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THE CONCEPT OF CLIMATE SMART AGRICULTURE – A CLASSIFICATION IN SUSTAINABLE THEORIES

Abstract: *In scientific literature with a focus on economics, the topic of sustainability has proven to be a relevant area of research in the last decade. Particularly in connection with the food industry, the issues of corporate social responsibility and the Shared Value approach of Porter and Kramer are important. With regard to the realization of sustainability in food production processes in the agricultural economy sector, the scientific climate of climate Smart Agriculture emerged in scientific literature. So it is now necessary to examine whether the theory of the Climate Smart Agriculture can meet the requirements of the definitions around the topic of Corporate Social Responsibility and the Shared Value Theory.*

Keywords: *Internet of Things; Digital Transformation; Supply Chain Management; Smart Technology; Digitization of Management.*

1. Introduction

The subject of sustainability is of the highest relevance in current literature. Especially in the context of the food industry a lot is discussed about Corporate Social Responsibility and the Shared Value approach. Politicians are calling for implementation of these approaches to food production in many countries and regions. The addressees of these demands are the producers of food, so the farmers. One possible and much discussed approach to meeting these demands is the Climate Smart Agriculture concept. Climate Smart Agriculture is currently the focus of agricultural economics literature. The definitions of Climate Smart Agriculture are promising for many experts. Sustainability, a reduction of emissions and increasing productivity can thus be realized (Steenwerth et al., 2014). The aim of this study is to find out if Climate Smart Agriculture can meet the

requirements of the definitions of Corporate Social Responsibility and Shared Value Theory. For this purpose, a qualitative content analysis should be carried out by means of a search of literature. In order to describe the concepts and theories on corporate social responsibility, shared value and climate smart farming in relation to the food industry, the value chain, the simple value chain, the extended value chain and the food chain are described on the basis of the value chain.

1.1. Research Question

Do the definitions for Corporate Social Responsibility and the Theory of Shared Value come together in the definitions of Climate Smart Agriculture?

1.2. Methodology

When talking about quantitative data, people who are not active in science also know that

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they are numbers and statistics, e.g. from the economic field. However, the facts of qualitative data are not equally self-explanatory (Kuckartz, 2012). The qualitative content analysis belongs to empirical social research. This empirical social research describes investigations that look at a particular section of the social world. This consideration should contribute to the further development of aspects of the considered field and / or the development of new theories (Gläser & Laudel, 2010). A qualitative data collection is to be described as case-oriented and hollistic. This type of data collection in the analyzes refers to an examination of process flows and the development of a situation over a certain period of time. In qualitative research, the object of investigation is depicted in its entirety. This totality can consist of persons, structures and institutions (Hussy et al., 2010). For example, the material being studied is texts (Mayring, 2015). With the claim to examine the respective individuality of the texts, these are extracted and analyzed and interpreted in further procedures (Früh, 2015). Thus, unlike in quantitative research, only the presentation of causality is presented. Rather, it is about describing processes and creating understanding in this regard (Hussy et al., 2010). By no means are qualitative data to be described as weak data. They are another form of data whose analysis is no less complex than in quantitative studies (Kuckartz, 2012).

2. Value Chain

Authors of scientific literature deal with the topic since the "Value Chain" was named in 1985 by Michael E. Porter. The primary activities in written order include "Inbound Logistics", "Operations", "Outbound Logistics", "Marketing and Sales" and "Service". The support activities take place in the levels "Operations". Outbound Logistics, Marketing and Sales. Support activities include "Firm Infrastructure", "Human Resource Management", "Technology

Development" and "Procurement". The margin is at the bottom of the value chain (Porter, 2010). In scientific literature, all definitions on the subject of the value chain refer to the theoretical foundation of Michael E. Porter. Thus, companies are a collection of activities through which products are produced, distributed, delivered and supported. These activities can be represented in a so-called value chain (Porter, 1999). If the value chain refers to the production of physical products, Chaniotakis describes a sequence of steps necessary to transform raw materials into a finished product (Chaniotakis, 2017). D'Heur defines the value chain as the backbone of a company. All decisions of e.g. Corporate governance has an impact on the value chain. The parameters defined in the corporate strategy are also implemented by value-adding actors within the value chain. The value chain thus has a significant relevance for the success of a company. The interaction between customers, business planners, buyers, suppliers, internal / external production Facilities and logistics are therefore a key success factor for companies (D'heur, 2015). Sahoo also refers to creating value in a value chain definition through human capital. He defines the value chain as a coherent set of organizations, resources, and streams of knowledge that enable the creation and delivery of value to the end user (Sahoo, 2010). In another definition of the value chain, namesake Michael E. Porter refers to the value of a product. The value chain therefore shows the total value and is composed by value activities and the profit margin. Value activities are defined here as physically and technologically distinguishable by companies carried out by companies. In addition, as building blocks that produce a valuable product for the end user. In this context, Porter also describes the terms of the profit margin. Thus, the profit margin is the difference between total value and the cost sum required by activities to manufacture the product (Porter, 1999).

Kaplinsky and Morris define the value chain as a range of activities from the manufacture of a product or service to the end user or final disposal after use. Activities for producing a product are described here as production phases. These phases involve a combination of physical transformation and input from various producers and services. In addition, it is described that value chains can differ in their depth. In order to be able to define the value chain in its function, the value chain categories described by Kaplinsky and Morris are discussed. These are: The simple value chain, The extended value chain and the "one or many" value chain (Kaplinsky & Morris, 2000). Both the simple value chain and the extended value chain are relevant for the definition.

2.1. The simple Value Chain

Kaplinsky and Morris describe the effect of interlinked value activities within the value chain in their simple value chain illustration (based on Porter). These links are the relationships between value activities that result from their cost and execution (Michael E Porter, 1999). Thus, the creation of value in the simple value chain begins with the development and design of a product. The next level is production. Here, factors such as the procurement of materials, logistics or packaging play an important role. In a value chain definition, value creation begins through activities in this phase. Thus, the creation of value in the procurement of raw materials begins and ends when the customer receives the goods (Shank, 1989). As the next value-creating activity, the manufactured product is promoted through marketing activities. In the last level of the value chain, the product is then consumed and possibly recycled (Kaplinsky & Morris, 2000). In the sense of realizing competitive advantages, the described interconnected value activities and cooperation can be optimized. Such optimization can be described as an optimization compromise of activities with well-defined goals (Michael E Porter, 1999).

The following example is intended to explain this optimization trade-off.

A confectionery manufacturer can deliver larger quantities of chocolate not in bars, but in tankers. This saves the supplier the costs of molding and packaging. The confectionery manufacturer here reduces its costs of handling and melting the incoming material. Which of the two partners has the greatest benefit from this optimization measure is due to the respective bargaining power and is then reflected in the profit margins (Porter, 1999).

The value chain does not just flow in one direction (based on development). For example, marketing activities, as well as recycling measures and consumers, have an impact on design and product development, which makes the value chain cycle (Kaplinsky & Morris, 2000).

2.2. The extended Value Chain

In practice, however, value chain is much more complex, as there are many other value-creating activities between those shown in the simple value chain. An example of this would be the furniture industry. The value chain would here consist of the production of seeds, chemicals, equipment, irrigation of forest. Sawmills process the wood and then deliver the sawn timber to the furniture manufacturer. The furniture manufacturer then receives another input from the adhesive or paint industry. As described herein, as part of creating value, the product goes through various intermediates until it reaches the end customer and is then recycled after use (Kaplinsky & Morris, 2000). The example shows how many cooperation are necessary to complete a product. It is possible to differentiate between internal and external cooperation. Internal cooperation can be described as an economic, but also partly legal dependency. In contrast, the purpose of external cooperation is not the provision of value-creating activity (Hess & Veil, 1999). By founding cooperation, company networks can be established. A general enterprise network can be described as an organizational

form of economic activity. Often, the cooperation of several companies seeks to realize a competitive advantage. Moreover, a corporate network is characterized by more cooperation than competition with stable relationships between legally independent, economically but mostly dependent companies (Teich, 2002).

Within the context of the value chain, corporate networks are to be assigned to inter-company cooperations, which are characterized by the joint creation of products (Teich, 2002).

2.3. The Food Value Chain

In order to gain an understanding of how value chain theory is integrated in the food industry, the value chain will be illustrated using the example of the food industry. In scientific literature from the perspective of agricultural economics, the presentation of the value chain or food chain is a subset of the food system and agribusiness. Thus, food chain can be defined as a network of actors and activities that interact with one another within an ecological, social and political environment (Gaitán-Cremaschi et al., 2019).

Thus, the definition of the food chain in origin does not differ significantly from definitions of the value chain. Only branches as well as the respective actors and activities are integrated into processes of the theoretical value chain. Looking at the food industry's selling system from a traditional perspective, farmers are increasing seed and the product is being "pushed" into the market. However, they are isolated from the consumer and have little control over input costs (Sahoo, 2010). With the aim of maximizing agricultural production, processes of actors are increasingly interlinked today (Herrmann et al., 2018). These links can be horizontal and vertical. Horizontal links connect players from the same markets or sectors. Vertical links, for example, connect supplier buyers and consumers. Thus, in the vertical integration, all the necessary processes and actors that are relevant for the production of

an agricultural product are linked in the food chain (Burlingame & Dernini, 2018). Following Joshi et al. the food chain can be described in this order as follows: Input, Farmer, Aggregator, Processor, Wholesaler, Retailer and Consumer (Joshi et al., 2017).

The input is given to the farmer in the form of fertilizer or seed, such as seed grain, which he then multiplies and produces. The input of fertilizer can have a positive effect on the propagation of the seeds (Fanzo et al., 2017). The harvested product is then delivered to the aggregators, which aggregate the product. The grain can then possibly be sold as seed for other farmers or goes into food production, so the processors. These then process the products into a consumable product (Levinson, 2013). In addition, at this stage, methods such as fermentation and drying are used to improve products such as vegetables or fruits (Fanzo et al., 2017). The product now to be marketed passes through the wholesaler to the retailer and from there to the consumer (Levinson, 2013). Sometimes, the activity of the aggregator will be skipped. This activity is not integrated for example with potatoes. In Value Chain theory, farmers are thus also connected to consumers, which may have an impact on satisfying the needs and preferences of consumers. Farmers are also working more closely with suppliers and processors. New innovation and feedbacks can increase the turnover of actors in the food chain (Sahoo, 2010).

The dynamics of the food chain has changed in the past. These changes are due to factors such as climate change (Severini & Sorrentino, 2017). Thus, there is a reciprocal effect between agriculture and climate change (Scherer & Verburg, 2017). Farmers in particular are affected by this. Thus, their production can be particularly adversely affected by drought, overhydration or even fire (Lim-Camacho et al., 2017). But other layers in the food chain are affected by climate change in addition to farmers. For example, global warming also affects the infrastructure of the processing layer. This

can spoil food faster and multiply the pathogens. Thus, the costs in logistics also increase due to the required cooling. Likewise, climate change impacts on product diversity. This will reduce the product availability of some foods (Allen & de Brauw, 2019). Another influence on the food chain is an increased complexity in consumer demand for food. Characteristics of foods such as quality, safety, origin play an important role in the decision-making of consumers today and are thus highly relevant to the entire food chain (Severini & Sorrentino, 2017). The food industry needs to adapt to changes in consumer behavior. This change is marked by a continuing increase in the number of allergy sufferers, vegetarians and vegans who are calling for more food information. (Lehmann, 2015). By creating transparency of production activities, needs of consumers can be met. At the same time, the competitiveness of the respective companies is increased (Lim-Camacho et al., 2017).

2.4. Shared Value

Some large companies were already in the press due to a scandal. Often this scandal is due to the production of the respective products. The food industry in particular has often been the focus of negative headlines in the past (Luhmann & Theuvsen, 2016). A consumer trend is emerging, where existing and potential customers are increasingly critical of what companies are doing in terms of economy, ecology, and society (D'heur, 2013). The creation of shared value deliberately aims to contribute in the three dimensions. For example, shared value implementations should be defined as company policies and practices that enhance competitiveness while promoting social and economic conditions in the regions where the company operates (Moore, 2014). The concept for creating shared value developed by Porter and Kramer in 2011 aims to ensure that the implementation of such activities is entirely self-interested. At the same time,

entrepreneurial interests, social interests and the interests of the environment should no longer be separated. The goal is to create a balance between entrepreneurship and society. The goal of the implementation of shared value is to create a balance between companies and society, based on the basic understanding of interdependence and opportunities and risks (Porter & Kramer, 2011) Simplified defined, companies meeting challenges through the integration of Shared Value of generating social benefits and profit at the same time (Corner & Pavlovich, 2016).

Since the publication of the article by Porter and Kramer in 2011 a lot has happened. Worldwide, the concept is implemented by leading companies. Leading companies such as Nestle, Intel, Unilever, Coca Cola and also Western Union (Moore, 2014). D'heur also describes an entrepreneurial change to be started, which was initiated by pioneering companies. They began to take responsibility for the entire value chain. Above all, previously neglected externalities are included in decision-making processes. These externalities refer to the costs of doing business that are not paid by the company (D'heur, 2013).

Often the terms corporate social responsibility (CSR) and shared value are defined as equal. However, they need to be differentiated. The following points already extracted show the core of Corporate Social Responsibility:

- Corporate philanthropy: sharing money the company has already made
- Corporate sustainability
- Reputation management
- Risk management; changing business practices
- Typically led by CSR, Marketing,
- Corporate Communications

In order to be able to understand the differentiation to the shared value theory, the core points are also presented in this regard:

- Design new products and services that meet social and environmental needs while delivering a financial return
- Access new markets
- Reconfigure and secure the value chain by tapping new or better resources and partners to improve productivity
- Create local clusters to strengthen economic and social benefits at the community level (Moore, 2014)

This comparison of Moore shows that the "Creating Shared Value" approach of Porter and Kramer refers in particular to the added value for economy, ecology and society, which should already arise during, and even before the production of a certain value. By contrast, Corporate Social Responsibility, on the other hand, refers to sustainable activities that take place after the production of a value that may have a negative impact on the dimensions of economy, ecology, and society. Thus, CSR activities use money for sustainable purposes, which may have been generated by unsustainable production processes (Moore, 2014). To avoid scandals and customer confidence crises, the shared value approach is becoming increasingly important for companies. It is therefore relevant to pursue product development and the value chain on the basis of sustainability criteria (D'heur, 2013). However, before shared value approaches can be implemented by a company, a rethinking must take place, so that shared value approaches also fit in with corporate culture (Font et al., 2016). The implementation of shared value is described in a column model by its developers Porter and Kramer.

This is how products and markets are first redefined. This is the conception of sustainable products which either solve social problems or are oriented towards a common added value, such as a benefit for ecology and society. The next step is to redefine value creation productivity. The aim here is, to increase the quality and quantity as well as the reliability of the added value productivity and

at the same time to stand up for the preservation of natural resources, or to secure resources. Finally, the integration of the respective company into local economic cycles, which should be stable and interact (Porter & Kramer 2012).

Shared Value approaches promise a positive outlook for the dimensions of economy, ecology and society. Above all, the positive effects of shared value create a stable basis for future profitable growth in companies and society (D'heur, 2013)

3. Corporate Social Responsibility

The topic of Corporate Social Responsibility (CSR) is firmly anchored in many companies today. CSR can be defined as a measure by companies where companies voluntarily take social and environmental considerations into account. Here, e.g. related to the production of goods, but also to the interaction with stakeholders. CSR is voluntary and there are no legal obligations (Idowu et al., 2015).

Other authors change the perspective of the definition of Corporate Social Responsibility and differentiate whether a company is allowed to call itself a "social responsible".

Corporate Social Responsibility activities are creating transparency, they are social, based on ethical and legal rules and take responsibility for society, the environment, employees and investors (Mazur-Wierzbicka, 2015). The just mentioned transparency on the part of companies can be generated, for example, by not only communicating the implemented Corporate Social Responsibility activities, but also how Corporate Social Responsibility aims are to be achieved (Hildebrand et al., 2017). Challenges are handled by companies through self-imposed policies and organizational measures. These measures and guidelines are influenced by institutional, organizational and individual actors (Aguinis, 2011). Based on research on Corporate Social Responsibility has been proven that there is a positive correlation between the implementation of CSR measures and the buying behavior of potential

customers (Khan, 2017). Thus, the greater the CSR level or the frequency of implementing Corporate Social Responsibility activities, the more positive the evaluation of the company by the customers (Mohr & Webb, 2005). Regarding the purchase decision is the already mentioned factor of transparency.

Research has shown that consumers made their purchasing decisions without knowing the background information on the product (Peloza et al., 2015). However, consumers are given information about a product, e.g. over the production cycle, they prefer the "transparent" product. A lower price of an alternative product cannot compensate for this preference (Mohr & Webb, 2005). In scientific literature and general reporting, the implementation of Corporate Social Responsibility activities into a company is due to a variety of motivations. For many companies, the positive effect of Corporate Social Responsibility is well known. Companies exposed to scandals such as balance sheet manipulation, excessive salaries in top management and environmental damage in public are trying to regain the trust of their investors, employees, suppliers and customers by implementing Corporate Social Responsibility policies and Corporate Social Responsibility activities (Loew et al., 2004). From this it can be deduced that not only environmental protection and social interests are the driving force for the implementation of Corporate Social Responsibility activities, but rather the building of a positive image. For many companies, it is not just about making the world a better place, but rather about getting positive responses. (Hildebrand et al., 2017). Nevertheless, a positive correlation between Corporate Social Responsibility and buying behavior is a long process. The introduction of Corporate Social Responsibility into the corporate structure is not reflected in positive numbers immediately after implementation. For example, managers often still view Corporate Social Responsibility as an expense and not as an investment (Mohr & Webb, 2005).

The restructuring of a company that in the past has proven to be harmful to the environment and socially responsible to a company that implements Corporate Social Responsibility guidelines in its structures can also be described as a "greening of management". Decisions according to the "greening of management" are always made in consideration of environmental protection. The emphasis is on eco-friendly design, on the environmentally friendly purchasing of goods, on environmentally friendly production processes and on environmentally friendly marketing. In addition, all processes are trying to save resources. But it should be ensured that the production process produces substances that have a negative effect on products. Thus, Corporate Social Responsibility can intervene throughout the product lifecycle - from design to disposal (Tai & Chuang, 2014). Environmental considerations include eco-friendly design, green purchasing, eco-friendly manufacturing-practices, and environmentally responsible marketing, as well as an effort to conserve resources and ensure that there are no harmful effects on products that are harmful during the production process. In addition to improving the corporate image, embedding Corporate Social Responsibility policies can also impact a company's product diversity. In this way, as a food manufacturer, it is credible to penetrate the niche market for organic food (El Baz et al., 2016).

3.1. Corporate Social Responsibility in the Food Industry

The food industry in particular has repeatedly been criticized by environmental scandals in the past (Luhmann & Theuvsen, 2016). Consumers, activist groups, politicians and communities urged the food industry to be more concerned with the environment. The companies reacted. In particular, companies that have not been associated with environmental and social responsibility in the past are currently demonstrating their Corporate Social Responsibility programs.

Starbucks, McDonalds and Pizza Hut are moving forward as a positive example. Thus, their own CSR guidelines on sustainability are stricter than the framework conditions of the respective legislator (Kim, 2015). The strict guidelines are effective - only 1.9 percent of the tested in 2014 exceeded the limit of permitted pesticide residues (Federal Ministry of Food and Agriculture, 2016, p. 10). Above all, the producers of food, so the farmers, are facing great challenges through Corporate Social Responsibility. Analyzes by European society show that Corporate Social Responsibility activities are increasingly demanded by farmers. According to this, farmers should realize a high standard for agricultural production. These standards relate in part to an eco-friendly economy and the welfare of livestock (Mazur-Wierzbička, 2015).

The Committee on Twenty-First Century Systems Agriculture divided the requirement of Corporate Social Responsibility to the farmers in four points:

1. Satisfying people's needs in terms of food, fiber and the production of biofuels.
2. Increasing the quality of the environment and conserving resources
3. Maintain the economic viability of agriculture
4. Improving the quality of life for farmers and their employees (National Research Council, 2010)

If one compares the definitions of the National Research Council to guidelines of Corporate Social Responsibility with the definitions of the Federal Ministry of Food and Agriculture (BMEL), a consensus can be established. This consensus mainly refers to points 1-3. The "Green Paper" written by the BMEL substantiates the Committee on Twenty-First Century Systems Agriculture Points. For example, resource security is related to livestock, fisheries and forestry. The Green Paper describes perspectives on CSR projects. This includes u.a. stopping the killing of newborn chicks as this is not

ethically accountable. The German forests should also be reforested, as this contributes to increasing climate protection. The conservation of fish stocks is also to be prioritized according to BMEL as a livelihood for inland, marine, coastal and fishery fisheries. Fish stocks are becoming more and more important in the context of increasing world population (for example through animal proteins) (Federal Ministry of Food and Agriculture, 2016). Finally, it has to be mentioned that the guidelines of the National Research Council and the BMEL do not constitute binding regulations but must be understood as a voluntary action recommendation within the meaning of the definition of Corporate Social Responsibility. Because voluntariness is the basic principle of Corporate Social Responsibility. Additional regulation would prevent the development of innovative Corporate Social Responsibility development (Loew et al., 2004).

4. Climate Smart Agriculture

The concept of Climate Smart Agriculture is a response to the effects of climate change (Capalbo et al., 2014). Nevertheless, there are other indicators. Environmental change, the saving of natural resources, population growth and science and technology are drivers of the Climate Smart Agriculture concept. The goals of the concept include food security, healthy livelihoods and resilient agriculture (Steenwerth et al., 2014). From the Climate Smart Agriculture concept definitions, it can be deduced that conventional agriculture can not feed the steadily growing world population under sustainable conditions, as it pollutes the environment and minimizes natural resources. In scientific literature, conventional agriculture has even been linked to food insecurity (Braumoh, 2013). Conventional agriculture is therefore one of the main sources of emissions and minimization of forests. 30 percent of global greenhouse gas emissions are the result of unsustainable agriculture (Braumoh, 2013).

5. Results / Discussion

The term Climate Smart Agriculture can generally be described as an agricultural activity in which production processes are adapted to climate change in parallel with the more ecological and maximized in terms of food security (Capalbo et al., 2014; Bayala et al., 2017; Fanzo et al., 2017). For example, Climate Smart Agriculture is about providing elemental goods such as food, wood or fuel (Steenwerth et al., 2014). In addition, Climate Smart Agriculture refers to the restructuring and adaptation of farms to the sometimes extreme climatic conditions (Mullins et al., 2018). Thus, the concept of Climate Smart Agriculture as a solution is to be able to feed growing world population through sustainable production (Scherr et al., 2012). In addition, integrating a Climate Smart Agriculture concept into farm structures can increase farm income (McCarthy & Brubaker, 2014). In the past, in the theory of agricultural economics, the increase in farm income could not be achieved with sustainable production (Bogdanski, 2012). Maximizing productivity while increasing sustainability in Climate Smart Agriculture production processes can be achieved through innovation technology (Acharya, 2009). Innovations as well as smart technologies count as particularly relevant here.

6. Conclusion

This study has presented the current state of research on sustainable production through definitions of Corporate Social

Responsibility, the Shared Value Theory through its link to Climate Smart Agriculture. It was necessary to examine whether Climate Smart Agriculture meets the requirements of the Corporate Social Responsibility concept and the Shared Value Theory. Thus, it can be said that the challenges of the Corporate Social Responsibility concept and the Shared Value Theory are only partially met.

For example, the integration of Climate Smart Agriculture into agricultural processes in terms of sustainability and global warming are being questioned. It also covers the dimensions of ecology, economics and social issues. Thus, in the ecological dimension, the protection of finite resources also protects the local environment sustainably. In addition, it can be stated that climate-oriented agriculture also has economic added value, for example due to the more precise handling of seeds and chemicals. However, this refers to the Shared Value approach. If one refers to the differentiations of Moore, Corporate Social Responsibility is not to be integrated into the production process of the Food Value Chain. For example, because Corporate Social Responsibility invests money in sustainable processes that have been made through unsustainable production. Rather, corporate social responsibility is marketing oriented, hoping that the corporate identity and the respective brands will be classified by consumers as sustainable and "green. By contrast, the shared value approach according to Porter and Kramer focuses on a new conception of products and, for example, innovative processes for the production of goods such as food.

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