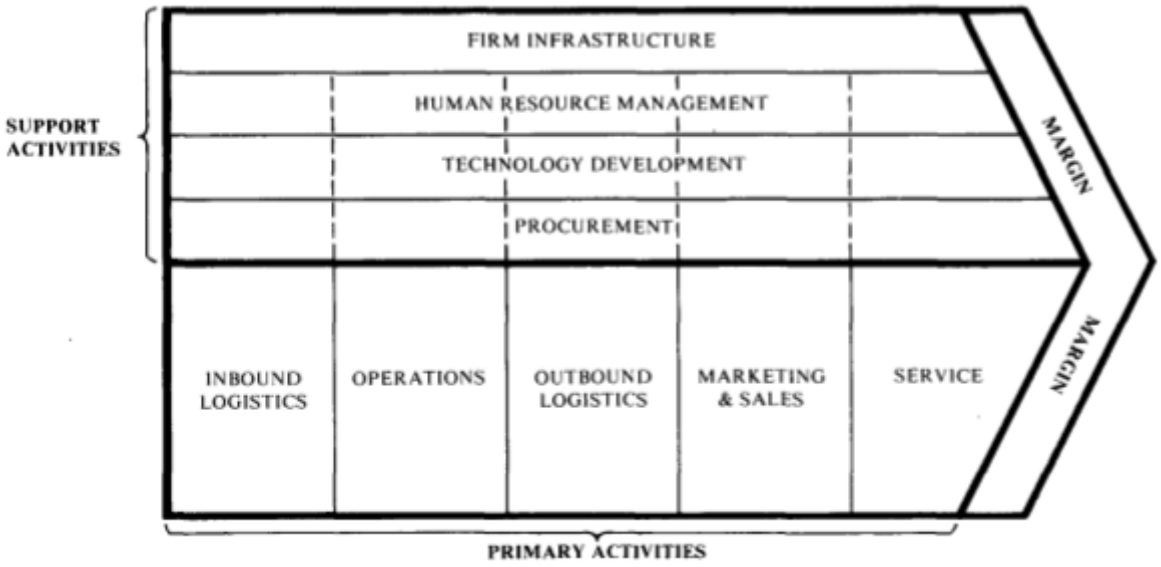
2a	… by 2050	Tesco					
2b	Retail stores have to be Carbon Neutral	Rewe					
3	Calculate a group Carbon Footprint	Tesco					
4	Tracking and Assessment of GHG emissions, no scope 3 focus (no possibility to influence)	Costco					
5	Decrease electricity usage	Kroger, Metro Group					
5a	By 50% Mostly through installation of LED lighting	AEON					
6	Increase share of renewable energy sources within the companies power mix	AEON					
6a	To 100%	REWE					
6b	Installation of solar panels on Warehouses	REWE, Costco					
6c	Installing renewable energy across estate including 170,000 solar panels, 98 biomass boilers and 27 Ground Source Heat Pumps.	Sainsbury's					
7	Decrease Fossil Fuel usage	Kroger, Metro Group					
8	Long-term goal to integrate suppliers into GHG emissions reduction.	Kroger					
9	Limit refrigerant losses for commercial refrigeration and air-conditioning	Metro Group					
10	Develop collaboration possibilities together with industry experts, vendors, NGOs to determine what makes products more sustainable - from packaging to ingredients	Target					
11	Environmental Impact Analysis	Target					
12	Reduce Water Usage by 10%	Target					
13	Assessment of GHG emissions together with NGO to identify saving potential	EDEKA, 7 Eleven					

(AEON, 2015; Carrefour, 2014; Costco, 2015; Eleven, 2013; Group, 2014; Kroger, 2015; Metro Group, 2014; Rewe, 2014; Sainsbury's, 2015; Target, 2015; Tesco, 2015; Walmart, 2016)

6.8 ***Appendix VIII.*** *The agricultural industry's global GHG abatement cost curve - 2030 (McKinsey 2013).*



6.9 ***Appendix VIIII.*** *Porter's value chain framework (Porter 1985).*



6.10 ***Appendix X.*** *Overview of primary and support activities in a company's value chain.*

PRIMARY ACTIVITIES		SUPPORT ACTIVITIES	
Inbound Logistics	• Required inputs (raw materials) • Storage • Stock coordination • Transportation inputs throughout organization	**Procurement**	• Resource acquisition • Input acquisition
Operations	• Processing inputs into end product • Inputs of labor • Production technologies	**Technology Development**	• Development of supporting technologies for primary activities and business operations
Outbound Logistics	• Allocation of end product • Stock and inventory coordination • Transportation of end product to consumer	**Firm Infrastructure**	• Management structuration • Planning and process coordination • Financial capital coordination • Attainment of supporting information systems
Marketing & Sales	• Advertisement • Promotions • Persuasive activities	**Human Resource Management**	• Recruitment of workforce • Selection of workforce • Training and development of workforce • Rewards and motivational incentives for workforce
Service	• After sales follow up		

NB. Based on Blogspot (2016).

6.11 ***Appendix XI.*** *The value shop framework (Stabell and Fjeldstad 1998).*