An integrated conceptual framework for sustainable agroindustry

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Abstract. Sustainable agroindustry is an important concept that is often cited by academics and practitioners in the field. However, its definition and underlying constructs are rarely discussed. This paper provides a review and summary of different frameworks that are used to define and understand sustainable agroindustry. This review is summarized and synthesized into a single conceptual framework of a business model for shaping sustainable agroindustry. The main concepts to be discussed are agroindustry, business models, and sustainability. The expected outcome of this single conceptual framework is for agroindustry development by identifying key elements of strategic initiatives for further research. The business model can support the realization of sustainable agroindustry by taking into account three aspects of the indicator namely economic, social and environmental. These three indicators must be met in creating a business model by taking into account aspects of the business model that includes value creation, value delivery and value capture. A single conceptual framework of business models for sustainable agroindustry can be created if three aspects of the business model can meet the three main indicators for sustainable agroindustry.

1. Introduction

Agroindustry, also known as the agricultural industry, is understood as an industry that carries out the processing of agricultural products (plants or animals) into a product (finished or semi-finished) to increase its added value. Agroindustrial activity is an integrated system that involves natural resources (agricultural products), human resources, capital, information, science, and technology. Indonesia, an agrarian country, has a great opportunity to increase agricultural-based industrialization activities. The agricultural sector and the industrial sector is one of the main sectors in the development of the national economy. Agroindustry is one sector that must be developed if we are going to develop the agricultural sector [1]. Indirectly, the growth and development of agroindustry will encourage the achievement of agricultural development.

At present, agroindustry has developed into sustainable agroindustry which has close links with the environment [2]. Agroindustry always utilizes technology in its activities, so it can be concluded that sustainable agroindustry has a relationship with technology. Technological innovation is considered as a key factor that is very decisive in a company because it is closely related to carbon emissions, energy consumption, and reduction of material requirements.

Therefore, all activities involved in agroindustry are directed to meet the interests of the community now and in the future. So if sustainability is always associated with technology, the technology used...
by industry must follow the carrying capacity of natural resources, not causing environmental degradation, economically beneficial and socially acceptable to the community. The definition of sustainability in the community is clear and a company will present it as a responsibility and an opportunity. The responsibility is to ensure that the products produced are safe for the environment and humans [3]. Sustainable agro-industry is also supported by the concept of a business model. The business model will explain about how the company runs the business or about how the company creates, delivers and captures a value that has been created [4]. The three main concepts in the business model need to adjust to these conditions to create a sustainable agro-industry.

This paper is written to develop a single conceptual framework between business models and sustainable agro-industry. A business model concept needs to be developed by considering three main indicators of sustainable agro-industry. During this time, a growing study is about sustainable agro-industry that emphasizes environmental aspects and sustainable business models that are still separated with support for creating sustainable agro-industries. From the results of the study of this paper, it is expected to provide a reference in developing a business model that can create sustainable agro-industry. It is also expected to be able to assist in the development of agro-industry or become a reference in formulating a policy.

2. Methodology

Literature review activities are carried out transparently, replicable, and rationally. The important thing in conducting a literature review is to ensure that the literature used is relevant and up-to-date. Before conducting a literature study, several things can be done, namely by writing a search strategy [5]. The search strategy can be done by:

2.1 Parameter determination

The first strategy is to determine the search parameters. The search parameters defined in this review literature are shown in Table 1.

| Parameters         | Scope                                                                 |
|--------------------|----------------------------------------------------------------------|
| **Language**       | - Indonesian                                                        |
|                    | - English                                                           |
| **Subject area**   | - Sustainability                                                    |
|                    | - Agroindustry                                                      |
|                    | - Sustainable Agroindustry                                           |
|                    | - Factors affecting sustainable agroindustry                        |
|                    | - Business model                                                    |
|                    | - Innovation business model                                          |
| **Business sector**| - Rural business development                                        |
|                    | - Agriculture product processing industry                            |
| **Type of literature** | - Jurnal                             |
|                    | - Proceeding                                                        |
|                    | - Book                                                              |
|                    | - Mass media                                                        |
| **Source of literature** | - Emerald Insight          |
|                    | - Scopus                                                            |
|                    | - ScienceDirect                                                     |
2.2. **Determine the keywords**

Keywords are the basic part that will explain the objectives and research questions, which are then used to determine tertiary literature searches. Search by collecting information from tertiary to primary is done to get more detailed information. Keywords that have been set from the beginning will continue to experience growth. One method used to develop keywords is to create relevance trees.

2.3. **Relevance trees**

Figure 1 is the relevance trees created by developing keywords that have been previously determined. Relevance tree can be built with these steps; (1) setting research goals or questions as top level, (2) identifying two or more important subject areas, (3) dividing subject areas into relevant sub-areas, (3) dividing sub-areas into sub-areas more appropriate sub-area [5].

![Relevance trees](image)

**Figure 1.** Relevance trees.

2.4. **Systematic review**

After determining the parameters and keywords to be used, the next step is to arrange a systematic review process. Sources of information are accessed through emerald insight, ScienceDirect and other sources. The search keywords for developing literature do not only come from journals related to agro-industry but also those related to business management journals, business strategies, business and environmental journals, journals about sustainable innovation management, etc. The main requirement that must be met is that the reference library source contains elements; agroindustry, sustainability, sustainable agroindustry, business innovation, value creation, environmental aspects, economic aspects, social aspects, and business models. Figure 2 and Figure 3 shows a graph of research developments related to sustainable agro-industry with search keywords; (1) sustainable agro-industry, (2) business model for agro-industry.
From Figure 2 and Figure 3 it can be seen that research that discusses sustainable agro-industry has always experienced growth, especially in the last 10 years. The results of a search on ScienceDirect which discusses the business model for sustainable agro-industry is still lower than Emerald Insight. Thus, there are still plenty of opportunities to conduct research by discussing business models for sustainable agro-industry and publishing them.

3. Result and discussion

3.1. Understanding the concept of sustainable agro-industry
From The concept of sustainable agro-industry based on sustainability is the activity of creating value by taking into account several important things, especially related to economic, social, and environmental aspects. Sustainable agro-industry can be created if resource utilization activities start from the beginning until the end. Each component of the process must pay attention to sustainability because the activities carried out not only pay attention to the present but also the future.

3.1.1. Agro-industry. Agro-industry is a company or industry that processes agricultural products. The description means that agro-industry is only limited to processing agricultural products (raw material). Understanding agro-industry then developed again into an agricultural industry that is also easy to understand by the community, so that people easily accept the term of food industry, beverage industry, etc. The understanding of agro-industry develops more broadly and is not limited to the processing of raw materials in the form of agricultural products. Previous descriptions are used to explain that agro-industry is an activity of processing agricultural products into semi-finished products or finished products. The main reference is the raw material used. The following Table 2 will describe some of the understanding of agro-industry.

| Authors                  | Definitions                                                                 |
|--------------------------|------------------------------------------------------------------------------|
| Austin (1992)            | “An agroindustry is an enterprise that processes agricultural raw materials, including ground and tree crops as well as livestock” |
| Adams and Ghally (2006)  | Agro-industry involves quite several stakeholders ranging from farmers' associations, cooperatives, and companies. The level of stakeholder involvement can be one of the supporting factors for the creation of sustainable agro-industry. |
| Soekartawi (2007)        | Agro-industry in a broad sense is an activity that does not only              |
Authors | Definitions
--- | ---
process agricultural products. More complexly discussing the start of agricultural products, processing and their impact on industrial development. Agro-industry is also not free from 5 sub-systems of agribusiness, namely upstream agribusiness, agribusiness farming, agribusiness processing, agribusiness marketing, and agribusiness coaching and supporting services.

UN Commission on Sustainable Development (UNCSD) (2008) | Agro-industry is an activity of processing, preservation, and agricultural production for medium to final consumption. Agriculture and agro-industry are sectors that have an important impact on economic growth and development.

Wilkinson and Rocha (2009) [8] | Agro-industry is understood as a post-harvest activity in the form of transformation, preservation, and preparation to process agricultural products to then be delivered to consumers. Agro-industry will develop along with the development of the human population because it plays a role in providing food for final consumption.

3.1.2. Sustainability. Furthermore, the term sustainable agro-industry develops. Sustainable agro-industry consists of two terms, namely agro-industry and sustainability. The article written by Peter [3] states that sustainability is part of "doing things right". Currently, sustainability is receiving high attention from academics, policymakers, and industry. Sustainability is also defined as an activity to ensure a better quality of life now and in the future [3]. Sustainability is closely related to three important factors that are social, environmental, and economic [9]. The most widely recognized principle of sustainability work is the triple bottom line that can be used to understand aspects of sustainable development [10]. Sustainability cannot be ignored simply because creating value will have an impact on the environment and society.

The environmental dimension is based on the assumption that human life is related to the physical and biological environment [10]. Value creation activities carried out by the industry will also have an impact on the environment. Environmental impacts that are often a concern are acid rain due to air pollution, habitat destruction due to exploitation of natural resources, drought, sea surface siltation, consumption of energy resources and toxic materials [11]. On the social aspect, sustainability focuses on developing quality of life. The organization has the responsibility in maintaining the balance of individual and social activities of the community. In terms of social community, we need an activity that has the opportunity to be carried out sustainably such as employment opportunities, and involvement in community local community activities [10] [11] for business sustainability. The economic dimension is related to all financial aspects including the costs to be incurred for the environmental impacts caused.

3.1.3. Sustainable agro-industry. An organization is currently starting to focus on sustainability. Sustainability is meant to meet current and future needs. Organizations or companies need to maintain economic prosperity without sacrificing environmental and social responsibility [12]. Therefore, sustainable agro-industry which is sustainable business thinking will always be related to these three things. The basic concept of sustainable agro-industry can be started with sustainable business thinking. This way of thinking of sustainable business is a positive force because it will contribute to the environment and society while still generating profits [9]. A business model concept can be arranged in the form of a Business Model Canvas (BMC). Business Model Canvas (BMC) is a tool to describe a business in a simple canvas so that it is easy to understand [13]. Several definitions explain the meaning of sustainable agro-industry described in Table 3.
Table 3. Definition of sustainable agro-industry

| Author | Definition |
|--------|------------|
| Giovannucci dan Ponte (2005) [14] | Sustainable agro-industry can be said as a response to changes in global trade. There is a certification system that was initiated voluntarily by the private sector so as to facilitate a more direct relationship between producers, consumer desires, as well as information related to product prices in the market, customer demand related to sustainability. |
| Aguilar-Rivera (2018) [15] | Sustainable agro-industry can be supported in terms of land use for crop production activities that become agro-industry raw materials. For example, land use for sugarcane is chosen that has a productive climate and resources. This will avoid the use of chemical fertilizers, or it can also be done by the continuity of fieldwork in using compost and biological fertilizers, controlling biological pests, reducing the use of fossil fuels. |

3.1.4. Indicators for sustainable agro-industry. An agro-industry can be categorized as a sustainable agro-industry if it has been able to meet several criteria. In a study conducted by Giovannucci and Ponte [14] who analyzed the sustainability of the coffee industry, it was stated that sustainability standards in the coffee industry were fair, organic, and environmentally friendly trade. These criteria can also apply to various other types of agro-industry. In a food product, the intended sustainability criteria are the sustainability of the product itself. Sustainability criteria for products can be in the form of comfort, health, quality and price [14]. When stakeholders want an agro-industry to be sustainable, the stakeholders must be able to ensure that the products produced from the agro-industry have some of these criteria.

Indicators of sustainable agro-industry can be formulated from indicators of sustainable development for the industry. These indicators can also be designed from integrating indicators between industries. Indicator preparation activities can be carried out by comparing similar products made by different industries, comparing the processes carried out by each industry to produce the same product, comparing the performance of achievements among similar industries, and conducting an assessment for sustainable progress. The indicators used are based on indicators of sustainability in terms of environmental, social and economic aspects. The scope of indicators of environmental aspects is divided into the assessment of the arising environmental impacts, resource efficiency, and the actions of stakeholders. Economic indicators are divided into financial and human-capital indicators. Whereas social indicators consist of ethic and welfare indicators [16].

3.2. Business model concept
Agro-industry can not be separated with business model. The relationship between the business model and agro-industry is whereas the definition of agro-industry is to produce a value, the business model is to create, deliver and capture the value created by agro-industry to benefit economically. In terms of business models for sustainable agro-industry, companies also care about social and environmental aspects as a form of responsibility for the value creation activities undertaken. The business model describes how a company conducts business or about how a company creates, delivers, and captures value [4]. A business model will also relate to a strategy to explain the value of a company's products, proforma and competitive advantages of the company [17].

The model deals with the representation of something as a description of an object that can be used for calculations. The business model is a representation of how companies conduct sales transactions and provide services and collect money. The concept of a business model for sustainable agro-industry...
related to how to create, deliver and capture is to integrate the aspects of sustainability during the
value creation process and after that create a sustainable value [18].

3.3. The value of sustainability
To develop a sustainable agro-industry by developing its business model, one important component is
the social aspect. An agro-industry has a social responsibility to the community where the business
stands (rural). The community is invited to participate in contributing to the advancement of their
villages by carrying out activities that will have a positive impact on their personal, family and
surrounding residents. If the agro-industry company succeeds in carrying out social responsibility to
the community, then the agro-industry has the opportunity to be sustainable. Business models that will
support sustainable agro-industry are those that are capable of being environmentally, socially and
economically responsible. At this time the concept of Triple Layer BMC also develops, which is a
business model concept by adding to two layers, namely the environment-based layer at the life cycle
perspective, and the social layer based on the stakeholder perspective [19].

Social and environmental responsibility must be understood by an agro-industry when creating
value. If the social responsibility is carried out by involving the community in activities that have an
impact on their villages, then environmental responsibility will be closely related to aspects of the
product life cycle from upstream to downstream. One thing that can be done is to meet with
customers, then provide knowledge about their responsibilities in consumption, and the company does
not turn its attention to the negative impacts that may occur from the products being marketed [20].

Apart from the triple bottom line component, other factors support sustainable agro-industry. The
development of the concept of sustainable agro-industry cannot only refer to the narrow definition of
agro-industry, namely the processing of agricultural products. A broader understanding of agro-
industry has a more complex definition that is related to activities from the production of agricultural
products, then processing them, to their impact on development, especially rural development [7]. The
next supporting factor in sustainable agro-industry is policy. The policy that is often discussed is the
policy in industrial development which consists of two groups namely policies related to product
development and market development. These two policies, then used as a basis for the development of
sustainable agro-industries [7]:

a. Market penetration policy; where this policy deals with directions on how to sell old
   products on the old market
b. Market development policy; this policy deals with directives about selling the same product
   in new marketing areas
c. Product development policies; relating how to sell new products with the same raw materials
   in new markets
d. Product diversification policy; is related to directives to sell new products from the same raw
   material in the old marketing area

Another factor that supports sustainable agro-industry is the external environmental factor that
challenges a company to be able to keep up with the changes that occur. A company must be able to
adapt to changes in the external environment related to political, social, economic, and technological
factors. The ability of corporate adaptation can be seen from the ability to change in terms of work
culture, strategy, structure and systems so that companies become competitive [21]. The government
also has a role to support the success of sustainable agro-industry. The government can create
programs that support improvement of the welfare and income of stakeholders involved in agro-
industry. The government can issue a number of regulations that are issued and very tight supervision
including micro-credit regulations, labor, licenses, and product certificates.

4. Integration of business models for sustainable agro-industry
From these descriptions, the main focus of this paper is to develop a concept that integrates a business
model with sustainable agro-industry. Understanding of the business model that has been known so far
is about how companies will create, deliver and capture a value [13] or about how input is used in a process and finally produces an output. Osterwalder and Pigneur [12] explain the concept of a triangle business models that are subject or strongly influenced by the external environment. Strengths from the outside environment include changes in law, social, technology, and changes in customer demand.

Table 4 will explain how each indicator in the aspect of sustainability is used to create a sustainable agro-industry or sustainable business model. So, it will be able to become a reference in developing integrated concepts of a business model for sustainable agro-industry.

Table 4. Indicators of sustainability to create a sustainable business model and business model innovation.

| Indicator      | Result                                                                                                                                                                                                 | Reference |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Economy        | 1. In order for a business to be sustainable and sustainable, it is necessary to develop business methods that can produce competitive advantages from customer value.                                         | 1. [8]    |
|                | 2. Business models can be utilized to arrange sustainable consumption in the form of maintaining relationships between companies and customers.                                                             | 2. [23]   |
|                | 3. The concept of a sustainable business model has the opportunity to replace the concept of a business model with a sustainable competitive advantage. Business models are structured to achieve the mission of organizational sustainability. | 3. [24]   |
| Social         | 1. It is expected that competitive advantage will make a positive contribution to society and the company.                                                                                           | 1. [8]    |
|                | 2. All activities in the company should always proactively involve all stakeholders, so that positive impacts are expected, especially between the company and consumers.                               | 2. [25]   |
| Environmental  | 1. Competitive advantage must also make a positive contribution to the environment and can minimize hazards. One of the tools that can be used to pay attention to environmental aspects is the LCA (Life Cycle Assessment). | 1. [8]    |
|                | 2. The combination of sustainable consumption with the economic concept will overcome challenges mainly related to the environment such as reducing emissions, increasing the reuse of some recyclable products.          | 2. [23]   |

Currently, researches often discuss about sustainable business models or business model innovations. Business model innovation itself can be in the form of start-up, business model transformation, business model diversification, and business model acquisition [24]. Besides that, also developing a sustainable business model archetype which consists of (1) technology related to activities that will be related to efforts to use energy more efficiently, (2) social will relate to stewardship roles that are easily adopted, (3) organizational, one of its activities are related to resilience in loan granting and sustainable financial products [25].

From some descriptions above, it can be seen that research that addresses business models is about sustainable business models or business model innovation. Not many researches have discussed the concept of a business model to support sustainable agro-industry. Therefore, this paper examines the relationship between business models and sustainable agro-industry to become a single integrated conceptual framework. The core explanation of the concept of a business model are:

a. Value creation is an activity to create value (goods or services) that will be delivered to customers. The value that will be delivered to the customer must have a high value.
b. Value delivery is very important because it will relate to customer loyalty. The organization conveys the value that has been made to the customer. The consumer has the right to decide whether or not to use the value created by the company. Marketing department of the company plays an important role in maintaining customer loyalty.

c. Value capture is the stage where the company will get revenue from the value that has been delivered to customers. Detailed calculations are needed for the company when it will get economic value from the value that has been delivered to customers, especially if we want a sustainable company. Then there will be more consideration in calculating the value capture that will be obtained by the company.

Figure 4 shows the results of identifying indicators and supporting components for sustainable agro-industry. The concept of developing a sustainable agro-industry business model starts with the analysis and determination of sustainable agro-industry indicators and then arranges its components.

![Figure 4. A framework: Business model for sustainable agro-industry.](image)

The idea of integrating three important aspects of this business model is explained in more details in the description in Table 5. Every aspect that becomes a measure of sustainable agro-industry must be considered carefully. Especially, if agro-industrial companies are still on a small scale that has a big enough opportunity to engage in the practice of activities that care about the environment [2].
Table 5. Integrating important aspect business model for sustainability.

| Economy | Indicator | Social | Environment |
|---------|-----------|--------|-------------|
| Value Creation | - Value proposition based on products or services | - Policy on resource use (exploitation policy) | - Impact of product creation on the environment (emissions, packaging, etc) |
|          | - Selection of technology for the process | - Community involvement by building strong social communities | - Energy use |
|          |                      | - Balance between individual needs, natural capacity | - Used a friendly technology for environment |
|          |                      | - Opportunities for job creation | - Company commitment to the environment |
| Value Deliver | - How much customer will spend money for our products (potential customer segment) | - Benefit offered to customer | - Customer awareness of the environment |
|          |                      | - Distribution channel to convey value | - Health issue |
| Value Capture | - The benefits derived from the value that has been created and delivered to customers | - Conformity of the values conveyed by the company with values and morals of the community | - Availability of resources as key resources |
|          | - Percentage for capital (raw materials, production costs, and other costs) | - Government policy (regulations, policy, indicators) | - Impact of the product on the environment in the short and long term (for example: product packaging) |
|          | - Percentage for CSR (Corporate Social Responsibility) | | - Policies for repairing environmental damage |
|          | - Percentage saving for environment recovery | | |

4.1. Key elements in the business model for sustainable agro-industry

The key elements in a business model for creating a sustainable agro-industry are usually influenced by three main pillars, there are environmental, social and economic. In the context of a sustainable environment, a business model that is designed must be able to (a) maintain a stable resource base, (b) avoid over-exploitation of renewable resources, (c) use non-renewable resources wisely. In the context of economic sustainability, they have different meanings. However, the notion of a sustainable economy in a developing social environment is to gain increased efficiency and to develop added value from available resources. Social sustainability is an activity that must have a focus on the impact of the system being evaluated and its relationship directly with all stakeholders [6].

The business model for a sustainable agro-industry allows businesses to pay more attention to social aspects. The market of the products produced is developed by leading to innovation for the social aspect, the market in which to operate acts as a catalyst to facilitate development [18]. There is
also a focus on the environment, one of which is by the practice of more efficient waste and energy management and the reduction of processes that are harmful to the environment [22]. A sustainable business model can be developed by determining a business case. A sustainable business case can be created with an innovative business model that involves systematic social, environmental management [20]. Efforts to achieve sustainability in agro-industry can be done by changing the company’s business model.

5. Conclusion
Some citations have described the journey of an agro-industry concept and then developed into a sustainable agro-industry. Sustainable agro-industry can be compiled from the concept of a business model. The concept of a business model is defined as the activity of creating value, capturing the desires of consumers, and conveying that value to consumers. The activities carried out in agro-industry so far have aimed to produce a value / profit for the company. All this time, the activities carried out only focus in terms of the economy, then develop to pay attention to social and environmental aspects.

A deeper explanation is needed related to the single concept of how the business model concept can build a sustainable agro-industry. The conceptualization of a business model for sustainable agro-industry is carried out with regard to 3 main aspects namely social, economic and environmental. There is a more detailed discussion related to the business model from an economic perspective as conducted by Osterwalder [13], and discussion in the business model related to the environment and social was conducted by Joyce and Paquin in 2016 [19].

Sustainable agro-industry can be prepared by meeting several indicators which are divided into 3 main indicators, namely social, economic, and environmental indicators. Components that can meet these indicators consist of policy components issued by the government, stakeholders involved from the beginning (producers) to the end (consumers), company activities and business models. The business model discussed can develop sustainable agro-industry by paying attention to the details of the activities of value creation, value deliver and value capture.

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