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How are companies addressing supply chain transparency?
Pedagogical Case Study of Rügenwalder Mühle

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Master in Management of Services and Technology

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Abstract

In the wake of further development of appropriate technologies and reports about food contamination incidents, human rights abuses, and environmental impacts, supply chain transparency in the food industry is gaining more attention. Customers demand more information and new governmental regulations were prescribed. Furthermore, companies can benefit from transparent supply chains as opportunities to increase efficiency can be revealed and risks can be managed more easily. However, many companies struggle to build transparent supply chains as it comes with several requirements and challenges. This pedagogical case study is about a German traditional meat company that successfully launched vegetarian and vegan substitutes in 2014 and is today the market leader in the sector in Germany. The case study applies frameworks from strategic management theory on the company's endeavor to establish a new transparent supply chain structure for its meat substitutes. External factors supporting or impeding the undertaking will be explored and relevant internal factors will be identified and reviewed on their ability to ensure sustained competitive advantage. A detailed case description of the company establishing the context of the topic and a comprehensive literature review on supply chain transparency are provided. The study is a problem-based instructional approach situating learning in a practical task. The implementation in education imparts students with several diverse skills like critical and analytical thinking, information evaluation, and in case of group work, what is recommended to maximize learning effects, numerous interpersonal skills. It was designed for students but can be integrated into courses in different ways.

Keywords: Supply Chain Transparency, Strategy, Sustainability, Meat Substitutes, SWOT, VRIO

JEL Classification

- L21 Business Objectives of the Firm
- M11 Production Management

Resumo (PT)

Na sequência de um maior desenvolvimento de tecnologias apropriadas e de relatórios sobre incidentes de contaminação alimentar, abusos dos direitos humanos e impactos ambientais, a transparência da cadeia de abastecimento na indústria alimentar está a ganhar mais atenção. Os clientes exigem mais informação e foram prescritos novos regulamentos governamentais. Além disso, as empresas podem beneficiar de cadeias de abastecimento transparentes, uma vez que as oportunidades de aumentar a eficiência podem ser reveladas e os riscos podem ser geridos mais facilmente. No entanto, muitas empresas lutam para construir cadeias de abastecimento transparentes, uma vez que estas vêm acompanhadas de vários requisitos e desafios. Este estudo de caso pedagógico é sobre uma empresa de carne tradicional alemã, que lançou com sucesso substitutos vegetarianos e veganos em 2014 e é hoje o líder de mercado no sector na Alemanha. O estudo de caso aplica quadros da teoria de gestão estratégica sobre o esforço da empresa para estabelecer uma nova estrutura transparente de cadeia de abastecimento para os seus substitutos de carne. Os factores externos que apoiam ou impedem a empresa serão explorados e os factores internos relevantes serão identificados e revistos quanto à sua capacidade de assegurar uma vantagem competitiva sustentada. É fornecida uma descrição detalhada do caso da empresa que estabelece o contexto do tópico e uma revisão exaustiva da literatura sobre transparência da cadeia de abastecimento. O estudo é uma abordagem instrucional baseada em problemas, situando a aprendizagem numa tarefa prática. A implementação na educação confere aos estudantes diversas competências, como o pensamento crítico e analítico, a avaliação da informação e, no caso de trabalho de grupo, o que é recomendado para maximizar os efeitos de aprendizagem, numerosas competências interpessoais. Foi concebida para estudantes mas pode ser integrada em cursos de diferentes formas.

Keywords: Supply Chain Transparency, Strategy, Sustainability, Meat Substitutes, SWOT, VRIO

Sistema de Classificação JEL:

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1 Introduction

In a recent study, Xu et al. (2021) showed that food production is responsible for more than a third of all man-made greenhouse gas emissions (GHG). The food system is also a major driver for diversity loss, deforestation, water pollution and scarcity, and soil degradation (UN & DESA, 2021). Hence, the food system contributes enormously to climate change. Being highly vulnerable to temperature and precipitation, agriculture consequently becomes more difficult while at the same time the world population is continuously growing (Eise & Foster, 2018; FAO, 2020). Today, already millions of people suffer from food insecurity and malnutrition (Eise & Foster, 2018; UN & DESA, 2021). A transformation of the food system is inescapable (Tilman & Clark, 2014; Willet et al., 2019).

Xu et al. (2021) identified that more than half of the emissions caused by the food system correspond to livestock production. They further estimate that only 13% of total agricultural land is used to produce plant-based food. A change towards a more plant-based diet can therefore reduce the carbon footprint of our food system (Garnett, 2011; Springmann et al., 2018; Xu et al., 2021). Reducing meat consumption also comes with several health benefits (Tilman & Clark, 2014). High meat consumption is a diet-related risk factor for several health issues as it can cause cardiovascular diseases, cancer, strokes, obesity, and eventually early mortality (Godfray et al., 2018; Wang & Beydoun, 2009; Westhoek et al., 2014). Besides impacts on health and the environment, limiting consumption of animal products also has an ethical aspect referred to animal welfare.

To reduce environmental and health impacts of diets, especially high-income countries need to reduce their consumption of animal source foods (UN & DESA, 2021). The decision to select a German company for this case study is based on the fact that it is not only a high-income country but also one of the largest markets in Europe for meat substitutes (Vegconomist, 2020). Rügenwalder Mühle is the market leader in the German market for meat alternatives (Jahberg, 2021). The meat substitute industry is a rapidly growing market bearing chances for high returns (Destatis, 2021).

Today's food supply chains are long and complex including many actors having production or distribution roles (Astill et al., 2019; GS1, 2017). As Trienekens et al., (2012) stated "a supply chain is as strong as its weakest member" (p.56). This denotes that all members are responsible for the quality and safety of a product. An incident at one point in the chain can affect the whole chain. As ensuring products' quality and safety is particularly important in the food industry, the processes along the supply chain should be coordinated and transparent

(Aung & Chang, 2014; Trienekens et al., 2012). In a transparent supply chain, information about products and processes are shared along the chain. They can be made accessible only for actors within the chain or for the public including stakeholders like consumers (GS1, 2017).

Consumers increasingly care about safety and sustainability when making consumption choices (Astill et al., 2019; Nilius, 2021). Companies can respond to this changing demand by increasing sustainability by decreasing environmental and social impacts of their products and processes and revealing a product's history and ecological footprint to customers (Wognum et al., 2011). To assess a product's impact, companies must monitor all stages of the supply chain (Garnett, 2011). Making supply chains transparent to customers enables them to make more informed buying decisions and trust brands (FSA, 2002). In case of any incident, products can be recalled from the market more easily and cost-efficiently (Trienekens et al., 2012). Furthermore, detailed information can help companies to identify opportunities for improvements like process efficiency. Unnecessary intermediaries can be eliminated (Bateman & Bonanni, 2019). Emerging technologies like blockchain enable new opportunities for traceability and thus transparency (FAO, 2021).

Eventually, supply chain transparency can help companies to gain competitive advantage (Blaha & Katafono, 2020).

This pedagogic case study is about a traditional German family-owned company offering meat substitutes and its endeavor to install a new supply chain structure linking all areas. It was designed to allow students to apply fundamental frameworks from strategic management theory to a real-life company. Students are provided with a detailed description of the company and the case and a comprehensive literature review on supply chain transparency.

The next chapter presents the case of Rügenwalder Mühle including information about the company and the market of meat substitutes. It finishes with the questions to be discussed. Chapter 3 describes the methodology of the pedagogic case study including how data were compiled. The following pedagogic note identifies the target group of the case study and the corresponding objectives. The literature review in Chapter 5 dives into the theory of food supply chain transparency and the strategic frameworks that are supposed to be used. Finally, the thesis concludes with a proposal for a lecture plan and a solution proposal for the questions, followed by a conclusion.

2 Case

2.1 Problem Identification

This pedagogical case study focuses on the supply chain transparency for plant-based meat substitutes of Rügenwalder Mühle, a family-owned traditional German sausage company. The production and consumption of plant-based alternatives to meat is seen as eco-friendly. However, without having adequate information about the whole supply chain, this can't be automatically assumed. Analyzing the case will allow to understand internal and external factors that might support or hinder making the supply chain more transparent and drivers for the endeavor can be investigated.

2.2 Emerge of meat substitutes

We are living in a world facing tremendous environmental challenges like the loss of biodiversity and climate change (Skiba et al., 2020; Wan Mahari et al., 2020). To overcome these, we need to change our way of living in several aspects. One field we have to tackle and change is our diet (Garnett, 2011; Tilman & Clark, 2014). Especially as the world population continues to grow and gets wealthier, which leads to higher demand for food (FAO, 2020; Springmann et al., 2016), a dietary transition is one of the biggest challenges of our days (Tilman & Clark, 2014). According to the Food and Agriculture Organization of the United Nations (FAO), two-third of all agricultural land areas in the world are meadows and pastures, i.e., used for livestock production (FAO, 2020). Other sources state even higher percentages (Greenpeace European Unit, 2019; Xu et al., 2021). Most food-related emissions are caused by the consumption of animal products. Meat causes higher GHG emissions, deforestation, and land use than vegetarian alternatives (Poore & Nemecek, 2018; Sandström et al., 2018; Tilman & Clark, 2014). To reduce the environmental impacts of diets, it is therefore inescapable to decrease the consumption of meat and replace it by alternatives (Sandström et al., 2018; Springmann et al., 2018). In Europe, the average consumption of meat per capita is twice as high as the global average (Greenpeace European Unit, 2019). Consequently, particularly in high-income countries like Germany, a major decrease in meat consumption is needed (UN & DESA, 2021). However, meat consumption does not only have a high impact on the environment and climate but is also a threat to human health (Garnett, 2011; Greenpeace European Unit, 2019; Springmann et al., 2016; Springmann et al., 2018; Tilman & Clark, 2014). High meat consumption is a risk factor contributing to chronic and infectious diseases, obesity, colorectal

cancer, cardiovascular diseases, strokes, and early mortality (Godfray et al., 2018; Springmann et al., 2016; UN/DESA, 2021; Westhoek et al., 2014). A plant-based diet is healthier for human bodies (Springmann et al., 2018). Furthermore, meat production harms animals.

2.3 Market for meat substitutes

A report published by the German Federal Ministry of Food and Agriculture (BMEL) in 2021, informing about the dietary habits of Germans, showed that meat consumption in Germany is declining. At the same time, the market for meat substitutes in Germany is booming and production is increasing tremendously (Destatis, 2021). Experts see high annual growth rates for plant-based alternatives worldwide in the coming years (Wunder, 2021).

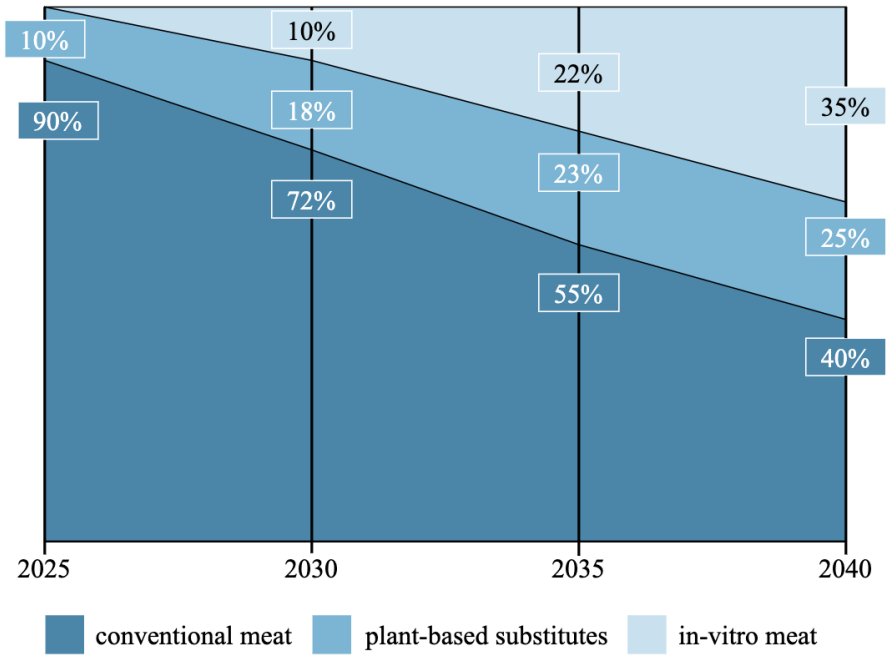

Figure 2.1: Global market trends for meat and meat replacements
Adapted from Wunder (2021).

Meat substitutes (or alternatives; replacements) are products imitating attributes like taste, texture, and smell of meat. They often have the same function in a meal and nutrition characteristics like high protein (Rödl, 2018). Besides plant-based alternatives, there is in-vitro meat, which is produced from animal stem cells in vitro without animal slaughtering, and products with insects as the main ingredient on the market (Bryant & Barnett, 2019; Jetzke et al., 2020; Welin et al., 2012). 30% of the people asked for the BMEL report said they buy substitute products regularly. Especially the younger generations are interested in the offer.

Almost half of the people within the age bracket of 14-29 put the products regularly in their cart, in the age bracket of 30-44, it's 38%. 17% of the 14–29-year-olds stated that they eat those alternatives at least once a day. In 2021, it was only 7% (BMEL, 2021). Besides curiosity, people who buy alternatives name animal welfare, taste, health, and environment and climate as major factors for consumption. The bigger the city they live in, the more people buy the substitute products regularly. There is also a positive correlation between education and open-mindedness towards meat replacement products (Wunder, 2021). However, only 10% of Germans are vegetarian (BMEL, 2021). The most important customer segment for meat substitutes is the mass market of the so-called flexitarian, people who live mostly vegetarian but eat meat occasionally (Jetzke et al., 2020). Not only the amount, but also the variety of alternative products for meat is increasing (BMEL, 2021). Taste and texture have been improved over the years and new ingredients other than seitan and tofu entered the market (Wunder, 2021).

2.4 Major Players

Currently, a large number of start-ups are entering the market, but also big meat manufacturers invest at a progressive rate in companies that offer substitutes or launch their own vegetarian meat replacements (Wunder, 2021). An overview of the most common substitute brands available in supermarkets in Germany is shown in Annex A. Some of the brands listed have further products in their portfolio, but as they are no meat replacements, they are not included in the table (for example falafel). All product names referring to meat just refer to what classic meat product they replace. However, they are all vegetarian.

There are three kinds of companies in the meat substitute market in Germany: Startups and small to medium producers, big meat companies and conventional big enterprises, and store brands of supermarket chains. The latter are not included in the table in Annex A as those are considered as no-name products with a different organizational structure and target group of customers.

2.5 Rügenwalder Mühle

2.5.1 History

Rügenwalder Mühle is a family enterprise having its roots back in 1834, when Carl Müller opened a small butcher's shop in Rügenwalde, a town in Pommern at the Baltic Sea that

belongs to Poland nowadays and was renamed to Darłowo. Mühle is the German word for mill, and it originates from the founder's surname 'Müller'. Carl's wife Alwine designed the first logo, a mill with two sausages crossing in the middle. As a town at the port Rügenwalde became popular for its butcher's shops. During World War 2, they had to produce canned products for the navy and the army. However, when the Red Army approached the area in spring 1945, the fourth generation of the company fled and found a new home in Westerstede in Lower Saxony where they opened a new butcher's shop. Many employees also fled to Lower Saxony and helped rebuilding the company. In the fifth generation in the fifties, Kurt Rauffus, related by marriage, became the manager of the company, the first one that was not a meatman. The business became a medium-sized company and one of the region's biggest employers. In 1956 they moved to Bad Zwischenahn where it became a modern industrial meat factory. Products were sold in department stores and other specialty shops, but mostly in the 27 own butcher shops. However, with the increasing emerge of supermarkets, the owned butcher shops became economically unvaluable and shut down. In the mid-nineties Kurt's son Christian overtook the management and under his direction Rügenwalder Mühle became one of the biggest food brands in Germany (Billstein, 2017; Rügenwalder Mühle, n.d.f).

In 2018, the company was convicted to a fine of several million € due to forbidden price-rigging with other players in the industry between 2006 and 2009 (Handelsblatt, 2018).

Michael Hähnel became the first CEO of the enterprise not descending from the family in 2020. However, Christian's son Gunnar Rauffus is the chairman of the supervisory board, which Christian Rauffus is also part of. Thus, the Rügenwalder Mühle Carl Müller GmbH & Co. KG, remains in family ownership and is today a 187 years-old enterprise in the seventh generation (Billstein, 2017; Rügenwalder Mühle, n.d.h; Rügenwalder Mühle, n.d.c). In 2020, the company reached a total net return of 233.7 million Euro with its 772 employees (Rügenwalder Mühle, 2021b).

2.5.2 Products

The specialty goods of the first butcher's shop were liverwurst, goose breast and Teewurst. The latter made the company well-known and big in Lower Saxony. Tee means tea in German. The name derives from the habit to consume it at teatime with tea. In 2014 in its sixth generation, Rügenwalder Mühle introduced its first meat substitutes. All the products, besides two vegetarian snacks as indicated in Figure 2.3, are refrigerated. For hotel business, gastronomy, and communal feeding the company sells the vegan schnitzel, cordon bleu, nuggets and rissoles

in frozen big packs. Private customers in Germany can buy the products in discounter markets (e.g., Penny) and classical supermarkets (e.g., Rewe).

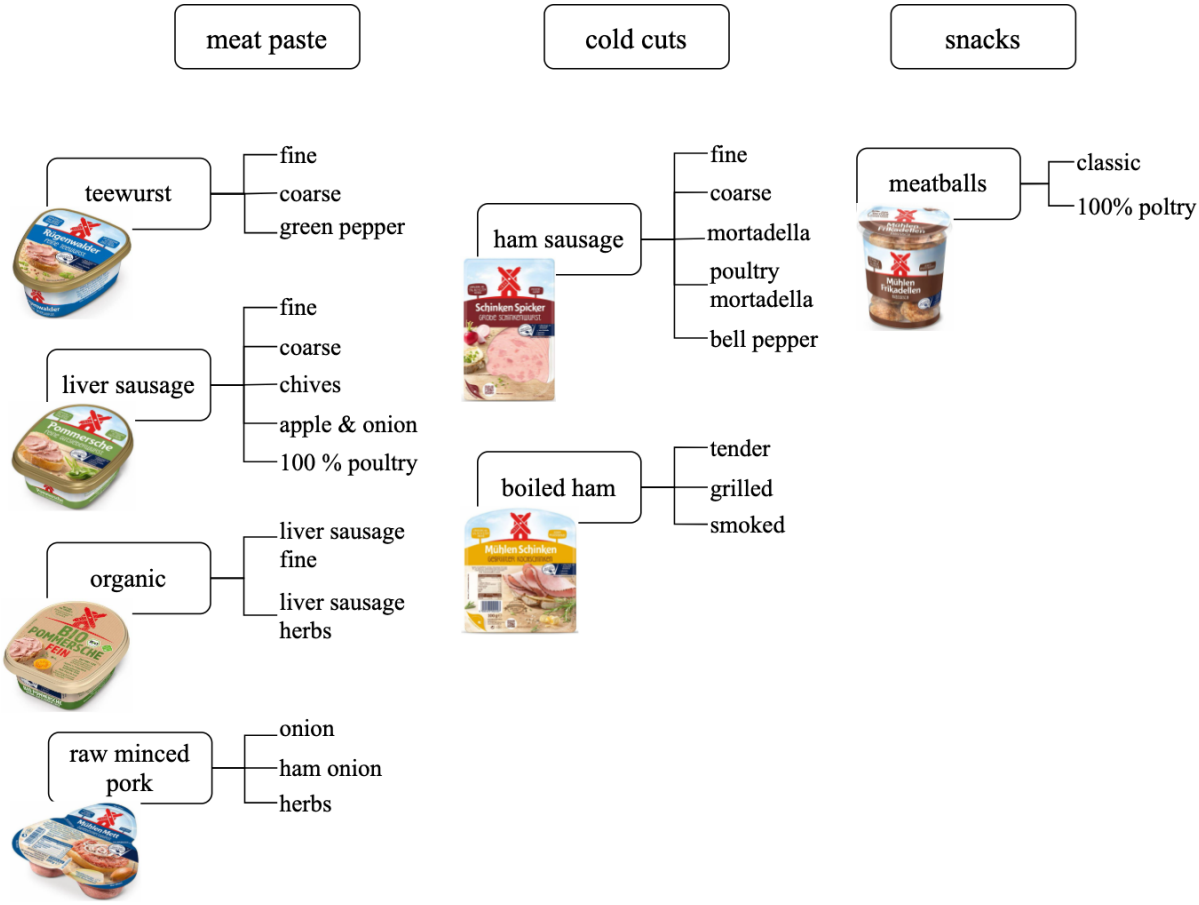

Figure 2.2: Rügenwalder Mühle products with meat
Information derived from Rügenwalder Mühle (n.d.d).

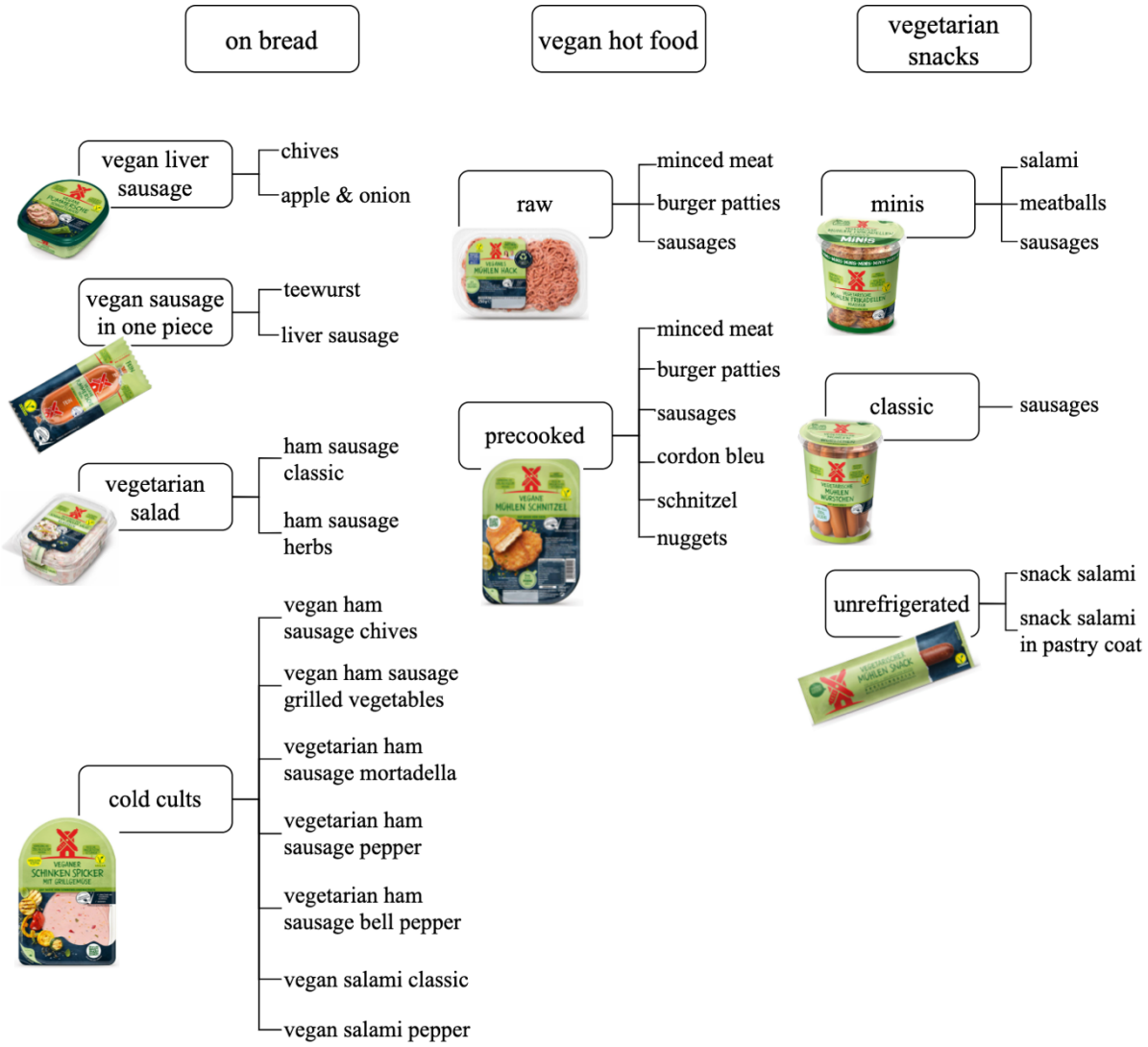

Figure 2.3: Rügenwalder Mühle vegetarian and vegan products
Adapted from Rügenwalder Mühle (n.d.e).

To inform customers about the products, there are different recognized standardized labels on the packaging, for example information about absence of genetic engineering. Some products also inform about the percentage of recycled materials in the packaging. Furthermore, they inform that they are producing using only renewable energy (Rügenwalder Mühle, 2021b).

2.5.3 Plant-based meat substitutes

End of 2014, Rügenwalder Mühle introduced their first meat replacements to the market. They started with three kinds of cold cuts, vegetarian ham sausages. The company's mission, as stated on its website, is to offer alternatives without meat that also taste good for sausage enthusiasts (Rügenwalder Mühle, n.d.a). Due to manufacturing manager Heiko Röder, all

vegetarian and vegan products are produced with the same kind of machines that are used for the meat production. Only the ingredients are different (Billstein, 2017). Most of the products are nowadays produced in a new area at the headquarter in Bad Zwischenahn that is strictly separated from the meat production. Additionally, they cooperate with partner firms for production (Rügenwalder Mühle, n.d.h). As shown in chapter 2.5.2, today they have way more vegetarian and vegan products than ones with meat. In July 2020, for the first time the return with the plant-based substitutes was higher than the one generated with meat products (Jahberg, 2021). In the Reader's Digest study "Trusted Brands 2021", which is an unsupported representative poll, i.e., not giving answer options, Rügenwalder Mühle ranked first in the category vegan/vegetarian products (Reader's Digest, 2021).

As Michael Hähnel says, after the "Greta -Effect", which is a reference to the Fridays for Future initiative and increasing consciousness about sustainability and environmental care, the company now benefits from the "Corona-Effect", as people want to change to a healthier diet during the pandemic. To meet the high demand for their plant-based products, the company even had to outsource the production of a meat product temporary (Terpitz, 2021). In 2014, the company invested its whole marketing budget in the plant-based products (Billstein, 2017).

2.5.4 Sustainability

In 2020, Rügenwalder Mühle published its first 66-page long sustainability report. The company's CEO Michael Hähnel states that the company wants to minimize negative effects on human, animals, and the environment, and therefore deals with the subject which relevance their resources and production have (Rügenwalder Mühle, 2021b). As their most important stakeholders the company names suppliers, NGOs & media, politics, customers, trading, owners and supervisory board, managers & employees. They conducted an opinion survey asking what is important to them and how the company could improve (Rügenwalder Mühle, 2021b). Combing their answers with the company's own view resulted in the following matrix:

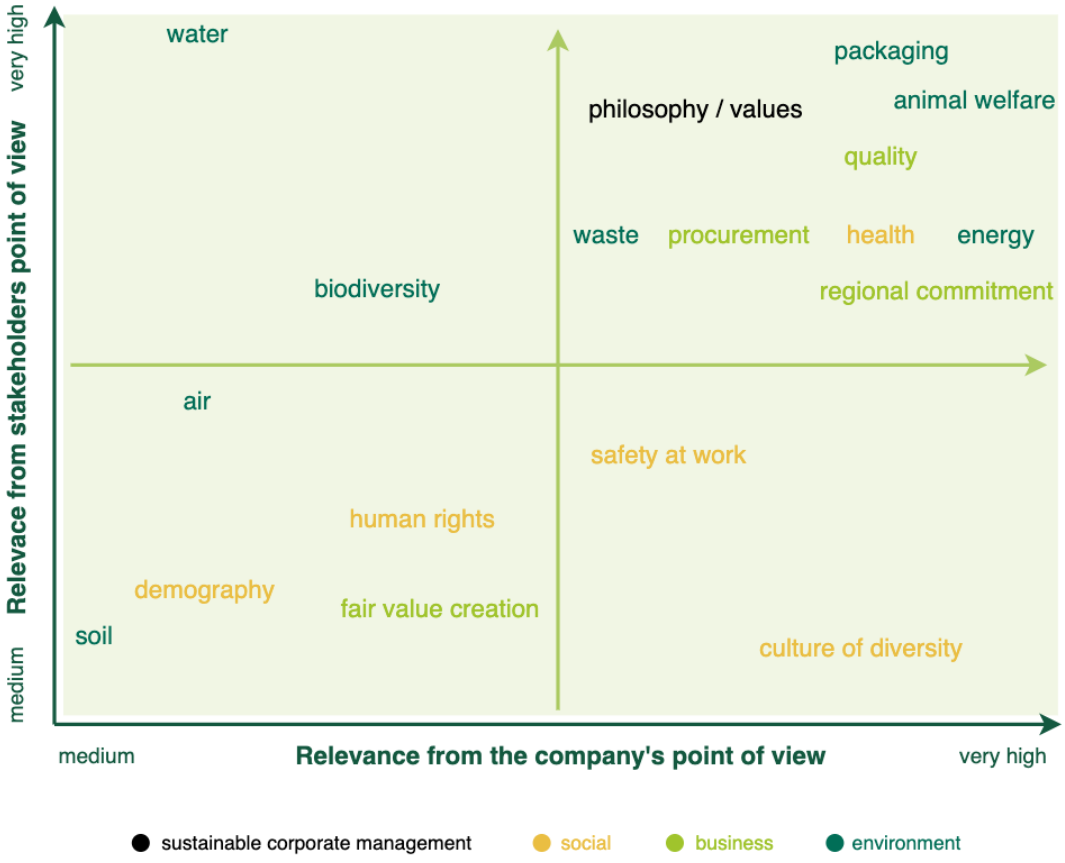

Figure 2.4: Rügenwalder Mühle's sustainability topics
Adapted from Rügenwalder Mühle (2021b).

Annex B shows a translated presentation of the company's sustainability strategy at a glance as it is presented in the company's sustainability report. The topics included there are retrieved from the analysis of the matrix above.

The matrix shows that packaging is a hot topic. Plastic is the most appropriate packaging material for the company's products ensuring its safety and quality. Being aware on its effects on the environment the company continuously tries to minimize the material use for example by thinning the plastic containers the products are packed in. They are using mono materials as much as possible as they are completely recyclable, and they also use material that is already recycled. To upcycle used snack packaging the company designed banderoles customers can download on the website to use the packaging for example as pencil storage (Rügenwalder Mühle, 2021b).

The company's ambition is to reach climate-neutral production until 2025 (Rügenwalder Mühle, 2021b). Since 2016, they only use renewable energy in its production (Rügenwalder Mühle, 2021b). To expedite electromobility, there are several battery charging stations on the

premises. There are also two electric cars employees can use for business rides and they can also lease electric bikes with special conditions (Rügenwalder Mühle, 2021b).

Rügenwalder Mühle continuously works on the conversion from the vegetarian products to becoming vegan. The related operative sustainability goal is to increase the percentage of vegan products within the division of plant-based substitutes to 65%.
With the expansion of the plant-based meat alternatives the company wants to contribute to the following Sustainable Development Goals (Rügenwalder Mühle, 2021b).

- Nr. 2: Zero Hunger. As animal feed becomes redundant, less natural resources like water and land are needed.
- Nr. 12: Responsible Consumption and Production. The substitutes make it easier for people to change their diet without having to give up the taste of meat.
- Nr. 13: Climate Action. A comparison of the ecological footprint of products showed that plant-based food reduced greenhouse gas emissions.

Furthermore, the company wants to increase the percentage of raw materials originating from Germany. Hence, another operative goal is that 80% of plant protein should originate from Europe until the end of 2022 (Rügenwalder Mühle, 2021b). One of the 6 sustainability guiding principles is taking responsibility for the supply chains (Rügenwalder Mühle, n.d.b).

2.5.5 Supply Chain

The main ingredients of the company's whole product range are pork, poultry, egg white, and plant-based proteins like soy, wheat, and peas (Rügenwalder Mühle, 2021b). Nowadays, Rügenwalder Mühle itself doesn't slaughter anymore and procures its pork and poultry already hashed from eight vendors with whom they cooperate for several years already. Poultry is sourced from only 3 German suppliers while pork comes from Germany and Denmark. The family business stipulates its vendors which parts of meat should be delivered and specifies quality requirements. (Rügenwalder Mühle, n.d.g; Rügenwalder Mühle, 2021b). About 300 tones of meat are processed each week in the factory in Bad Zwischenahn (Rügenwalder Mühle, n.d.g).

The company's supply chains for plant-based products are way longer and complex than the ones for meat products. Rügenwalder Mühle sources as many raw materials from local suppliers as possible. 80% of the suppliers are based in Germany, and a third of them from Lower Saxony. Wheat, peas, and rapeseed oil are procured from German suppliers only.

However, this does not automatically mean that the products were grown in Germany. Eggs are procured from free range from Germany and the Netherlands. In 2020, 50% of the soy used for production was sourced from suppliers in Europe, the other half originated from northern America. To shorten supply chains and decrease the carbon footprint, the company currently tests growing soy on fields in Germany. Parallelly, they conduct research to find out if local plants like lupines and field beans can be used as protein sources. (Rügenwalder Mühle, 2021b).

However, for the plant-based products, the company procures many raw materials that are already processed like mixed spices and vegetable protein. Especially for spices the company sees limited options to fully understand the supply chains. The cultivation of spices in particular is characterized by smallholder structures in emerging and developing countries. Therefore, traceability often ends with a trader in the country of origin who sources the goods from many small farmers (Rügenwalder Mühle, 2021b). Supermarket trade chains all over the country are supplied with the company's products by big haulers (Billstein, 2017).

An analysis of the product eco-balance conducted on behalf of Rügenwalder examining the product's whole history, i.e., raw material production, production, distribution, purchase and consumption, disposal, and recycling showed that the biggest environmental impact, no matter if the product is meat, vegetarian, or vegan, lies in the beginning of the supply chain, i.e., the provisioning of the raw materials. The company inferred that in order to reach their goal of a further reduced ecological footprint, they have to ally with their suppliers to work together on improvements. Nevertheless, the carbon footprint of the meat product is more than twice as high as from the vegan product (Rügenwalder Mühle, 2021b).

Rügenwalder Mühle is QS certified. The QS certification mark is a control system for food safety and quality assurance. Every part in the supply chain, from farmer or grower to the butcher, must follow strict hygiene and documentation rules. With every transfer to another actor in the chain, a shipping document must be handed over. It informs for example about usage of pesticides during crop growing or provender being fed to the animals. This way, every single step, i.e., the product's whole history in the supply chain is documented, and every actor in the chain must ensure that a product's history can be traced back at any moment in time. The final supermarket stores the documents so in case of any incident, the products can be traced back to their origin. The certification institute regularly audits for example animal feed, soil conditions, temperature and working conditions. An independent veterinarian checks the animal care (QS, n.d.). This standard is the minimum all vendors of the company must at least fulfill (Rügenwalder Mühle, 2021b).

In 2020, Rügenwalder Mühle set up a code of conduct all suppliers must comply with. International standards and regulations build the foundation, including

- Universal Declaration of Human Rights by the United Nations
- Fundamental conventions by the International Labour Organization (ILO)
- The Base Code of the Ethical Trade Initiative (ETI)
- Principles of the code of conduct of the Amfori Business Social Compliance Initiative (amfori BSCI).

The code of conduct is also guided by the UN Sustainable Development Goals (SDGs) (Rügenwalder Mühle, n.d.b; Rügenwalder Mühle, 2021b).

Compared to 2019, the company's net sales increased by 22% in 2020. The sales revenue of the plant-based products increased even by almost 73% while the growth of the market of meat substitutes in Germany grew by 65%. For 2021, the company expects a further increasing demand, especially for the plant-based product segment. The surge is a great success for the company but also a challenge. Already in 2019, the company invested 15 million € to build a new factory for plant-based products at their head office in Bad Zwischenahn (Rügenwalder Mühle, 2020). In 2020, they invested more than 10 million € in the expansion of its production and storage capacities in Bad Zwischenahn (Rügenwalder Mühle, 2021a). Additionally, they are looking for further locations within a radius of 200 km from the headquarter (Lenders, 2021). Acquisitions of sites or strategic cooperation are also a possibility for the company (Lenders, 2020).

In summer this year, the company announced to implement a new supply chain management structure with the goal to link all areas involved in the supply chain and optimize the corresponding processes (Rügenwalder Mühle, 2021c). This should ensure optimal mapping of the delivery capacity against the background of further planned growth. For this undertaking, the family business got support from the consulting company Höveler Holzman over a period of seven weeks. The consulting company is specialized on supply chain and procurement management (Höveler Holzman Consulting, n.d.; Höveler Holzman Consulting, 2021).

As the market for plant-based meat substitutes booms, Rügenwalder Mühle's CEO Michael Hähnel fears that all plant-based proteins, which are raw materials for the industry, will become scarce in the upcoming years. As all brands access the same markets, all producers could face supply problems. In an interview Hähnel gave the Berlin daily newspaper Der Tagesspiegel this summer, he explains the company wants to learn how to grow its own raw

materials like soy, as the scarce of the raw materials will lead to higher prices in the market. However, as the company cares about the origin of the materials, they have long-term contracts with their suppliers he says (Jahberg, 2021).

2.6 Case Questions

Q1: Which reasons might have supported the company's decision to implement a new supply chain structure making the processes transparent?

Q2: Analyze which internal strengths and weaknesses and which external opportunities and challenges the company might face approaching supply chain transparency for its plant-based products using the SWOT framework.

Q3: Holding 40% of the market of plant-bases meat substitutes, the company is market leader in Germany. Identify resources and evaluate their capability for sustainable competitive advantage using the VRIO framework.

3 Methodology

As a multidisciplinary student-centered teaching technique (Schwartz, 2014), case studies have been used in several academic disciplines. They typically describe a situation to establish the context for a problem (Bonwell & Eison, 1991), where theoretical concepts can be applied (Davis & Wilcock, 2003). Case studies follow a problem-based instructional approach situating learning in an expedient task (Hmelo-Silver, 2004). According to Hammond (2002), the case study method is "a focused form of learning by doing" (p. 2).

As case studies are a strategy to encourage and promote active learning (Bonwell & Eison, 1991; Davis & Wilcock, 2003), their implementation in education does not only amplify course content but also imparts students with several diverse key skills (Davis & Wilcock, 2003). Case studies can hone students' analytical and problem-solving skills and improve their ability of critical thinking and reflective learning (Bonwell & Eison, 1991; Daly, 2002; Davis & Wilcock, 2003; Hammond, 2002; Schwartz, 2014). The analysis of case studies fosters students' information literacy as it requires research and evaluation of data sources (Schwartz, 2014). Students learn how to gather information (Davis & Wilcock, 2003) and how to organize, condense and analyze them (Daly, 2002; Davis & Wilcock, 2003). Professional skills like the self-contained organization of work in a given time frame can be developed (Schwartz, 2014). The results of case studies are often not only documented in a written report but also presented in an oral presentation in class. Thus, students can train their presentation skills (Davis & Wilcock, 2003). This is a skill employers often highly appreciate.

Doing case studies in groups can add to the learning experience (ibid.). As an interactive technique, they can be used to trigger discussions (Bonwell & Eison, 1991). Students can develop or train interpersonal skills like communication, and their ability to present their perspective while at the same time listening to others (Bonwell & Eison, 1991; Davis & Wilcock, 2003; Schwartz. 2014). Proficiency of collaborative working within teams can be increased as well as managerial skills like moderating meetings and presenting results (Daly, 2002). Although case studies can be done individually, it is highly beneficial to perform them in group work.

Case studies encourage students to discuss real-life situations companies might have faced and students might face in their professional future. Students can recognize that many organizations and managers face similar problems (Hammond, 2002). Working through complex real-life issues and having the opportunity to apply what they learned demonstrates students that the teaching content is not just for the sake of it (Davis & Wilcock, 2003). It helps

bridging the gap between theory and practice and engages students with the subject matter (Bonwell & Eison, 1991; Davis & Wilcock, 2003; Schwartz, 2014). Business skills cannot be acquired by only reading books and studying theory. The knowledge can be valuable but practicing the analysis of business situations prepares for professional life (Hammond, 2002).

A big advantage of case studies is that they are often highly motivational for students (Hoover, 1980 as cited in Bonwell & Eison, 1991). They can capture students' interest and enjoyment of subjects and thereby increase their desire to learn (Davis & Wilcock, 2003). The affective involvement can lead to a change in students' attitudes (Bonwell & Eison, 1991).

Case studies are also a great method to give students suffering from exam nerves the chance to prove their skills and knowledge in a less formal and time-constrained setting (Davis & Wilcock, 2003). This method does also represent professional challenges after university more accurately, where no one would have to answer right or wrong questions in an exam. However, as students have different preferences and strengths, a balance in teaching and learning styles ensures fairness (Davis & Wilcock, 2003). There is usually not one right answer in case studies. Different groups or individuals can come up with various viable ideas (Hammond, 2002; Hmelo-Silver, 2004). This also represents situations in professional life, as business is not an exact science with one demonstrably right answer (Hammond, 2002).

However, this makes the assessment of case studies more challenging for lecturers compared to traditional written tests. One aspect that should be considered in the evaluation is the rigor and conclusiveness of the proposed answers. Students should prove their ability to reason rigorously and be able to justify their results and defend their analyses and arguments (Hammond, 2002). It should be ensured everyone understood every part to make the most out of the study. This can be done by individual questions after the presentation or additional individual written reviews on the case study.

In the case of group work, lecturers can ask students to rate their team members' collaboration skills anonymously. This rating can then be individually included in the evaluation of the group work. Involving an assistant or second lecturer in the assessment who does not know the students is beneficial as the person can provide a more objective view on the results being less biased.

Group sessions piloted by the lecturer can help to tackle the issue of uneven workload between group members as the lecturer can identify individual roles and contributions (Davis & Wilcock, 2003).

Case studies are a type of teaching and learning different from the classic head-on method. This diversification can be a joy not only for students but also for lecturers (Davis & Wilcock, 2003).

As many students are used to right or wrong tests, they might feel unconfident with case studies when they never faced one before. Sometimes, they do not really know what is expected from them (Davis & Wilcock, 2003). It is therefore helpful for students to get a well-rated former solution report of another case study from the lecturer. This way they can estimate what the lecturer expects in terms of extent, depth, and, if applicable, level of independent research. The level of guidance and supervision by the lecturer during the case study should be suited to the stage of studies of the students.

The present case study was developed by the author from scratch. The first step in the development of this study was the identification of a relevant topic: supply chain transparency. Secondly, a company the topic is currently pertinent for was defined. The company was chosen due to its position as the market leader in the industry of plant-based meat alternatives in Germany (Jahberg, 2021). Thus, its development can be seen as a best practice. Another important reason for the decision is that they are currently restructuring their supply chain. Although they do not communicate any details about the restructuring process, establishing supply chain transparency is nearby and may depict a current real-life situation. The case is eligible to apply frameworks from management theory and to allow students to focus in-depth on contemporary managerial topics in a real-world, holistic context (Yin, 2017).

The information used for this case study was derived from secondary data sources. For the literature review and the methodology description, peer-reviewed, scientific journal articles and public organizations' publications were collected, relevant content was identified and compiled, analyzed, and contextualized. For the development and description of the case, the company's website and news articles were the main sources for information to illustrate the situation. The attempt to obtain more detailed information on the restructuring of the supply chain from the company was unfortunately unsuccessful.

4 Pedagogic Note

4.1 Target Audience

This case study was designed for students in the management field, both bachelor and master programs. It is especially useful in strategy, (international) management, sustainability management, and supply chain management courses. It can be solved either individually or in group work. Group work is recommended though as it comes with several additional benefits described in the methodology chapter. It suits well to take home and can either be used just for students' training or as a take-home exam. Otherwise, the case can also be discussed in class or handed out with the suggested solution.

The document could also be used by the company for employee training.

4.2 Objectives

Depicting a real situation, this case study enables students to apply and train their knowledge and transfer it to practice. The SWOT and VRIO frameworks and theory concepts can be solidified by analyzing a real company's situation. Analytical thinking and a problem-solving oriented approach are fostered. Students' confidence in their skills and their ability to apply the knowledge gained in university in a job one day is supported. After analyzing the case, students starting to work at companies that are also confronted with restructuring supply chains and the challenge to make them more transparent can draw on experience, knowledge, and skills gained during this case study. Students can train job-relevant skills like time management and self-organized work. When solved in groups, the learning outcome includes interpersonal skills like the ability to participate in open, constructive, divergent-thinking discussions and brainstorming sessions within a team. Furthermore, by presenting the solutions students can train and get more comfortable with presenting in front of an audience.

By studying this case, students gain an insight and gather knowledge in two areas in particular:

- The growing market of meat substitutes. This might be especially inspiring for students from Portugal or other countries to develop this industry further.
- The economically and socially relevant issue of supply chain transparency that will be further evolved with further developed technologies in the future.

5 Literature Review

5.1 The Food Supply Chain

A supply chain is a network of actors that carry out all the processes necessary to obtain the desired final product and bring it to the final consumer (Maloni & Brown, 2006; Opara, 2003; Trienekens et al., 2012; Wunderlich & Smoller, 2019). Every actor represents a link in the chain (Opara, 2003). Processes in the chain can operate either parallel or sequentially (Trienekens et al., 2012). There are different movements in the chain: physical, financial, and informational (Abeyratne & Monfared, 2016). A simplified model of a food supply chain representing its actors and their main activities (FAO, 2017; Maloni & Brown, 2006; Pizzuti & Mirabelli, 2015; Wognum et al., 2011) is shown in Figure 5.1.

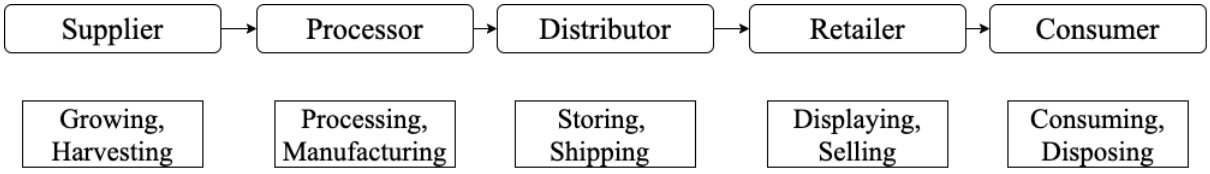

Figure 5.1: Simple representation of a food supply chain

Today's food supply chains are often complex and long. Due to globalization, supply chains transcend several national borders and actors operate under anonymous conditions. Responsibility is diffused among a multitude of actors while one supply chain intersects with several other supply chains. (Astill et al., 2019; Davis et al., 2021; Opara, 2003; Kumar Mangla et al., 2021; Tian, 2017). Especially in case of processed food, it is common that there are numerous actors and activities, like different suppliers of raw and processed materials, intermediaries, brokers, wholesalers, packaging plants, freight carriers, and logistic providers (Bateman et al., 2017; Maloni & Brown, 2006; Tian, 2017; Vermeulen et al., 2012).

Food supply chains handling and processing foodstuff have specific characteristics differentiating them from other supply chains. Most food products have a limited lifetime and thus the product quality and safety are continuously rapidly declining. Interruptions in the cold chain can lead to severe safety issues and cause foodborne illness. As every single step in the supply chain can impair the quality and safety of the final product, all actors and processes involved in the flow must fulfill strict requirements and standards (Aung & Chang, 2014; Kumar Mangla et al., 2021; Mahajan et al., 2014; Manzini & Accorsi, 2013).

Supply chain management is the coordination and integrated planning and control of the entire flow along the supply chain including products, money, and information (Mentzer et al., 2001; Opara, 2003; Stadtler & Kilger, 2008). As all actors and processes are linked, having access to all relevant information to coordinate the activities is crucial (Manzini & Accorsi, 2013).

5.2 Supply Chain Transparency

Transparency in food supply chains can be defined as the revealing and communication of product-related information, for instance, information regarding the production processes, the raw materials, environmental impact, or labor circumstances (Hofstede, 2003; Mol, 2015; Schmutz et al., 2017). That information is supposed to be timely, relevant, accurate, and accessible (Wognum et al., 2011). It can be communicated internally, meaning within the supply chain, and externally, meaning to parties outside the chain, like customers and the public (Bateman & Bonanni, 2019; Carter & Rogers, 2008).

There are different instruments to reveal transparency to customers: product labels are supposed to guarantee some defined standards, for example, regarding the quality, environmental friendliness, or social sustainability. Companies can use labels to distinguish their own products from other ones (Golan et al., 2001; Wognum et al., 2011). Some organizations publish corporate reports that can be addressed to different stakeholders. Transparency can also be provided by social organizations, public authorities, and journalists (Kalfagianni, 2006; OECD, 2001).

Bateman & Bonanni (2019) suggest two dimensions to measure supply chain transparency as depicted in Figure 5.2: on the one hand the supply chain scope, which describes the visibility, namely information about the movement of the product along the chain. The other aspect considered are milestones on the way to transparency.

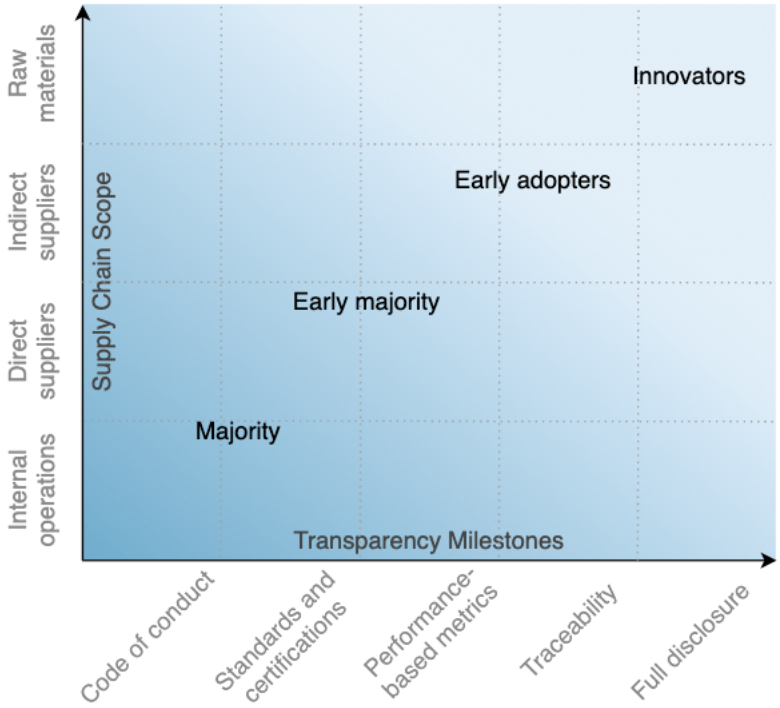

Figure 5.2: Dimensions of transparency
Adapted from Bateman & Bonanni (2019).

Within a supply chain, some information like master data can be gathered without, but for transactional data providing more detailed and dynamic information, it is necessary to establish a traceability system (GS1, 2017). In this case, traceability sets the framework for transparency (Blaha & Katafono, 2020). Traceability promotes and increases the transparency of supply chains (Aung & Chang, 2014; Opara, 2003; Pizzuti & Mirabelli, 2015).

5.3 Traceability

In the literature, various definitions of traceability can be found (e.g., Bosona & Gebresenbet, 2013; Moe 1998; Olsen & Borit, 2013; Opara & Mazaud, 2001; Wilson & Clarke, 1998). For this thesis, two definitions from international organizations will be considered as they serve as internationally accepted standards. According to ISO, the International Organization for Standardization, traceability is the “ability to trace the history, application or location of an object” (ISO, 2015, def. 3.6.13). However, this definition relates to generic traceability, not specified for the food industry. The Codex Alimentarius Commission is a joint committee from the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) describing international food standards. In its Procedural Manual,

traceability is defined as “the ability to follow the movement of a food through specified stage(s) of production, processing and distribution” (FAO & WHO, 2019, p. 26). This definition is also adapted in ISO 22005:2007, which provides standards for the design and implementation of traceability systems for food (ISO, 2007, def. 3.6).

Detailed traceability can provide a wide variety of information about a product and process history that led to a final product (Aung & Chang, 2014; Bertolini et al., 2006; Blaha & Katafono, 2020; Karlsen et al., 2010). Within a traceability system, two types of traceability can be distinguished, depending on the direction in which information is recalled. Tracking, also referred to as forward traceability, is a top-down approach and enables the identification of the current location and status of a traceable item, as it relates to following it in real-time forward, downstream, moving between actors in the chain. Tracing on the other hand, also referred to as backward traceability, is a bottom-up approach and refers to reconstructing the path of a product in the supply chain in retrospect. It is the ability to identify the origin or history of a traceable item (Bosona & Gebresenbet, 2013; FAO, 2017; Kelepouris et al., 2007; Pizzuti & Mirabelli, 2015; Schwägele, 2005). Figure 5.3 illustrates the two directions of traceability in the food supply chain. Traceability can be established in a whole supply chain or just in some parts of it (Blaha & Katafono, 2020). A proper traceability system needs to enable both directions (Kelepouris et al., 2007; Thakur & Hurburgh, 2009). However, in the literature, traceability often refers to both directions.

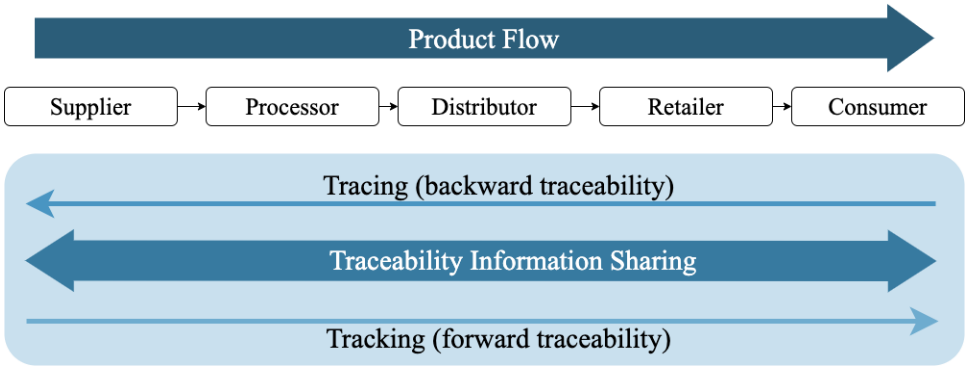

Figure 5.3: Conceptual representation of tracing and tracking
Adapted from Bosona & Gebresenbet (2013).

A distinction can further be made between internal and external traceability. Internal traceability refers to the traceability within one link or actor (e.g., producer) in the chain. It reveals the path of an item within that company and is important to link incoming components

like raw materials to outgoing components or products (e.g., potatoes coming in and chips going out). Figure 5.4 below shows the generation of traceability data within one company.

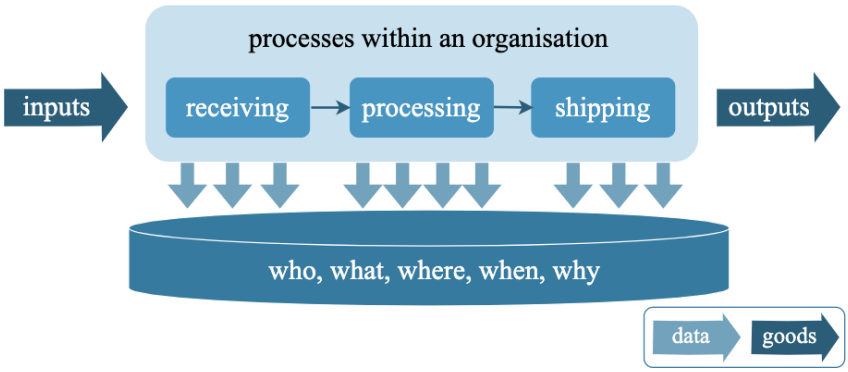

Figure 5.4: Generation of traceability data within a single company
Adapted from GS1 (2017).

External traceability is the traceability between different links, i.e., parties of the chain (e.g., farmer and processor). Therefore, each company in the chain must generate and record data as depicted in Figure 5.4. Those data must then be made accessible to other players in the chain. There are different models for doing so differing in the way data is stored and made available to others. Companies can make just some of their data accessible to other stakeholders and keep sensitive data within the own system (GS1, 2017).

In their framework of a Global Track and Trace Informative System, Pizzuti & Mirabelli (2015) highlight four stages of the supply chain, where data recording is essential: when (1) receiving a lot, (2) a product is stored or moved, (3) a product is transformed, and (4) a product is shipped or delivered. Hosch & Blaha (2017) propose a similar traceability platform.

However, traceability systems should not only capture and store relevant information throughout the supply chain but also manage, maintain, transmit, apply, and link those data (Aung & Chang, 2014; Dabbene & Gay, 2011; Opara, 2003; Pizzuti & Mirabelli, 2015).

While Pizzuti & Mirabelli (2015) refer to specific events when data should be recorded, Opara (2003) suggests six elements of traceability, i.e., what kind of information should be captured, which put together form a food supply chain traceability system:

- Product traceability: information about a product's location at any level in the supply chain.
- Process traceability: information about the activities that affected a product along the chain.
- Genetic traceability: information about a product's genetic constitution, that is information about genetically modified ingredients and planting materials like seeds.

- Inputs traceability: information about inputs such as fertilizers, irrigation water, and chemicals and additives used for the transformation or preservation of the raw material.
- Disease and pest traceability: information about pathogens that may contaminate food.
- Measurement traceability: relating information about individual measurement results to accepted standards.

Regattieri et al. (2007) present a framework in which they describe four pillars building fundamental mainstays a traceability system of a food supply chain is based on:

- Product identification: identification of a product's and its parts' characteristics: weight, perishability, packaging, cost, etc.
- Data to trace: characteristics of data like confidentiality level, degree of detail, data storage requirements, etc.
- Product routing: recording the product's history i.e., the production process and all processes along the chain: activities, lead times, storage systems, etc.
- Traceability tools: factors that influence the choice are costs, compatibility, accuracy, etc.

Golan et al. (2004b) suggest three dimensions to specify traceability systems. The range from internal to external traceability, i.e., how far backwards or forwards, can be described as the depth of traceability. The breadth of traceability refers to the amount of information a system records. Precision describes the degree of certainty with which the system can identify the history or characteristics of an item. The higher the depth, breadth, or precision, the more complex it is but on the other hand, the more transparency a traceability system provides (Blaha & Katafono, 2020; Golan et al., 2004a; Stranieri et al., 2017).

If a product and all its components can be tracked and traced through the entire chain and its entire life cycle offering ideal transparency, this is referred to as end-to-end traceability, or in case of food supply chains, "from farm to fork" (Astill et al., 2019; Calvo Dopico et al., 2016; ITC, 2015; Opara, 2003; Qian et al., 2020).

5.4 Benefits

The main options for reducing greenhouse gas emissions at all stages of a food supply chain are increasing energy efficiency, using cleaner and renewable fuels, and using resources more efficiently (Astill et al., 2019; Garnett, 2011). With traceability corporate social responsibility (CSR) standards can be integrated and controlled. It can be used as an instrument to distinguish oneself from competitors and constitute competitive advantage (Blaha & Katafono, 2020; Maloni & Brown, 2006; Moe, 1998; Stranieri et al., 2017; Trienekens et al.,

2012). To assess environmental and social impacts of food and increase sustainability along the supply chain, tracing its origin is important (Godar et al., 2015; Wognum et al., 2011). By eliminating unnecessary intermediaries from the chain, farmers can get better payment and working conditions (Duric, 2020). Establishing transparency reduces the risk of workers' exploitation, especially at the beginning of the supply chain (The hands, 2020).

Traceability is also a tool to comply with legislation, regulations, and standards like ISO 9000 (Aung & Chang, 2014; Bateman, 2015b; FSA, 2002; ITC, 2015). Information can be easily made available for quality management and certification audits as well as to inspection authorities (Astill et al., 2019; Bechini et al., 2008; Moe, 1998; Blaha & Katafono, 2020).

Traceability is a cost-efficient proactive preventive strategic management tool for ensuring product quality and safety and assists gaining customer confidence. It enables continuous monitoring which is especially important for food products that are sensitive to temperature, light, and other environmental conditions (Aung & Chang, 2014; Manzini & Accorsi, 2013; Opara, 2003; Pizzuti & Mirabelli, 2015; Trienekens et al., 2012).

The incidence of food safety hazards and potential for product recalls can be minimized and product identification and management of rapid and effective recalls and withdrawals of products can be facilitated when needed, minimizing the impact, protecting a brand's reputation, and decreasing costs for disposal and recovery (Aung & Chang, 2014; Calvo Dopico et al., 2016; Dabbene & Gay, 2011; FSA, 2002; ITC, 2015; Moe 1998; Opara, 2003; Trienekens et al., 2012). Problems in production can be diagnosed, sources for contaminations isolated and seemingly unrelated issues can be linked and resolved. In traceable, transparent supply chains liabilities and responsibilities can be identified and in case of any incident, effective corrective actions can be implemented more easily (Astill et al., 2019; FSA, 2002; ITC, 2015; Moe, 1998; Opara, 2003; Pizzuti & Mirabelli, 2015; Regattieri et al., 2007).

Transparent supply chains allow real-time analyses for more informed management decisions and continuous optimization (Aung & Chang, 2014; ITC, 2015; Pizzuti & Mirabelli, 2015). Efficiency of resources and processes can be increased, for instance unnecessary middlemen can be eliminated or inventory management can be optimized, for instance reduction of stock (Bateman, 2015a; Bateman & Bonanni, 2019; Fritz & Schiefer, 2008; ITC, 2015; Moe, 1998; Pizzuti & Mirabelli, 2015; Trienekens et al., 2012). By shortening supply chains products have a longer shelf live when they reach the consumer which can lead to less post-purchase waste (Astill et al., 2019; Manzini & Accorsi, 2013). Improving efficiency leads to lower operation costs and thus long-term profitability can be increased (Aung & Chang, 2014; Bateman, 2015a; Bechini et al., 2008: ITC, 2015; Regattieri et al., 2007).

As a consequence of several food scandals and incidents in the past, the public and consumers call nowadays for verifiable evidence of traceability offering transparency (Astill et al., 2019; Bechini et al., 2008; FSA, 2002; Duric, 2020; Garnett, 2011; Michelson, 2020; Opara, 2003; Regattieri et al., 2007; Trienekens & Zuurbier, 2008). Consumers perceive traceability as vital for verifying food quality and safety and are becoming increasingly interested about their diet and its environmental impacts (Opara, 2003; Wunderlich & Smoller, 2019). Transparency can inform stakeholders and customers about sustainability activities and thereby justify higher prices (Bateman & Bonanni, 2019; Pizzuti & Mirabelli, 2015; Wognum et al., 2011). It enables them to make more informed consumption choices and appraise the consequences of their purchase decisions. They can consume appropriate to their mentality and mindset (Abeyratne & Monfared, 2016; Duric, 2020; Kumar Mangla et al., 2021; Moe, 1998; Pizzuti & Mirabelli, 2015; Regattieri et al., 2007). Transparency becomes even more important as customers have different demand and specific buying criteria like fair trade, no usage of pesticides or gluten-free products (Bateman et al., 2017; Trienekens et al., 2012). Traceability connects food producers and consumers and increases consumers' trust (Bateman & Bonanni, 2019; Duric, 2020; Galli & Brunori, 2013; Pizzuti & Mirabelli, 2015; Regattieri et al., 2007).

Sharing information with other actors in the supply chain can deepen vendor relationships and create long-term agreements (Bateman, 2015a; Pizzuti & Mirabelli, 2015). Some major buyers presuppose traceability for collaboration with suppliers (Michelson, 2020). Transparency reduces information asymmetries between actors in the supply chain but also between companies and external stakeholders like customers. Those asymmetries can lead to incentives to cheating by mislabeling products and increasing transaction costs, especially for actors downstream in the chain (Hobbs, 2004; Liu et al., 2018; Minarelli et al., n.d.).

Companies can also benefit from transparent supply chains as such sustainable measures may attract employees who want to work for responsible companies (Bateman & Bonanni, 2019). Altogether, establishing transparent supply chains can contribute to the United Nations Sustainable Development Goals Nr. 1, 2, 3, 4, 8, 10, 12, 13, and 15 (UN, n.d.).

Summing up the findings of Aung & Chang (2014), Golan et al. (2004), Morais et al., (2019), and Pizzuti & Mirabelli (2015), food supply chain transparency has three main objectives: improving supply chain management and efficiency (1), ensuring food quality and safety (2), and differentiation from competitors by making subtle attributes transparent (3). The associated benefits are lower operation costs (1), reducing recall expenses, avoiding health risks and scandals and ensure customer satisfaction (2), and increasing market share and customer trust and loyalty and thus gaining higher sales (3).

5.5 Requirements

Providing traceability that in turn enables transparency is based on the collaborative exchange and linkage of product-related data between different actors in the chain (Blaha & Katafono, 2020; Dabbene & Gay, 2011; FSA, 2002; Regattieri et al., 2007; Trienekens et al., 2012). Those data can include but are not limited to information about product identity and location, production processes, labor circumstances or environmental impacts (Hofstede, 2003).

A traceability system must include mechanisms for the identification of traceable items and be able to capture information of transformations and movements (FSA, 2002; GS1, 2017). Within a food supply chain, a traceable item can be feed, raw materials, or other substances incorporated into food in the supply chain as well as packed products. In terms of size, traceable items can be a single unit/product, bigger batches like a package or pallet, or logistic units like container (FAO, 2017; FSA, 2002). It is essential that the identifying code of an item entering a link in the chain can be associated to the one of the item leaving the link in the chain (Blaha & Katafono, 2020; Thakur & Hurburgh, 2009). Therefore, each actor along the chain must achieve internal and external traceability (Aung & Chang, 2014; ITC, 2015; Opara, 2003; Pizzuti & Mirabelli, 2015). This requires that all actors know their processes and methods, product, and information flow, and have qualified staff available (ITC, 2015; Pizzuti & Mirabelli, 2015). As actors in the chain cannot rely on manual data entry and paper records, a proper set of technologies is a precondition for a well-working system: software and hardware for item identification, recording, managing, storing, and transmitting data and supporting decision making (Bateman & Bonanni, 2019; Fritz & Schiefer, 2008; Schwägele, 2005; Opara, 2003). All actors must commit to invest in the technologies needed (Pizzuti & Mirabelli, 2015). Moreover, the interoperability of all systems in the chain must be ensured (GS1, 2017). Any system should guarantee scalability, interoperability, and independence (Bechini et al., 2008). Agreements on issues like format and content of communication, data ownership and responsibilities are also required (Bechini et al., 2008; Fritz & Schiefer, 2008). The parties must agree on a method data is stored and made available. Options are for instance centralized or decentralized systems as blockchain. (GS1, 2017). Moreover, all actors must agree on and act according to regulations for the traceability processes and a common set of quality, hygiene, and safety standards as well as a shared language and notation (Hofstede, 2003; Morais et al., 2019; Pizzuti & Mirabelli, 2015; Trienekens et al., 2012). Systems should support forward as well as backward traceability, also called tracking and tracing as discerned in chapter 2.3 (Fritz & Schiefer, 2008; Thakur & Hurburgh, 2019). All links of a food supply chain should be

integrated and commit to the traceability system (Regattieri et al., 2007). Data should be transmitted in real-time and in a secure manner, so information is readily accessible without time delay (Morais et al., 2019; Pizzuti & Mirabelli, 2015; Trienekens et al., 2012). The system should be able to give information about a specific item at any time (Schwägele, 2005; Thakur & Hurburgh, 2008). As for any successful collaboration between business partners, trust and commitment are crucial (Ameseder et al., 2008; Panahifar et al., 2018).

5.6 Challenges

Establishing a transparent food supply chain comes with several challenges. Those can be technical, financial, organizational, managerial, or environmental (Aung & Chang, 2014; Wognum et al., 2011).

The first challenge a company that wants to reach transparency and traceability is confronted with is ensuring the commitment and consensus of all parties (Bateman et al., 2017). This implicates a shared understanding of transparency, what constitutes it, and the need for promoting it along the chain (Blaha & Katafono, 2020; Wilson, 2021). Actors do often not see the benefits of establishing a transparent supply chain and digital traceability systems, being deterred by not clearly knowing the return on investment which can lead to reluctance to change (Bateman, 2015; Bateman & Bonanni, 2019). There are no widely adopted standards for traceability systems, so the parties in a supply chain must develop and agree on their system and processes to manage traceability (Bateman 2015; Bateman et al., 2017; Golan et al., 2004; Karlsen et al., 2013; Regattieri et al., 2007).

Having the necessary financial resources for investments and qualified staff available can be a barrier, especially for small enterprises (Aung & Chang, 2014; Manzini & Accorsi, 2013). This is particularly challenging in food supply chains that rely on many smallholders (ITC, 2015). Technical solutions for traceability do furthermore rely on infrastructure like reliable connectivity to the internet (Astill et al., 2019). Especially for farms in rural, poor areas, this cannot be taken for granted. Capturing and transferring all information accurately in a standardized electronic format is one of the biggest challenges the success of a traceability system enabling transparency depends on (Abeyratne & Monfared, 2016; Bateman, 2015; Bechini et al., 2008; Moe, 1998). Having only one common system for item identification with consistent codes in practice, so any item entering the chain can be associated to one leaving the chain, can pose an operational challenge (Bateman et al., 2017; Pizzuti & Mirabelli, 2015). Bateman et al., (2017) identified data latency and veracity as further challenges. Additionally,

data security must be ensured, and data ownership must be defined to avoid unlawful access to and collection of data (Abeyratne & Monfared, 2016; Astill et al., 2019).

The more complex, long and fragmented a supply chain is, the more challenging it is to ensure traceability along the chain. Considering intersection with other supply chains, the challenge might not only be a multi-party but multi-chain one (Bateman 2015; Bateman et al., 2017; Manzini & Accorsi, 2013; Trienekens et al., 2012; Wognum et al., 2011).

5.7 Strategic Tools

5.7.1 SWOT

SWOT is an acronym for strengths, weaknesses, opportunities, and threats (Hill & Westbrook, 1997). Threats and opportunities analyze an organization's external situation while strengths and weaknesses relate to internal attributes. Hence, SWOT considers both, the external and internal environment (Chen & Kodono, 2014). The forces comprise potential stimulations and limitations for an organization's performance or objectives. Their identification and evaluation are therefore fundamental as they might hinder or assist a company. However, as the organization's environment is dynamic and continuously changing, the analysis should also be considered as a snapshot and must be reviewed and adjusted over time (Houben et al., 1999). The SWOT analysis is a strategic tool that enables balancing efficient focus and open exploration (Everett, 2014). An open-minded approach is important to avoid just looking for information that reassures pre-existing beliefs (Day, 2002). Although the inquiries should not be too restrictive, to keep the process efficient, preventing the collection of too much irrelevant data is crucial (Everett, 2014).

5.7.2 VRIO

The Resource-Based View (RBV) focuses on an organization's internal resources (Wernerfelt, 1984). Barney (1991) identified four indicators to assess the potential of a resource of sustained competitive advantage that were later adjusted to: value, rarity, imperfect imitability, and organization. The latter refers to an organization's ability to exploit the resource. The VRIO framework, which is an acronym derived from the four attributes, is a strategic analysis tool that "serves as a means of applying RBV" (Lopes et al., 2018, p. 661). Barney (1991) considers those criteria as indicators how immobile and heterogeneous resources are and hence how

useful for generating sustained competitive advantage. Figure 5.6 shows the framework and its impacts.

V Valuable	R Rare	I Difficult to imitate	O Exploited by the organization	Impact on Competition	 Performance
NO				Competitive Disadvantage	Below Average
YES	NO			Competitive Parity	Average
YES	YES	NO		Temporary Competitive Advantage	TemporaryAbove Average
YES	YES	YES	NO	Unused Competitive Advantage	Above Average
YES	YES	YES	YES	Sustained Competitive Advantage	Sustained Above Average

Figure 5.5: VRIO Framework
Adapted from Glistau et al. (2015).

6 Lecture Plan

The study was designed to be adjustable to different forms of usage. It can be used for but is not limited to the following settings:

- The case study can be used for bachelor course students. In this case, the lecturer should investigate students' experience with self-organized group learning and offer guidance according to the students' level, e.g., interim meetings to ensure progress is made, everyone participates in the discussions, and the workload is spread over the given time frame.
- The case study can be handed out to students including the proposed solution to understand how to approach a case study and comprehend how to put the strategic tools in practice.
- The case study or parts of it can be presented by the lecturer embedded in the lecture.
- Students can be expected to solve the study individually.
- The case study can be used for students in master programs to be solved in groups apart from the class.

The following plan is a suggestion how this case study can be used for the last suggested setting, i.e., for students in master programs in an academic institute. The timing is approximately scheduled and may be adjusted depending on the number of groups and involvement in the discussions. The case study is supposed to be solved in groups. To ensure everyone can participate, students should form groups of 3-5. If there is anyone left without a group, the lecturer mediates the allocation. The case study should be handed out to the students after the first class of the subject in the semester so they can first read through it at home.

Phase	Activity	Time
1	The case study is handed out to students at the end of a lecture. They are asked to read through it at home to gain an overview and understanding of the case study. Doubts should be marked. To gain a greater understanding, independent research into the topics should be carried out.	Individual
2.1	Students' doubts are clarified in class.	30 min approx.; adjusted to students' need
2.2	After clarifying all doubts, the groups are asked to prepare a solution for Q1, i.e., identifying the company's reasons for the	Individual

	project at home. They are informed that they should hand in a written solution in the next session and that one group will be picked randomly in the next session to present their results.	
3	All groups hand in their written solution for Q1. One group presents the results for Q1. This is followed by a discussion in class moderated by the lecturer	40 min
4	At the end of the lecture where the SWOT framework is introduced, the groups are asked to prepare the solution for Q2 at home. Again, they are informed that they should hand in a written solution in the next session and that one group will be picked randomly in the next session to present their results.	Individual
5	All groups hand in their written solution for Q2. One group presents the results for Q2. This is followed by a discussion in class moderated by the lecturer	40 min
6	At the end of the lecture where the VRIO framework is introduced, the groups are asked to prepare the solution for Q3 at home. Again, they are informed that they should hand in a written solution in the next session and that one group will be picked randomly in the next session to present their results.	Individual
7	All groups hand in their written solution for Q3. One group presents the results for Q3. This is followed by a discussion in class moderated by the lecturer. After the discussion of Q3 a final case discussion is hold	60 min
8	At the end of the last session of the semester, every student hands in an individual executive summary.	

Figure 6.1: Lecture plan suggestion

The phases do not have to be done week by week. They should be adjusted to the syllabus and lecture content. The assessment of the case study is supposed to be part of the final grade for the subject. All groups must hand in a written solution of each question. In should be ensured that each group presents their solution at least once. This means, if they are for example 6 groups, the suggested plan will be adjusted so each question's solution will be presented by 2 groups. At the end of the semester, each student must hand in an individual executive summary

used as an independent component of the group work. The decision if the written parts should be submitted in paper or digital form is up to the lecturer.

7 Resolution Proposal

The lecturer can decide if additional research beyond the information provided is expected. For this following proposed resolution, additional research was conducted.

7.1 Q1: Reason why Rügenwalder Mühle aims to implement a transparent supply chain structure

Which reasons might have supported the company's decision to implement a new supply chain structure making the processes transparent?

There are several potential reasons for the decision to restructure the supply chain for the plant-based products:

- In case of any incident with a product, recalls are way easier, faster, and more cost-efficient with a digitalized, transparent supply chain. (1)
- Gaining more control of long and complex supply chains and their risks as every actor and process in the chain can impair the products' quality and safety. Ensuring constant quality and safety of the products as this is especially important for food and any incident can lower brand trust and loyalty and thereby sales. (2)
- If the new structure implies that customers are provided with or can access more detailed information on a product's history and ingredients, this can be a distinguishing feature and lead to competitive advantage as people increasingly care about their diet and sustainable consumption and have higher trust in brands that reveal that information. (3)
- Options to improve sustainability and social impact along the supply chain can be identified. (4)
- Opportunities for improvements along the chain to increase efficiency can be revealed. (5)
- The further development of supporting technologies for a digitalized transparent supply chain structure and their implementation by other companies may have encouraged Rügenwalder Mühle to make use of those technologies and implement them and restructure the supply chain. (6)

- Being able to prove the sustainability of products and processes the company may get further certifications and labels that can be placed on products' packaging and induce competitive advantage. (7)
- In its sustainability report, the CEO states that the company wants to minimize negative effects on humans, animals, and the environment, and therefore deals with the subject which relevance their resources and production have. This relevance can only be analyzed when supply chains are completely transparent. Thus, a transparent supply chain is a logical consequence of the statement. (8)
- The company also states that it wants to reach climate-neutral production until 2025. The ecological footprint can only be defined when all processes in the products' history are known. (9)
- Taking responsibility for supply chains is one of the company's guiding principles as stated in Annex B.
- Half of the soy the company currently procures is from suppliers in Northern America, the other half is from other countries in Europe. Thus, the supply chain for those plant-based products that include soy is quite long. Communication with suppliers from other parts of the world is more difficult and much easier in a digitalized supply chain structure. (10)
- Many materials Rügenwalder Mühle procured for its plant-based products like vegetable protein and mixed spices are already processed. Only by establishing transparency along the whole supply chains, the origin of the ingredients and the corresponding production processes can be assessed. (11)
- A transparent supply chain can support meeting the growing demand for the company's plant-based products as planning processes can be improved and production can adapt to changes in demand by automated digital just-in-time communication. (12)
- From the company's production, the products are delivered to supermarkets all over Germany and even other European countries by big haulers. A new supply chain structure can facilitate communication with those many purchasers. (13)
- Rügenwalder Mühle might have assessed its supply chain scope and milestone in the matrix analyzing the dimension of its supply chain transparency and identified room for improvement. (14)

- The analysis of the products' history showed that the biggest environmental impact lies at the beginning of the chains. Therefore, cooperating with the actors at the beginning of the supply chain is fundamental to decrease the products' ecological footprints. (15)
- Suppliers' compliance with the code of conduct Rügenwalder Mühle established in 2020 can be ensured more easily. (16)
- Adoption to law. (17)
- Ideal mapping of the delivery capacity can be ensured, which is important against the background of further planned growth. (18)
- Digitalization of supply chains is necessary to install traceability systems and thereby get transactional real-time data like a lot's current location. (19)
- Provided data can be linked, analyzed, and used for improvements.

7.2 Q2: SWOT Analysis

Analyze which internal strengths and weaknesses and which external opportunities and challenges the company might face approaching supply chain transparency for its plant-based products using the SWOT framework.

7.2.1 Strengths

As we do not have access to internal information of the company, the analysis of the internal strengths and weaknesses can only rely on information accessible to the public.

Rügenwalder Mühle is the market leader in the segment of meat substitutes in Germany. This comes with a high brand value. Customers are usually more loyal and tend to accept higher prices for prestigious brands. The company can access lots of data of their customers (supermarkets) and thereby knows their buying behavior, which in turn depends on and represents the final customers' consumption decisions. High, continuously increasing sales lead to higher demand for materials from suppliers. This offers a good base for negotiations with suppliers. It also enables economies of scale. (20)

Having cultivated, long relationships with suppliers increases trust between the actors and ensures high reliability. Suppliers will more likely invest in technologies for tracing and tracking, as they can be quite sure it will be profitable. (21)

The diversified product range attracts different kinds of customers. This spreads the risk. A transparent supply chain can first be installed for plant-based products and in case of success be established for meat products too. (22)

Over the years, the company showed to be able not only to adjust to a changing environment but also to actively develop and induce new markets. Although being a traditional family-owned company, Rügenwalder Mühle is an innovative, dynamic, and modern company. They proved their innovative approach by launching the plant-based product range in 2014, but also in 2021 when they responded to the snacking trend by launching two vegetarian snacks that can be stored unrefrigerated. Over the years, several new products were successfully introduced to the market. But not only the products were further developed. Also, the packaging was for example refined to be more recyclable and improved to reduce the amount of material needed. A dynamic mindset and openness to change and experience with it are fundamental for a new supply chain structure. (23)

Transferring the CEO position to an external person showed the owners are not too self-centered to rely on managing and strategic skills from outside the family. CEO Michael Hähnel has several years of experience with other fast-moving consumer goods brands. Diversified long-time experience in the market is an advantage to anticipate future developments and trends in the market. (24)

Being a traditional, family-owned company makes the brand more likable for sustainable customers compared to brands from big international enterprises that are often criticized in the media for their unethical behavior. People trust brands that offer consistent high product quality customers can rely on. Being a traditional brand, many people in Germany grew up with the company's products. Brand trust is a big competitive advantage and one of the most important drivers of market share. There are several ways brand trust pays off: People tend to buy products again becoming regular customers when they trust a brand. They also like to try new products of a trusted brand lowering a company's risk for innovations. Without brand trust, the launch of the plant-based products of Rügenwalder Mühle would not have been as successful. Family-owned companies have a reputation for representing more personal values and scoring points with authenticity, leading to brand trust. One of the most important benefits of brand trust for a company is that customers are willing to recommend the brand to others. This is a cost-neutral efficient way to gain new customers. Finally, customers' willingness to pay is higher for brands they trust. In case the transition to a transparent supply chain would need to increase prices, it is likely that customers will accept them. (25)

186 years after it was founded, Rügenwalder Mühle is still in family ownership. Family-run businesses think and act more focused on shared success and persistence over generations. Accordingly, work is done on long-term concepts instead of generating profits as quickly as possible and thinking only in quarters. Decisions can be made more easily, faster, flexible, and independent when the ownership is not disjointed. The decision-makers have also more trust in each other. Being able to decide independently simplifies the adoption of a new supply-chain structure. (26)

Family-run companies are attractive employers for many people. Those businesses are associated with a good team spirit and flat hierarchies that enable employees to work self-contained. Satisfied employees are more loyal and committed and feel a sense of belonging to the company. Even in times of crisis, staff turnover is lower. (27)

Increased sales and profit provide financial stability and opportunities for investments.

80% of the company's raw material suppliers come from Germany, and a third of them even from the region of the company, Lower Saxony. The basic raw materials wheat, peas, rapeseed oil, and chicken egg white are sourced exclusively from German suppliers. Rügenwalder Mühle is endeavoring to increase the percentage of materials for the plant-based products coming from Germany. They have a pilot project that tries to cultivate soy on German ground. Short delivery routes underline the company's approach to be sustainable and facilitate communication to suppliers. This is a benefit to establishing a new supply chain structure. (28)

The financial report of 2019 (2020 is not published yet) indicates that the company was able to expand its retail listings in the existing markets of Austria, Luxembourg, and Switzerland last year, especially for vegetarian and vegan products. Furthermore, the company succeeded in further expanding its market share in Denmark in the vegetarian and vegan market. In addition, measures were taken to enable entry into the Spanish and Dutch markets. Through the promotion of internationalization to open and develop new markets the company positions itself more broadly. As other markets have other behaviors risks of changes are spread being not completely dependent on one market. (29)

7.2.2 Weaknesses

Although Rügenwalder Mühle invested in new production capacity and built a new plant, they are still looking for new locations close to the headquarter in Bad Zwischenahn. When consumers often face empty shelves in the supermarkets the brand loyalty might decrease

threatening financial stability and making investments in new supply chain structures difficult. (30)

The high investments also decreased the company's liquidity. (31)

Having long-time contracts with suppliers can be a weakness if the suppliers do not agree to make any changes now as the contract did not indicate them.

The surge of demand for plant-based products the company experienced over the last years can come with risks. Structures have to keep up with the high demand. Otherwise, the company's success and financial situation are threatened. (32)

7.2.3 Opportunities

The market for meat substitutes in Germany is rapidly growing and Rügenwalder Mühle's sales of plant-based products increased accordingly. This gives the product range a long-term perspective for success. Therefore, there is a high chance that investments like the establishment of a new supply chain structure pay off. (33)

There is the trend that Germans care more and more about their diet. Many want to eat healthy food and less meat. Plant-based meat substitutes meet this development and transparent supply chains can help consumers to get more information about the ingredients. (34)

Consumers also show increasing interest in the impacts of their consumption and want to know how the products they consume were produced and where they come from. Consumers ask for regional and organic products. A transparent supply chain meets this demand as it can show the origin of food. Consumers likely appreciate the additional information and in turn, brand loyalty can increase. (35)

Technologies that can be used for a restructured supply chain, like blockchain, for example, are getting more mature and their usage in supply chains increased. Best practice examples companies can use to orientate themselves are emerging and can offer some guidance for their application. (36)

7.2.4 Threats

As the market for meat substitutes in Germany is very attractive, new players appear. Those are startups, meat companies, or other big enterprises launching a plant-based meat replacement product range. Competition is growing making it harder for Rügenwalder Mühle to keep the market leader position and increase sales. (37)

Another threat is that raw materials the company procures for its plant-based products are getting rare, as CEO Michael Hähnle stated. Delivery problems can limit the company's success and as competition increases market prices for plant-based proteins might rise. (38)

To restructure a supply chain linking all actors, the company is dependent on the commitment of everyone in the chain. Suppliers might need to install new technologies, i.e., make investments, to ensure communication between the actors. Besides the commitment and investments, this is also a technological challenge that needs appropriate experts supporting the project. (39)

For end-to-end transparency, all actors in the supply chain must install interoperable communication tools. The cultivation of spices Rügenwalder Mühle procures for its plant-based products is characterized by smallholder structures in developing and emerging economies. Therefore, traceability often ends with a trader in the country of origin, who sources the goods from many smallholders. In this case, end-to-end supply chain transparency is impossible. (40)

Strengths	**Weaknesses**
○ Market leader for meat substitutes in Germany; strong market position ○ Long-term relationships with suppliers ○ Diversified product range ○ Innovative, dynamic leadership ○ Successful launch of new products ○ Trust as a traditional brand ○ Family-owned and therefore independent ○ Loyal employees ○ Sales, profit, and total assets increased over the last few years ○ High percentage of materials is coming from Germany ○ Development of further international markets is being driven forward	○ Limited production capacity ○ High investments in the expansion of production facilities reduce liquidity ○ Long-term contracts with suppliers ○ Surge of demand
Opportunities	**Threats**
○ Rapidly growing market for meat substitutes	○ New competitors entering the market

o Increasing interest in a healthy diet o Increasing interest of customers in sustainable products o Technologies are getting more mature o Demand for organic and regional food rises	o Existing competitors might gain higher market share o Raw material scarcity for plant-based products o Dependent on suppliers' commitment o End-to-end transparency is difficult due to smallholder structures for some ingredients in emerging and developing countries o All actors in the chain must install technologies that allow communication

Figure 7.1: SWOT analysis proposal

7.3 Q3: VRIO Analysis

Holding 40% of the market of plant-based meat substitutes, the company is the market leader in Germany. Identify resources and evaluate their potential for sustainable competitive advantage using the VRIO framework.

The resources will first be analyzed separately in detail and at the end summarized in an overview showing the impact on competition.

- Skilled and loyal employees

  Important resource as they are willing to learn, and low turnover leads to fewer costs. It is a valuable and rare resource. Rügenwalder Mühle benefits from its motivated staff and offers training and benefits like charging stations for electric cars at the headquarter. Being 820 employees at one location supports connectivity and personal contacts. (41)

- Financial resources

  From 2018 to 2019 the annual profit increased by 8% (latest financial report). According to the company's CEO, the profit also increased in 2020. The company has high fixed assets in property and machinery. End of 2019, the equity ratio was more than 40%. The net income was 4.7 million. The company financed all investments from its funds. Thus, they do not have to pay interest. However, having financial resources is neither rare nor difficult to imitate. International competitors probably have even

more. Investments in 2020 and 2021 show that treasury accords with strategic leadership. (42)

- Propensity to innovate

  The launch and further development of the plant-based product range indicates that being innovative is part of Rügenwalder's core competencies the company profits from. It is highly valuable, as it supports gaining a first mover advantage and puts the company on a broader footing for the future. The company continuously makes use of its innovative ability launching new products and trying new ways like the pilot project of growing soy in Germany. Innovations are often viewed critically as they pose a risk for a company and the target audience must adapt to something new. Looking at the market and other German companies we can see that no competitor pioneers alike. Imitating the innovative mindset is difficult as the whole leadership of a company must support the approach and starting to produce plant-based meat replacements was probably one of the biggest innovations the meat and food industry could come up with. (43)

- Supplier relationships

  Strong and long-time relationships with suppliers are highly valuable. In case of raw material scarcity, which CEO Michael Hähnel predicts, suppliers might tend to prioritize loyal customers they have already trusted for a long time. Having most suppliers in geographical proximity makes regular communication and building relationships easier. This kind of relationships are rare in the food industry and cannot be imitated as they are based on cooperation for several years. (44)

- Renowned brand and brand equity

  Having a traditional brand can be a big advantage as customers could built trust for several years and it comes with a big installed base. Imitating Rügenwalder's brand image as one of Germany's most traditional butcher shops that successfully built a second mail pillar by launching plant-based meat substitutes and meets customers' demand is impossible. Family-owned and traditional but at the same time innovative brands with long-term success is rare nowadays, as many brands belong to or are taken over by one of the few big companies for fast-moving consumer goods. (45)

- CSR image

  Rügenwalder continuously works on putting forward an image of corporate social

responsibility. They have different environmental initiatives like using only renewable energy and decreasing plastic in packaging. The company is one of its regions' biggest employees and most employees have open-ended contracts. Focusing on sustainable long-term success over several generations increases job security. To support the image, the first sustainability report was published in 2021. However, many companies try to increase their CSR image these days and differentiating between greenwashing and honest engagement is sometimes difficult for customers. (46)

- Relationship to retail markets

  Holding the market leader position and having continuously high sales over years the brand is strategically relevant for retail markets. The company nowadays relies on this way of distribution having all butcher shops closed several decades ago. Export and internationalization are driven forward. The sales department was insourced in 2019 so the company leads the field crew itself. Getting a continuous listing in supermarkets is getting more difficult as more and more brands arise and shelf space is limited. (47)

- R&D Skills

  The research and development department is very important for Rügenwalder Mühle as this is where innovative products are invented. To produce plant-based meat alternatives imitating sausage products' look and taste needed intensive research and development. The department continuously develops new products and works on refining vegetarian ones to become vegan. Such a sophisticated R&D department is rare in traditional butcher shops as there are few innovations. (48)

- Freedom of decisions

  Being a family-owned company financed by equity, the decision-making authority lies completely in the company itself. Communication with decision-makers is facilitated and quick decision-making is enabled. This structure allows being dynamic and adapting quickly to the market. Investments to enhance production capacity come without interest. Most competitors are either dependent on debt providers or the brands belong to big enterprises as mentioned before. (49)

- Corporate leadership and vision

  The operational management of the company was handed over to long-standing proven managers from its own ranks. Although the CEO is not a family member since 2020,

the family holds the chairman of the supervisory board position. They work closely together on the company's strategy and development. (50)

- Production plant

  Although the company already invested in new production plants, it is reaching capacity limits and is therefore intensively looking for further production capacities close to the headquarter. (51)

- Growing product range

  When the company launched its first plant-based products in 2014, it offered three different cold cuts. Today, the product range for vegetarian and vegan products comprises 28 different products. The large range coffers the demand of different users and consumption patterns and has an attractive effect. Sales and demand increase and the biggest target group of flexitarian people is very heterogenous concerning taste and preferences. (52)

Ressources	V	R	I	O	
Skilled and loyal employees	YES	YES	NO	YES	Temporary Competitive Advantage
Financial resources	YES	NO	NO	YES	Competitive Parity
Propensity to innovate	YES	YES	YES	YES	Sustained Competitive Advantage
Supplier relationships	YES	YES	YES	YES	Sustained Competitive Advantage
Renowned brand; brand equity	YES	YES	YES	YES	Sustained Competitive Advantage
CSR image	YES	NO	NO	YES	Competitive Parity
Relationships to retail markets	YES	NO	NO	YES	Competitive Parity
R&D Skills	YES	YES	NO	YES	Temporary Competitive Advantage
Freedom of decisions	YES	YES	YES	YES	Sustained Competitive Advantage
Corporate leadership & vision	YES	NO	NO	YES	Competitive Parity
Production plant	YES	NO	NO	YES	Competitive Parity
Growing product range	YES	NO	NO	YES	Competitive Parity
	Human Resources	Financial IResources	Intangible Resources	Intangible Resources	

Figure 7.2: VRIO analysis proposal

The analysis of the resources and capabilities of Rügenwalder Mühle, 4 main intangible ones ensuring sustained competitive advantage can be determined:

- Propensity to innovate
- Long-term supplier relationships
- Renowned brand

- Freedom of decisions

However, it could be revealed that the company makes use of all its resources. As well as the SWOT analysis, the VRIO analysis is just a snapshot and should be regularly reviewed as the answers to the VRIO questions may change and new resources may evolve.

8 Conclusion

The German market for meat alternatives will continue to grow in the coming years. Thus, competition is increasing. The most important customer segment are flexitarians, i.e., people who hold a vegetarian diet most of the time but also eat meat occasionally. Irrespective of this, supply chain transparency is becoming an issue of increasing importance. It refers to the revealing and communication of product-related information like information about production processes, ingredients, and environmental impacts of production. There are several reasons why the implementation of transparency in a supply chain can be beneficial for organizations. Shortfalls in supply and delay in delivery can be identified timely before the company's own production comes to a standstill. It also helps to manage inventory and minimize storage costs. Efficiency can be increased leading to fewer costs. Information can be communicated only within the chain or also externally to customers. Communicating the information to customers meets their demand for product and process information to make informed purchase decisions that are in line with their values. Relationships with suppliers can be lifted to another level and customers can always be automatically kept up to date on the status of orders and problems with delivery promises can be communicated in a timely manner.

In case of any incident, products can be recalled from the market more easily and cost-efficiently, which is especially important for companies handling food. Sophisticated software can analyze and use data to predict future developments, which is called predictive supply chain management.

However, building a transparent supply chain comes with several requirements and challenges. Collaboration between the actors in a chain is fundamental, and commitment and consensus of all parties must be ensured. All actors in the chain must have or install appropriate technologies and interoperability of the actors' systems must be ensured. Qualified staff must also be available. Convincing suppliers to make investments can be challenging.

This thesis developed a case study for students to gain knowledge about the market of meat substitutes and the relevance of supply chain transparency. The company the case is about is a German family-owned company, that was a traditional butcher's shop but launched vegan and vegetarian alternatives in 2014. The step was very successful and in August 2020, for the first time, the company reached higher sales with the alternative products than with the ones with meat. In summer 2021, the Rügenwalder Mühle announced to implement a new supply chain management structure with the goal to link all areas involved in the supply chain and optimize

the corresponding processes. Thus, for this case study it was supposed the company wants to implement a transparent supply chain for its vegan and vegetarian products. A comprehensive literature review on food supply chain transparency is provided.

Students are asked to identify reasons why the company might have taken this decision. The second task was conducting a SWOT analysis and in the third question, students must analyze the company's resources and apply the VRIO framework on them. Theoretical frameworks can be applied and thus be linked to practice. The pedagogical case study is an active learning method that often motivates students and may increase their desire to learn. It is suggested to conduct the case study in groups of 3-5 students. Interpersonal and communication skills can then be trained and developed.

Besides the case description and the literature review mentioned above, the present document contains information about the pedagogical case study methodology. A lecture plan is suggested and proposed answers for the questions are presented.

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Annex A: Competitor Overview

Parent company	Subsidiary	Brand	No. of substitute products	Base ingredient	Products	Market launch in Germany
PHW (distribution rights)		Beyond Meat	3	pea protein	frozen food: burger patties, minced meat, sausages	2018
Pfeifer & Langen		endori	14	pea protein	refrigerated products: schnitzel, pulled, nuggets, kebab, burger patties, meat balls, minced meat, sausages, cevapcici,	2016
Nestlé	Tivall Deutschland GmbH	Garden Gourmet	18	soy protein, wheat protein, pea protein (Thun Vish)	frozen food: pizza, refrigerated food: filet pieces, sausages, thunfish, burger patties, minced meat, schnitzel	2019
Nomad Foods	Iglo	Green Cuisine	13	pea protein, wheat protein, rice flakes (fish sticks)	frozen food 5 convenice dishes: Lasagne, Linguine Bolognese, Chili sin Carne, Fricassee, Pasta with cream sauce and stripes of meat. Burger patties, minced meat, schnitzel, nuggets, meat balls, pulled pork, fish sticks	2020

PHW	Wiesenhof Geflügel-Kontor GmbH	Green Legend	16	pea protein, wheat protein, field bean protein, potato protein	frozen food: fish sticks, rissoles, nuggets, schnitzel, chicken sticks refrigerated food: rissoles, nuggets, schnitzel, chicken sticks, fish sticks, poultry meat sausage, poultry mortadella, poultry salami, poultry wiener	2020
		Greenforce	10	pea protein	shelf food easy mix: minced meat, schnitzel, burger, rissole, cevapcici, köttbullar, sausage, fish rissole	2020
		Like Meat	15	soy protein, wheat protein	refrigerated products sausages, chicken wings, kebab, gyros, grilled chicken, minced meat, chicken bites, nuggets, schnitzel, meat balls. convenience dishes: chicken bami goreng, chicken indian curry, minced meat pasta	2013
		Meica	5	soy protein	refrigerated food: sausages, curry wurst shelf food: sausages	2015
		No Meat	4	soy protein, pea protein	frozen food: burger patties refrigerated food: burger patties, minced meat, sausages	2020
		Planted	7	pea protein	refrigerated products: pulled pork, kebab, chicken bites	2019

Migros Elsa-Mifroma	Estavayer Lait SA (ELSA)	SoFine	2	soy protein	refrigerated food: chicken skewer, chicken sticks, fish filets, fish burger pattie, fish medaillon	?
Unilever		The Vegetarian Butcher	8	soy protein	refrigerated food: nuggets, filet stripes, burger patties, minced meat, schnitzel, vegetarian balls	2010
Friesland Campina		Valess	9	milk	refrigerated food: nuggets, crispy sticks, schnitzel, burger pattie, smoked bbq chicken style, steak, , sausage, chicken pieces (Geschnetzeltes)	2009
Vossko		Veggie Club	2	pea protein, rice flakes	frozen food: nuggets, patties	?
TofuTown		Veggie Life	23	soy protein, wheat protein	refrigerated products: cevapcici, gyros, burger patties, steak, minced meat, wiener, nuggets, schnitzel, salami, gulasch, cold cuts	2003
		Vegini	19	pea protein	burger patties, cevapcici, minced meat, sausage, pulled kebab, nuggets, schnitzel, chunks	2017
JBS Foods		Vivera		soy protein, wheat protein	refrigerated food: chicken tender, bacon, fish sticks, schnitzel, steak, meat balls, kebab, nuggets	2019
Topas GmbH		Wheaty	29	seitan	refrigerated food: cold cuts, bacon, sausages, gyros, döner, burger patties, steak, medaillons, roulade, joint	1994

Mühlen Gruppe	Gutfried	Gutfried	7	chicken egg white pouder, pea protein	refrigerated food: mortadella, wiener, pork sausage, meat paste	2015

Annex B: Rügenwalder's sustainability strategy