INTEGRATED BUSINESS MODEL OF SUSTAINABLE DEVELOPMENT FOR AGRICULTURAL SECTOR

Svitlana Strapchuk
V. N. Karazin Kharkiv National University, Ukraine
ORCID: https://orcid.org/0000-0003-2809-6633


**Purpose.** The purpose of the article is to improve the methodology of the integration process of business model to ensure environmental, social and financial results of entrepreneurial activity taking into account the interests and needs of stakeholders and to study the possibilities of implementing sustainable practices in different segments of the business model and the sustainable value created by these transformations.

**Results.** The study highlights a number of approaches to the methodology of creating sustainable business models, which are the Business Model Canvas, the Teece Business Model, the Ecosystem Pie Model, and the Sustainable Value Creation Model. Each of the methodologies has its advantages and disadvantages, but they all have common elements that can be combined and integrated when considering industry specifics. The author used the methodology of creating sustainable value, which is formed through the implementation of new approaches to the implementation of sustainability, in particular, the methods of ecodesign, climate-smart agriculture, organic farming, biodynamic agriculture, sustainable intensification and renewable agriculture. Sustainable value is created through activities in different segments of the business model, at the same time the Business Model Canvas (BMC) is a template for mapping the transformations in each segment. The integrative business modeling approach is able to provide a detailed qualitative overview of a specific business by combining social, environmental and economic components with stakeholder theory. Therefore, taking into account the needs of a wider range of stakeholders than is provided for in the "key partners" field of the Canvas model took place through the implementation of sustainable value in the complex Ecosystem Pie Model.

**Scientific novelty.** The scientific novelty consists in the adaptation of the methodology of transformation of traditional business models into sustainable ones for the agricultural sector, which, unlike the existing ones, allows taking into account sustainable value through new sustainable approaches that cause changes in the fields of Business Model Canvas with the subsequent transfer of their individual elements to the Ecosystem Pie Model for a systematic visual perception of both the current situation and prospects for further development for the enterprise.

**Practical value.** The results of the research can be used by scientists, representatives of business and state institutions dealing with the issue of introducing sustainability principles into existing traditional business models, based on the needs and interests of stakeholders.

**Key words:** sustainable business model, transition to sustainable development, stakeholder integration, agriculture, sustainable approaches, sustainable value.

**Introduction.** International trends in the implementation of sustainable practices stimulate businesses to improve models in order to meet consumer expectations, standards and be competitive in the industry.
The search for the optimal solution to form a more sustainable agriculture should correspond to the assessment of the possibilities of implementing advanced practices and combine different methods into a new approach in business modeling. This requires the creation of an integrated business model for sustainable development, focused on ensuring production efficiency, social responsibility and conservation of natural resources, taking into account the interests of stakeholders.

The agricultural sector has a number of features that distinguish it from many other industries. Most of the businesses in it are farm-based and run directly by owners who are long-term oriented and expect their heirs to continue the business. At the same time, farmers focus not only on their own growth and income, but also take care of social and environmental issues of the community. In agriculture, there are many small producers and processors at the beginning of the supply chain, while all power is often concentrated in retailers at the end of the chain [1]. Also, the close connection between production processes and product quality & safety is a specific characteristic of the sector.

Therefore, meeting market requirements regarding product quality and safety, with an emphasis on the ability of the economic system to interact with the environment and ensure its regeneration, is possible through a change in traditional business models. Ecodesign, climate-smart agriculture, organic farming, biodynamic agriculture, sustainable intensification and renewable agriculture are new approaches to implementing sustainability and increasing added value. Applying these approaches requires a well-grounded and balanced business modeling methodology to help market players quickly adapt to technological changes in the business environment.

Review of literature. Recently, there has been an increased interest among scientists in sustainable business models that include social and environmental aspects of value creation. Most studies call for the integration of sustainability principles such as efficiency, systems thinking and consistency [2; 3]. However, the transition from traditional to sustainable models should resolve the incompatible contradiction between sustainable development and the creation of economic value [4]. Agricultural enterprises, in addition to social and environmental pressure, are in a competitive environment. The appearance of new technologies, the opening of foreign markets and the desire of retailers to cooperate with large operators threaten the existence of small farmers. Taking into account the importance of a systemic approach to global problems and the connection of agriculture with the needs of man and nature, there is an objective need for integration into traditional business models of sustainable practices focused on the ecological and social component.

In paper [5], the methodology of implementing a business model of sustainable development through the introduction of eco-innovations with high added value based on eco-design methods is considered. The implementation of this model occurs through a combination of elements of non-standard thinking, inspiration from nature and the 5R concept (rethinking the product and its functions, reducing energy and materials, replacing harmful chemicals, reusing the product, re-cycling materials and energy) [6].
Technical and technological aspects of ecodesign depend on the application of comprehensive certification, life cycle assessment, life cycle costing, MET matrix and ecolabeling [7].

The business modeling methodology is based on a combination of a holistic view of the ecosystem and stakeholders, a detailed description of the internal elements of the business model, and a technologically driven innovation implementation mechanism. An integrated approach to business modeling with its approbation was proposed by a team of authors headed by Goncearuc et al. [8]. The researchers singled out three methodological concepts for building a business model:

1) Canvas Business Model by Osterwalder and Pigneur, which includes nine components that can be grouped into customer perspective, business perspective, financial perspective, and value proposition [9]. The main advantage of this concept is a detailed approach to business modeling. The disadvantage is the static nature of the model, which does not contain a transformation mechanism. Also, other interested parties of the business system (except partners and customers) remain out of consideration.

2) Teece Business modeling in the form of a business scheme with a description of how the enterprise creates value, defines customer segments, finds available sources of income and related costs, and constantly reviews these steps [10]. The mechanism of filling the business model begins with the selection of new technological developments that will be taken into account in the model. The elements of the Teece model, despite the differences in the mechanism, are quite comparable to the Canvas model. A characteristic advantage of the model is its ability to transform through constant revision.

3) Ecosystem Pie Model (circular ecosystem model), which was developed in 2020 by a group of researchers led by Talmar. The business model is an integrated part of the ecosystem [11]. The focus is the value proposition. Each participant in the model has a certain level of involvement in the formation of the value proposition and occupies a certain part of the pie. Each design marks one or more elements of the Business Model Canvas, in addition to the risk field, which depends on the participant at a specific moment in time.

Another approach to integrative business modeling is considered in the study [12]. In the authors’ concept, a methodology was used that involves changing the business model to a sustainable one under the influence of external factors and threats and leads to the creation of sustainable value (Figure 1).

Sustainable value can be created through activities in different segments of the business model, with the Business Model Canvas (BMC) serving as a template for mapping the transformations in each segment. The process of transition to sustainable development begins with the identification of possible new markets and/or products/services within the new sustainable strategy. Thus, business model transformations affect value creation.

Sustainable value research is based on Elkington’s triple bottom line approach
combined with Freeman’s stakeholder theory. Businesses should strive to strengthen their relationships with stakeholders to improve their own social capital and create shared knowledge. The introduction of technologies contributes to the increase in sales revenue, profit and business growth, as well as increases the quality of products and services, increases labor productivity and contributes to participation in global markets.

<table>
<thead>
<tr>
<th>External factors</th>
<th>Internal factors</th>
<th>Creating sustainable value</th>
</tr>
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<tbody>
<tr>
<td>Changes in the business model</td>
<td>knowledge and innovation</td>
<td>circularity</td>
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<tr>
<td>changes in key actions</td>
<td>digital transformation</td>
<td>bioeconomy</td>
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<tr>
<td>changes in key resources</td>
<td>sustainable value</td>
<td>inclusivity</td>
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<tr>
<td>new products and services</td>
<td>internal factors</td>
<td>external factors</td>
</tr>
<tr>
<td>changes in the relationship with consumers</td>
<td>production</td>
<td>future value</td>
</tr>
<tr>
<td>new markets and consumers</td>
<td>diversification</td>
<td>current value</td>
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**Figure 1. Framework based on (left) Business Model Canvas segments and (right) aspects of sustainable value creation**

*Source:* built by the author based on [12].

The integrative business modeling approach is able to provide a detailed qualitative overview of a specific business, starting from a general definition of the enterprise environment at various levels to a specific definition of the company's internal structure, ultimately offering a mechanism for its renewal.

**Materials and methods.** The purpose of the article is to improve the process of integrating the business model to ensure the environmental, social and financial results of business activities, taking into account the interests and needs of stakeholders, studying the possibilities of implementing sustainable practices in different segments of the business model and the sustainable value created by these transformations.

This article uses a case study methodology based on real conditions. This method is known for the study of processes and phenomena that occur in specific situations or in certain contexts [13]. Its advantage lies in the fact that it allows us to understand the considered phenomena on the basis of their detailed description. The methodology was chosen due to the exploratory nature of the study and ensuring the integration of practical and theoretical knowledge [14].

**Results and discussion.** Sustainable agriculture can be defined as “an integrated system of plant and animal husbandry methods applied on a specific site, which in the long term will satisfy human needs for food and fiber, improve the quality of the environment and the natural resource base on which the agricultural economy depends, as efficiently as possible use non-renewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls, maintain the
economic viability of farm operations and improve the quality of life of farmers and society as a whole” [15].

There are different interpretations of sustainable agriculture, most of them are based on three principles [16]:
1) producing more food, feed, fuel and/or fiber per unit of land, labor and/or capital used;
2) preservation of the main ecosystem services;
3) resilience to shocks and stresses caused by climate change.

In agriculture, sustainable value creation includes categories such as innovation and knowledge, digital transformation, circularity, bioeconomy, inclusiveness, product identity, distribution network, collaboration, production and diversification [17]. Operating within these categories, businesses can take into account the interests of different stakeholder groups (Table 1).

Table 1
Description of interested parties in the agricultural sector in the crop production market

<table>
<thead>
<tr>
<th>Participants</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant production market</td>
<td></td>
</tr>
<tr>
<td>Product manufacturers</td>
<td>Enterprises that grow plant products on leased land and with their own or rented equipment</td>
</tr>
<tr>
<td>Land lessors</td>
<td>Owners of land plots who have land shares and provide them for rent</td>
</tr>
<tr>
<td>Intermediaries</td>
<td>Enterprises that purchase raw materials in large batches</td>
</tr>
<tr>
<td>Consumers in the market B2B</td>
<td>Enterprises that purchase products for further processing</td>
</tr>
<tr>
<td>Consumers in the market B2C</td>
<td>End consumers, small wholesale and retail</td>
</tr>
<tr>
<td>Manufacturers (lessors) of equipment</td>
<td>Enterprises that sell machinery or provide it for rent during the sowing and harvesting period</td>
</tr>
<tr>
<td>Regulators</td>
<td>State organizations that control the correct application of laws and rules on the market</td>
</tr>
<tr>
<td>Politicians</td>
<td>A group of people that makes laws and rules</td>
</tr>
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*Source:* built by the author.

Therefore, the value chain involves numerous stakeholders, which can be grouped by markets or niches. Using this approach in research allows us to clearly reflect the various types of values in each category, while taking into account the types of activities that may remain outside the boundaries of these categories. The understanding of value is consistent with the view of managing a sustainable business model, according to which consumer value and profitability should take into account environmental, social and other aspects of intangible value for a wide range of stakeholders [17]. It is important to note that sustainable value potentially leads to obvious benefits for the enterprise, such as reduced costs, new sources of income, increased organizational sustainability, positive public image and prevention of social problems and future legislation.

Taking into account the compromises between the achievement of the well-being
of the population and an ecologically balanced environment requires the use of sustainable approaches and management practices in agriculture that take into account the features of the landscape, ensure operational management and effective use of information arrays related to local soil characteristics, natural and climatic conditions, anthropogenic influence of other related industries and the efficiency of using the involved resources [18]. Accordingly, the provision of benefits from the creation of sustainable value is implemented through sustainable approaches (Figure 2).

Figure 2. Approaches that create sustainable value in agriculture

Source: built by the author.

1. Ecodesign. The introduction of ecodesign requires not only technological and technical parameters of the product, but also a rethinking of its functionality. The production of food products requires healthy and ecologically clean raw materials and, if possible, the replacement of animal raw materials with plant products. At the same time, the products will have a high nutritional value and a low carbon and nitrogen footprint. Ecodesign practice also requires efficient use of raw materials, waste reduction, recycling and reuse [5].

2. Climate-smart agriculture is modern agricultural practices that can increase production, increase sustainability (adaptation - control the dangers of global warming) and mitigate greenhouse gas emissions (mitigation), as well as help achieve food security and development initiatives (productivity). The goal of climate-smart agriculture is to reduce or eliminate greenhouse gas emissions from food, fiber, and fuel [19].

3. Organic farming is a method that emphasizes environmental protection, animal welfare, food quality and safety, resource sustainability and social justice, and uses the market to support these goals and pay for the internal consequences. The main characteristics of organic production include respect for the environment and animals;
promotion of sustainable methods of growing agricultural crops; use of non-chemical fertilizers and means of pest/disease/weed control; production of high-quality food products; lack of use of genetically modified crops [20]. As of 2018, more than 186 countries are actively implementing organic farming. On the other hand, organic agricultural land is only 1.5 % of the total land [21]. Soil fertility control, crop, livestock, farm and ecosystem management, and nutrient efficiency are characteristics of organic agriculture [22]. Consumer health awareness and market demand for organic produce are opportunities for farmers [23].

4. Biodynamic agriculture is a type of alternative agriculture that combines organic and metaphysical concepts based on the teachings of Rudolf Steiner (1861–1925), the founder of organic agriculture. The method is characterized by the use of natural fertilizers and the avoidance of conventional herbicides, insecticides and fungicides, GMOs, in addition, biodynamic farmers take into account natural rhythms – study the solar and lunar movements to determine the optimal time to grow and harvest plants, flowers and edible products to ensure their best quality [24]. As of 2019, biodynamic agriculture is conducted on a total area of 202,000 hectares, of which 150,000 hectares are on the European continent. There are 5,918 recognized farms in various parts of the world, including 3,806 in Europe. The Demeter brand is used to advertise biodynamic agricultural products around the world [25].

5. Sustainable intensification – it is a system for increasing the productivity of agricultural production without harming the environment or requiring the conversion of more non-agricultural land. Intensification is associated with an increase in both resource consumption and resource efficiency. The efficiency of resource use has agronomic, ecological, economic, social, intergenerational and global dimensions [26]. Increasing the application of inorganic fertilizers will increase production per hectare, thereby intensifying agricultural productivity by increasing production per unit of land and, most likely, per unit of labor [25]. At the same time, if other resources are not simultaneously increased (or at least optimized), the Law of Diminishing Marginal Returns will reduce production per unit of fertilizer or per unit of money [27]. This is the best solution for sustainable agriculture in general.

6. Regenerative agriculture is not a separate method, but rather a number of different approaches to sustainable agriculture [28]. Recycling more agricultural waste and adding composted material are the main methods. Permaculture, agroecology, agroforestry, regenerative ecology, and holistic management are widely used in regenerative agriculture on small farms and gardens [29]. Large farms tend to be less philosophically driven and often use “zero tillage” and/or “reduced tillage” methods [30]. Regenerative agriculture fundamentally intends to improve soil health or restore severely degraded soil, which symbiotically improves water quality, vegetation and land productivity” [31]. The Drawdown Project states that “regenerative agriculture improves and sustains soil health by restoring carbon [27] that can reverse the damage caused by industrial agriculture and create a food system that is better for people, animals and the environment.
Implementation of new agricultural approaches and methods should be carried out to ensure environmental sustainability and food security. Only radical changes in the direction of a sustainable global economy guarantee the preservation of nature and its benefits for humanity. These approaches and practices have already proven their sustainability.

For further integration of the business model taking into account the interests and needs of stakeholders, an Ecosystem Pie Model was used, which combines individual elements of the Canvas methodology. The model focuses on sustainable approaches that create sustainable value and allows to demonstrate the complex result of the interaction of social, environmental and economic factors, taking into account the needs of stakeholders.

In the formation of future sustainable value at the level of internal factors, special attention is paid to the creation of relevant knowledge and the implementation of innovations, at the level of external factors, bioeconomy, circularity and inclusiveness may be involved depending on the context. The basis of modeling is qualitative information related to each of the structures. For the example of building an integrated business model (Figure 3), ecodesign was chosen, which includes, according to studies [27], the following four practices:

1) design of products for reuse, processing, recovery of materials;
2) development of products that avoid or reduce the use of hazardous materials;
3) development of waste minimization processes;
4) product development to reduce material and energy consumption.

Modeling involves taking into account all possible sectors that are sustainable practices of the chosen approach and includes a description of sustainable value, key activities, the need for key resources and stakeholders. Based on the results of interviewing business representatives in the agricultural sector, described in [18], depending on the type of practices, an appropriate brief description of each value chain was provided.

The authors of the Ecosystem Pie Methodology [11], who demonstrated the approbation of the model on the example of the use of the latest technology in public transport, propose to establish possible relationships between participants of different sectors of the ecosystem, the level of risk for each sector and the level of dependence, which is debatable. In this study, the author is limited to the identification of sectors and the descriptive characteristics of the relevant circles by sector in the field of agriculture.

The considered methodology for transforming traditional business models into sustainable for the agricultural sector, unlike the existing ones, allows taking into account sustainable value through new sustainable approaches that cause changes in the fields of the business model Canvas with the subsequent transfer of their individual elements to the ecosystem pie model for visual perception both the current situation and prospects for further development for the enterprise. The results of the research can be used by scientists, representatives of business and government institutions
dealing with the issue of introducing sustainability principles into existing traditional business models, based on the needs and interests of stakeholders.

Figure 3. Step-by-step modeling of an integrated business model on the example of eodesign in agriculture

Source: built by the author based on [11; 27].

Conclusions. The study presents a step-by-step approach to choosing a methodology for transforming traditional business models into sustainable ones by integrating the principles of sustainable development into a system of sustainable value, taking into account the interests and needs of stakeholders. The reviewed existing methodological approaches in business modeling take into account in detail the study of relationships between related elements of the system, focusing on critical factors that will determine the success of the model, as well as constantly identifying the need for additional data. The integrated business model provides an understanding of the existing ecosystem, which creates opportunities for optimizing the structure and offers a systematic review of promising approaches in creating sustainable value for external experts of the system interested in investing. Presentation of the research
results in the form of a synthesized visual form provides a better understanding of the processes and submitting information to the stakeholders.

The conducted research has certain limitations related to the insufficient amount of available qualitative information and the timeliness of its updating, which would allow a more thorough description of the structural elements of the integrated business model, based on practical examples, and draw conclusions on this basis. However, despite these limitations, the methodology of forming an integrated business model for agriculture is practical, and its use can improve the state of the domestic business environment.

Prospective directions of further research are in the area of implementation of the structure of income and expenses in the Ecosystem Pie Model and justification of the choice and its consequences for the use in real life of one option from the existing alternatives.

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