



SUSTAINABLE INNOVATION DEVELOPMENT OF ENTERPRISES

Sviatoslav Zhukov, Olena Masligan, Erika Todierishko

Abstract

Increasing competitiveness, reducing costs and costs of production through the efficient use of potential is an important task for any enterprise. This is important for its effective functioning and sustainable development. Innovation is an important factor in the development of an enterprise in a competitive, uncertain environment. A combination of three interrelated pillars – economic, social, and environmental – can enhance its effectiveness from a strategic perspective. They are the ones that characterize the formation of sustainable innovative development of an enterprise of any kind – from industrial to tourism (sphere of services).

The article used various scientific methods of research. Methods of comparison, analysis and synthesis, extrapolation, and grouping have been used to examine the views on the current state of the problems of sustainable innovative development in enterprises. To assess sustainable innovation development of the enterprise used the methods of systems approach, economic analysis, modeling, expert evaluation, integrated assessment, synthesis method.

Currently, there is no unified system of concepts and categories of sustainable innovation that are needed to bring innovation to the enterprise. This requires a definition of concepts and an algorithm for evaluating efficiency for an enterprise in a given economic situation. To this end, the article explores and defines the essence of innovation-related categories: innovation, innovation process, innovation development, sustainable innovation development.

To realize the concept of sustainable innovation development of an enterprise, it is necessary to construct an effective system of measuring it based on an integral indicator. From the moment that the sustainable innovation development of enterprises covered economic, social, and environmental components, the evaluation principles should be completeness, adequacy, complexity, systematicity, consistency of the system based on the generalized index in three-dimensional space

The study found sustainable innovation development is closely linked to overall innovation activity and the capacity of the enterprise in a three-dimensional aggregate index. A study of the economic, social, and environmental dimensions of the concept of sustainable innovation in enterprise development showed the relationship between concept and efficiency.

It's argued that the most effective way for enterprises to measure an integral measure, which takes into account many indicators, is to measure both individually and collectively the overall level of sustainable innovation.

Keywords: innovation, innovation, innovation process, innovation development, sustainable innovation development of the enterprise, evaluation of sustainable innovation development of the enterprise.

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Abstrakt

Zwiększenie konkurencyjności, obniżenie kosztów i kosztów produkcji poprzez efektywne wykorzystanie potencjału to ważne zadanie dla każdego przedsiębiorstwa. Ma to znaczenie dla jego efektywnego funkcjonowania i zrównoważonego rozwoju. Innowacyjność jest ważnym czynnikiem rozwoju przedsiębiorstwa w konkurencyjnym, niepewnym otoczeniu. Połączenie trzech powiązanych ze sobą filarów – gospodarczego, społecznego i środowiskowego – może zwiększyć jego skuteczność z perspektywy strategicznej. To one charakteryzują kształtowanie się zrównoważonego rozwoju innowacyjnego wszelkiego rodzaju przedsiębiorstwa - od przemysłowego do turystycznego (sfera usług).

W artykule wykorzystano różne naukowe metody badań. Metody porównania, analizy i syntezy, ekstrapolacji i grupowania zostały wykorzystane do zbadania poglądów na aktualny stan problemów zrównoważonego rozwoju innowacyjnego w przedsiębiorstwach. Do oceny zrównoważonego rozwoju innowacyjności przedsiębiorstwa wykorzystano metody podejścia systemowego, analizy ekonomicznej, modelowania, oceny eksperckiej, oceny zintegrowanej, metody syntezy.

Obecnie nie ma jednolitego systemu pojęć i kategorii zrównoważonych innowacji, które są potrzebne, aby wnieść innowacje do przedsiębiorstwa. Wymaga to zdefiniowania pojęć i algorytmu oceny efektywności przedsiębiorstwa w danej sytuacji ekonomicznej. W tym celu w artykule zgłębiono i zdefiniowano istotę kategorii związanych z innowacjami: innowacyjność, proces innowacyjny, rozwój innowacji, zrównoważony rozwój innowacji.

Aby zrealizować koncepcję zrównoważonego rozwoju innowacji przedsiębiorstwa, konieczne jest zbudowanie efektywnego systemu jej pomiaru opartego na integralnym wskaźniku. Od momentu objęcia zrównoważonego rozwoju innowacyjności przedsiębiorstw komponentami ekonomicznymi, społecznymi i środowiskowymi zasadami oceny powinny być kompletność, adekwatność, złożoność, systematyczność, spójność systemu opartego na uogólnionym wskaźniku w przestrzeni trójwymiarowej

Badanie wykazało, że zrównoważony rozwój innowacji jest ściśle powiązany z ogólną działalnością innowacyjną i zdolnością przedsiębiorstwa w trójwymiarowym indeksie zagregowanym. Badanie ekonomicznego, społecznego i środowiskowego wymiaru koncepcji zrównoważonej innowacji w rozwoju przedsiębiorstw wykazało związek między koncepcją a wydajnością.

Twierdzi się, że najskuteczniejszym sposobem pomiaru przez przedsiębiorstwa integralnej miary, która uwzględnia wiele wskaźników, jest mierzenie zarówno indywidualnie, jak i zbiorowo ogólnego poziomu zrównoważonej innowacji.

Słowa kluczowe: innowacyjność, innowacyjność, proces innowacyjny, rozwój innowacji, zrównoważony rozwój innowacji przedsiębiorstwa, ocena zrównoważonego rozwoju innowacyjności przedsiębiorstwa.

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1. Introduction

It's clear from the studies that the concept of sustainable development is a combination of methods, tools, and systems that design to address the problems that arise at all stages of production in three spheres: economic, social, and environmental (Kuzior, 2014; Kuzior and Grebski, 2021). Legitimate demands for such an approach require flexibility and adaptation to dynamic development and sustainable development. This requires a focus on innovation processes, methods and tools for development (Grebski, 2021). The application of sustainable development principles in innovation creates competitive advantages and positioning in the market. To achieve a positive result in the enterprise and the public, consumer and environmental spheres, it is necessary to introduce this organizational form, provide support and increase innovation activity in the enterprise. In particular, there is a need to create sustainable innovation units.

By implementing mechanisms to implement sustainable development, an enterprise seeks competitive advantages that reflect growth in innovation-oriented enterprises. Innovation processes in the enterprise, covering all units, make it possible to evaluate all activities of the enterprise in an integrated manner. Comprehensiveness and systematism are important for building the foundation of sustainable development in an enterprise and have a clear definition of the associated paradigm (Chukhraieva N.M., 2014).

As noted above, the overall concept of sustainable development at the country and enterprise levels consists of economic, social and environmental aspects. It became popular at the end of the 20th century. It defined the environmental and social sectors as central to the establishment of an enterprise's competitive advantage. Principles and elements shaping the concept of sustainable development explored and presented in documents "Rio Declaration on Environment and Development", "Millennium Declaration and Outcome Document of the UN Conference on Sustainable Development", "Beijing Platform for Action", "Programme of Action of the International Conference on Population and Development" (Jaeho Shin et al., 2018).

2. Literature review

Many scientists have researched innovation activities in the enterprise, among which it is worth mentioning: Bazhanova M.I. (2012), Biryutin L.S. (2000), Kuvshinov M.S. (2012), Krysko Zh.L. (2015), Mykytiuk P.P. (2015), Orlova V.M. (2015), Ovsianiuk-Berdadina O.F. (2015), Skochylas S.M. (2015), Valdajcev A.V. (2000), Zavlin P.N. (2000). The sustainability of innovation in enterprises has been addressed by many foreign and domestic scientists:

Adams R. (2016), Androsyk Yu. (2016), Bessant J. (2016), Bezus A.M. (2018), Claude Villeneuve 2017, Denyer D. (2016), Dziubko M.Yu. (2017), Epstein M.J. (2003), Filipishyna L.M. (2017), Gomez-Conde J. (2015), Jaeho Shin (2018), Jeanrenaud S. (2016), Kuo-Jui Wu (2015), Lehominova S.V. (2007), Lopez-Valeiras E. (2015), Naranjo-Gil D. (2015), Nemli E. (2004), Overy P. (2016), Prahalad C.K. (2009), Rauter R. (2018), Roy M.-J. (2003), Sapa N.V. (2009), Shafranova K.V. (2018), Shyshlo S. (2016), Usevych V. (2016), Wagner M. (2016). Some elements of sustainable innovation (environmental, assessment) have been addressed by only a few scientists. Among those scientists who have given this issue the greatest attention – Aguilera-Caracuel J. (2013), Bihun U.V. (2019), Ortiz-de-Mandojana N. (2013) (studied environmental factor), Panova E.A. (2015) (worked on estimating of sustainability of innovation development). It should be noted that, with a significant number of research on innovation in enterprises, there is inadequate justification for concepts and categories related to the sustainable innovation development of enterprises. Also, in the research process, it is advisable to pay more attention to systems for measuring the sustainable innovation development of an enterprise. This is possible on the basis of research by Ukrainian and foreign scientists, their methods, their development, and recommendations. This will harmonize and simplify the evaluation process.

3. Methods

To achieve the purpose and objectives of the article, the following research methods use comparison, grouping, tabular presentation of data, an abstract-logical method for the conclusions formulating.

Chapter 1. Substance, basic concepts and categories of sustainable innovation development.

The general director of the project "Global Innovation Index" Banerjee Chandrajit (Global'nyj indeks innovacij, 2020) noted that innovation ensures the improvement of people's living standards (Kuzior, 2021). They should aim at rapid and sustainable development.

Among existing approaches to addressing the impact of sustainable innovation on all levels of enterprise activity, there is no common conceptual approach. There is no definition of such categories as: "innovation activity", "innovation process", "innovation development", "sustainable innovation development", which characterize this phenomenon.

Enterprise innovation is a defining concept in the context of research on sustainable innovation development. Scientists have proposed different approaches to defining this problem in the enterprise, but it needs to be developed. For this purpose, an analysis of the main definitions of concepts and categories is useful.

The Law of Ukraine "On Innovation Activity of 04.07.2002 40-IV" proposes a definition of this term as: "innovative activity – is an activity that uses and commercializes research findings and scientific development and determines the placing on the market of new competitive goods and services" (Zakon Ukrainy, 2002).

We consider M. Kuvshinov, M. Bazhanov, as the most successful definition of innovation activity of the enterprise. It demonstrates demonstrate the impact and linkages of innovative activity with the society, consumer, and innovation spheres. The approach is described as a process aimed at translating the results of research and development into the various spheres of activity of an entity (technical, technological, organizational and managerial, social). The result of the process is better performance (compared to the counterparts) in the current and projected market situation» (Kuvshinov M.S., Bazhanova M.I., 2012).

The broader category is the innovation process". In the framework of the study of sustainable innovation development, it is advisable to use the definition C. Legomines: "Innovation process – is the process of accumulation of fundamental theoretical and scientific-practical researches, research and development, production, marketing and results (commercialization effect), the discovery of new fields, the convergence of application, and the synergistic effect of". This definition shows the continuity of the process even after the innovation has been introduced and integrates all stages and instruments of innovation to meet public needs, which is indicative of marketing (Lehominova S.V., 2017).

P. Mikityuk and others emphasized the existence of two approaches to understanding the category of "innovative development":

- substantive and technological is scientific output-oriented. Innovative development in this case is be seen as the end result of certain scientific or scientific and technological activity;
- operational. It defines innovation development as function-related development – creating, implementing, diffusing, implementing innovation programmes and innovations (Mykytiuk P.P., Krysko Zh. L., 2015).

Differences in the interpretation of "innovative enterprise development" are due to the relationship between the innovation development of an enterprise, the launching of an innovation process, and the innovation potential of enterprises. There is also an interaction between innovation development and the effects of innovation in the enterprise.

P.N. Zaulin, in our opinion, gave the most precise definition: "Innovative development is a series of events from the acquisition of theoretical knowledge to the use of a particular product, technology, or service created on the basis of new knowledge. This development does not end with the realization of an innovative product or technology in practice. During practical use, innovation continues to be explored, improved, acquired new consumer properties" (Zavlin P.N., Biryutin L.S., Valdajcev A.V. i dr., 2000). The definition demonstrates the impact of innovative development on society and the environment after its immediate introduction and promotion in the market.

The analysis of definitions of such categories as "innovation activity", "innovation process" and "innovation development" will help to define "sustainable innovation development".

First of all, sustainable innovation is associated with the enterprise's strategic and systemic relationship to economic, social and environmental aspects. The latter implies the development of new environmentally responsible processes and products. For example, the group of authors (Adams R., Jeanrenaud S., Bessant J., Denyer D., & Overy P., 2016) notes that sustainable innovation requires changes in philosophy and organizational and entrepreneurial values, products and processes. This is important for achieving the goals of creating and implementing social and environmental dimensions, and goes beyond economic returns.

However, an enterprise's commitment to sustainable innovation will have a positive impact on its performance. But that requires financial investment or investment. Several researchers (Gunday G., Ulusoy G., Kilic K., & Alpkan L, 2011, Lopez-Valeiras E., Gomez-Conde J., & Naranjo-Gil D., 2015, Wagner M., 2010) link the results of investment in sustainable innovation to business performance..

Sustainable innovation through its impact on the financial, social and environmental sphere's of an enterprise's operations has a positive impact on its overall development (Aguilera-Caracuel J., & Ortiz-de-Mandojana N., 2013).

Proposed C. Legominov definition successfully combines all aspects of the question: "Sustainable innovation – a permanent, orderly, planned, ready for innovation change set of strategic focused transformations. This set covers all areas of the enterprise's business activities (scientific, institutional and management, technical, technological, productive, financial, marketing, social and ethical) that allows the enterprise system to effectively implement its activities, to respond adequately to the challenges of the external environment, to create competitive advantages» (Lehominova S.V., 2017).

There is a close relationship between the creation of new competitive advantages and the search for new ways of doing business through the impact of sustainable innovation. E. Nemli (2004) noted that if enterprises, their vision is complemented by ecological and social direction it will be able to integrate sustainable development practices into its economic strategic activities, gain a competitive advantage over competitors and enable them to accumulate them, thus ensuring sustainable development.

Examining the influence of open innovation on the economic and sustainable innovation development of the enterprise Rauter R., et al. (2018) presents three hypotheses on the role of innovation development in the enterprise's interaction with external partners.

1. The highest level of economic innovation is associated with a high level of interaction with external partners, and is critical in terms of social, organizational, and ethical challenges in the context of innovation. High levels of extreme integration with consumers, suppliers, and research institutions are a critical competitive advantage that provides the firm with the opportunity to maintain and improve the concept of sustainable innovation. So, as noted by Kuo-Jui Wu et al. (2015) there is a multiplier effect happens. At the same time, innovative sustainability leads to the positive performance of an enterprise, which in turn increases the enterprise's ability to implement a sustainable innovation strategy.

2. The highest level of continuous innovation by an enterprise is associated with a higher level of cooperation with external partners. Economic performance and sustainable development do not always represent the same dimensions of a firm's innovation performance. Some authors conclude that there is a positive relationship between them, stressing the need to include social and environmental indicators for their profitable purposes. Others debate the need for trade-offs in business decisions on sustainable development, which include the adoption of lower returns and profits for the successful implementation of the first stages of sustainable development. Since sustainable innovation development activities take place not only in the business environment but also at the level of the enterprise's innovation, their implementation requires external investment. These investments can reduce a company's initial income, but can lead to innovative outcomes that take into account economic and sustainable development objectives over a long period. This synergistic effect arises from the fact that both dimensions (economic and sustainable development) are already taken into account in product development, business process changes in production or service up to the moment of their "start-up" at the enterprise (Rauter R., et al., 2018).

3. Sustainable innovation in positive interaction. By testing the hypotheses put forward, apart from the positive impact of openness to innovation on the main indicators of enterprise competitiveness, a correlation was found between the economically innovative and sustainable innovation activities of an enterprise. The correlation can be seen in empirical evidence

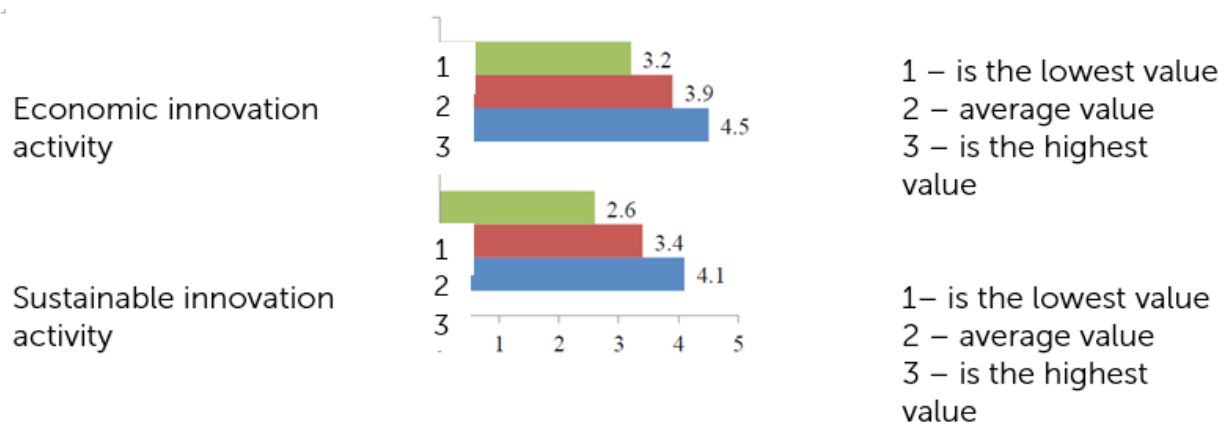
SUSTAINABLE INNOVATION DEVELOPMENT OF ENTERPRISES

Sviatoslav Zhukov, Olena Masligan, Erika Todierishko

that economic and sustainable objectives can be used simultaneously in an enterprise's strategy.

It is now appropriate to establish a link between economic innovation (contribution to income, contribution to profitability, contribution to net discounted income, contribution to market share, contribution to consumer needs, contribution to company image) and the continuous innovation of enterprises (product, resource efficiency, pollution reduction, social responsibility) (figure 1).

Figure 1. Linkages between economic and sustainable innovation by enterprises



Source: (Rauter R., et al., 2018).

The next step was to compare the measurement of the sustainable innovation development of the enterprise. As we can see, there is a clear correlation between these two operation planes of enterprise, with such effects as increase in net profit, return on investment (ROI), decrease of cost of products or services, expansion of customers, attraction of investments, image enhancement, etc (Jaeho Shin, et al., 2018).

Sustainable enterprise development management allows to promote competitive competence in interaction with social, economic and environmental systems, and to focus on innovations that will meet the new requirements of stakeholders (Chychryn et al, 2020; Kuzior et al., 2021). Sustainable innovation development in that case brings benefits by use of competitive competence and opportunities to improve efficiencies in management costs and operational efficiency in the enterprise. To understand the impact of sustainable innovation development, five dimensions of sustainable development are proposed:

- 1) technological capability;
- 2) networking works and social opportunities;
- 3) opportunities for learning and development;

- 4) competence of systems thinking;
- 5) Possibilities of integration of business, social and environmental problems, perspectives and information obtained in the course of activities (Dziubko M.Yu., 2017).

However, the fight for sustainable development is not really a choice between two perspectives: social benefits and financial benefits. Harvard Studies, through a study of sustainable development initiatives in 30 large enterprises, demonstrated the potential of sustainable development to reduce resource costs by introducing a more efficient production system and to increase long-term profits and enterprise development paths (Prahalad C.K. et al., 2009). Claude Villeneuve et al. (2017) noted the impact of sustainable innovation on the enterprise's activities at various levels. R&D spending at the entry of the business process translates into additional sales of innovative products. It is therefore advisable to identify five main stages in the implementation of the sustainable development of the enterprise (table. 1).

SUSTAINABLE INNOVATION DEVELOPMENT OF ENTERPRISES

Sviatoslav Zhukov, Olena Masligan, Erika Todierishko

Table 1. Stages of introduction of sustainable enterprise development

1st stage Consideration of conformity as an opportunity	2 stage Sustainable value chains	3 stage Design of sustainable service or products	4 stage Development of new business models	5 stage Design of next-practice platforms
<i>The main problem is:</i>				
Estimate exactly to what extent compliance with the standards creates an opportunity for innovation.	Increase efficiency during the pricing stage.	Development of a sustainable proposal or redesign in an environmentally friendly direction.	Search for new ways of providing and «capture» value that will change the basis of competition.	Testing the modern dominant logic of business through the prism of sustainable development.
<i>Competencies required for implementation</i>				
- the ability to anticipate and shape regulations; - the ability to cooperate with the external environment (including rivals for creative solutions).	- qualification in «carbonic management» and life cycle assessment; - the ability to redesign operations to reduce energy use and emissions; - evaluation of the environmental friendliness of suppliers and intermediaries.	- assessment of the environmental performance of goods and services; - the possibility of a sustainable supply; - scale up of reserves of „green” resources and process of „green” production.	- the possibility to understand the needs of the consumer and to find different ways of satisfying them; - the ability to understand as a partner can increase the value offer.	- assessment of the impact of renewable and non-renewable resources on the ecosystem of business and industry; - expertise in synthesis of business models, technologies and regulations of different spheres.
<i>Opportunity for innovation:</i>				
- use of compliance with the standards to attract company resources and partner resources for experimentation in development of sustainable technologies, new materials and processes.	- development of sustainable raw materials and components; - increasing the use of clean energy resources; - finding innovative ways to reuse products.	- application of biomimicry technologies in product development; - development of compact and environmental packages.	- new delivery technologies that will change the process of creating value added; - the creation of monetization models related to services rather than products; - the creation of business models combining physical and digital infrastructures.	- the creation of business platforms to enable consumers and suppliers to manage energy in a new way; - the development of products that do not need water in categories is usually associated with it; - the development of technologies that will allow the energy they generate to be used as a by-product.

Source: (Prahalad C.K. et al., 2009)

It is clear from Table 1 that the introduction of the concept of sustainable development in an enterprise with its three components affects its development at all stages of activity – from market research to the creation of new business models in the market.

Bezus A.M., Shafranova K.V., Bezus P.H. (2018) investigated the impact of the firm's innovation policies on its position in the business environment. The authors linked the introduction of the social and ecological vector of sustainable development in the main objectives of the enterprise and the creation of its certain competitive advantages and competencies. If integrated sustainable development goals are to be introduced into an enterprise, it's necessary to innovatively change production. This is important because the sustainability of an enterprise is linked to the permanence of its internal environment and its ability to respond effectively to the environmental uncertainties identified through marketing research. The elements of an enterprise's internal environment that need to be taken into account in implementing sustainable innovation development include resource, organizational, social, investment, marketing, and other components.

Innovation is a key element in the implementation of sustainable enterprise development in a dynamic way. Although the concepts of "effective development", "sustainable development" and "innovative development" are in several different dimensions and different spheres of enterprise activity, their integration should be considered as a whole. This result includes achieving the enterprise's long-term objectives with a multiplier effect and a high level of confidence among investors from the overall dynamic stability. The relationship between sustainable innovation and the financial performance of an enterprise is then obvious. Consequently, there are an increasing number of enterprises that need to engage in innovative instruments to shape the concept of sustainable development and to achieve the necessary financial results and competitive advantages.

Dynamic sustainability is an advantage of the impact of sustainable innovation development on enterprise operations. This shall be ensured by numerous competitive advantages that help to overcome long-term uncertainties. The modeling of sustainable innovation takes into account the evolution of individual enterprise indicators and the organization as a whole, following a systematic approach. In this case, there is a need to assess the effectiveness of the innovation program through social and environmental impact assessment, and the impact of changes in an enterprise's social and environmental policies on its effectiveness. Investors' established view of the nature of economic change is primary and has implications in the social and environmental bloc: innovation → efficiency → social and environmental direction. But such a vision is not always correct. Enterprise needs to consider a model where integration of goals in the social and environmental leads to the desired level of enterprise performance: innovation → social and environmental direction → efficiency (Fedorenko V.H., Didenko O.M., Bondarenko Ye.V., 2007).

As the importance of innovation in sustainable development increases, more research focuses on the impact of continuous innovation in enterprise performance. Since sustainable development is a broad concept that encompasses environmental issues, social issues and innovations in the framework of sustainable development are perceived differently by experts. It is advisable to focus on the prevention of negative impacts on the environment through the implementation of sustainable innovative development. At the same time, it is necessary to expand the scope of research in the direction of reduction of resources and energy consumption, social responsibility of business. Indeed, the most practical factor influencing the sustainable innovation development of an enterprise is the rational use of energy and materials in the production process. Also, in the strategic planning of an enterprise, it is necessary to create and implement objectives aimed at improving the environment and ensuring social security (Kvilinskyi et al., 2016) .

Chapter 2. The assessment of sustainable innovation development.

To identify the problems of sustainable innovation development in an enterprise, to create a picture of its potential and future development, it is necessary to investigate the internal and external environment of the enterprise, its innovative activities and to identify the shortcomings in the business.

Given the complexity of the implementation of the concept of sustainable innovation development of an enterprise, there is a need to establish a system of efficient, quantitative, and qualitative evaluation of this process based on an integral indicator. Since the concept covers several domains of activity of the economic complex, the main requirement for such an assessment is completeness, adequacy, comprehensiveness, and a systemic approach in reconciling the three areas of economic, social, and environmental. This is done by a generalized index in three-dimensional space. This index and its spatial location characterize the degree of "harmonization" of this development, which is the measure of harmonization of sustainable development. The assessment of sustainable innovation means calculating an integrated measure of an enterprise's performance at three levels, based on a preliminary analysis of the external and internal environment.

In implementing sustainable innovation in an enterprise important to account that profit is not the ultimate goal of the activity. So you don't just have to focus on profitability and profit. In this case, it is an economic objective and part of the system sought by the enterprise in its activities (Sapa N.V., 2009). Therefore, when considering sustainable innovation at the micro-level, it is necessary to evaluate different indicators, reflect every aspect of the concept (economic, social, and environmental areas) (Mykytiuk P.P., Krysko Zh.L., Ovsianiuk-Berdadina O.F., Skochylas S.M., 2015).

SUSTAINABLE INNOVATION DEVELOPMENT OF ENTERPRISES

Sviatoslav Zhukov, Olena Masligan, Erika Todierishko

I. The estimates of economic performance are directed at the financial performance of the enterprise, which reflects its contribution to the development of the national economy, the level of investment in intellectual capital, the level of consumer satisfaction and the quality of production.

II. The assessment of the social dimension includes indicators such as: contribution of the company to the safety and health of employees; the various social assistance programmes in which the enterprise participated; respect for human rights while operating a business. This is all in the area of personnel management, company corporate code, company relations with the public, etc.

In addition to these indicators, it is useful to use indicators of social responsibility of business.

1. Providing jobs for the local population. The personnel policy of the enterprise is not able to attract qualified technical staff, management specialists, does not contribute to the establishment of organizational and management relations.

2. The share of social investment in enterprise costs. The share of investments aimed at modernization and reform of the social environment is almost non-existent, the internal environment of the company does not ensure development of employees, funds for social programs are not allocated.

3. Interaction with the social environment (ensuring social dynamism). The image of personnel policy does not allow for effective two-way interaction with the social institutions of the external environment, social dynamics in the enterprise is not indicated in the policy of activity, is due to grass-roots initiatives.

4. Adoption of a social policy. There is no legal document at the enterprise approving the methods and objectives of the socially oriented policy of the enterprise. There are no professional committees of the enterprise. There is no organizational component in the hierarchy of business processes.

III. The environmental component assessment aims to protect the environment and demonstrates the environmental impact of the enterprise's activities. In doing so use the estimation indicators proposed by Epstein M.J., Roy M.-J. (2003)): energy consumption; participation in environmental programmes; emission data for various categories of pollutants; data on the environmental performance of products produced by enterprises; certification and standardization of processes and products.

1. Priority of renewable resource reuse in enterprise policy. Production and operations policies focus on maximizing profits, so there are no clear methods, tools, and targets for resource reuse;

2. Availability of environment-friendly standards and quality certificates of production processes. As can be understood from the efficiency with which production capacity is used, environmental standardization by the principles of sustainable development does not take place in the enterprise. The main focus of certification is on product quality.

3. Planned reuse of resources in the production process. The production process has a certain proportion of waste that is neither reused nor recycled by the enterprise.

4. Assessment of the potential of alternative energy sources. The enterprise is analyzing the energy sources used given the difficult situation of the indicator of the availability of energy resources for the non-consumptive needs of small and medium-sized enterprises. However, no measures have been taken to introduce alternative resources.

5. Rational use of energy resources at all levels of enterprise business processes. During production and operational tasks in the enterprise, energy resources, raw material reserves, and waste are used irrationally (according to maximum potential, energy-saving principles are not taken into account).

The environmental dimension of sustainable development doesn't take into account the possibility of rational and reuse of resources in production or neglects the opportunity due to lack of finance.

Each of the above groups of indicators can hurt the sustainable development of an enterprise. They lead to a loss of competitive position in the strategic perspective, a deterioration of image, and a reduction in the efficiency of production and operations. The only factor that produces a neutral impact on the implementation of a sustainable development system is the assessment of alternative energy sources. This is because enterprises are only starting to participate, due to high tariffs on energy resources for the business sector.

In many enterprises, there is a lack of a clear social policy, and personnel policies do not provide adequate social guidance and interaction with social institutions, as well as social stability for the population. Therefore, alternatives to enterprise development through sustainable innovation are reform of the social and personnel policy of the enterprise; implementation of technology standards for the management of productive resources and existing capacities; introduction of a reuse system; search for alternative sources of energy; seeking new sources of finance and creating new financial reserves for investment in sustainable innovation (Bihun U.V., 2019).

The positive impact of sustainable innovation development can only be fully realized through synergies between the environmental, economic, and social pillars. Therefore, activities aimed at solving the problems of sustainability of enterprise development should be applied simultaneously. Simultaneous reliance on long-term results is important.

In recent decades, scientists have developed a large number of methodologies and tools to assess the sustainable development of an enterprise according to various criteria and approaches of analysis with all advantages and disadvantages. However, a proper analysis of the existing methods will make it possible to establish the most effective system for implementing sustainable development in enterprise activities. Therefore, it is useful to assess the sustainable innovation level of enterprise development by assessing different types of sustainability. Namely: productive economic, institutional and management (decision-making, cooperation and management system), social (social protection of staff, interaction with the external social environment, etc.), the innovation culture of the organization (readiness of the structural elements of the firm for innovative solutions), the consumer culture (volume of demand and sales of the product changes in the price level, etc.).

Orlova V.M. (2015) emphasized the importance of a system for measuring the level of sustainable innovation of an enterprise using three sets of indicators for measuring economic and productive sustainability:

- 1) the market stability of an enterprise is a consideration of the stability of the economic environment in which the enterprise operates and the ability to react promptly to changes in environmental factors;
- 2) industrial and technological sustainability is the extent to which an enterprise is endowed with resources and funds, is capable of product renewal, and is efficient when reserves are identified and measures are taken to improve the production process;
- 3) investment sustainability shows the level of innovation activity, the level of fixed investment in R&D, the activity of companies in the financial market (Orlova V.M., 2015). However, given the complexity of the calculations, it is advisable to use the expert method through expert questionnaires. The questionnaire gives a value of 0 to 5 on the impact of each factor on the sustainability of innovative enterprise development (Panova E.A., 2015).

The expert method prevents labor-intensive studies of the business environment. It provides an integrated measure of sustainable innovation development in two stages: first, an assessment of the impact of the overall action line, second, a calculation of the specific weights for the selected indicators (table. 2).

SUSTAINABLE INNOVATION DEVELOPMENT OF ENTERPRISES

Sviatoslav Zhukov, Olena Masligan, Erika Todierishko

Table 2. Expert evaluation algorithm for an integral measure of sustainable innovation development of an enterprise

Indicator	Score of the indicator	Weighting factor of the indicator
<i>Microeconomic factors</i>		
1. Technological level of production	$I_{01} = \sum_{i=1}^n K_i F_i$	<i>Koi</i> according to expert assessment
1) technical level indicators	F _i	K _i
2. Innovation and investment strategy
7) indicators of innovation and investment strategy
3. Structure of funding sources
12) funding indicators
4. Performance
16) performance indicators
<i>Macroeconomic factors</i>		
5. Economic policy of the state
20) economic policy indicators
6. The state of the economy in the country
24) indicators of the state of the economy
7. external economic situation
28) external economic indicator
$I = \sum_{i=1}^7 K_{oi} I_{oi} = 0.0702$		

Source: (Panova E.A., 2015)

The average expert opinion is determined by the arithmetic mean. The share of an individual indicator is calculated as the ratio of average expert opinion to the sum of average expert opinions on all indicators (table. 3).

Table 3. Methodology for assessing the indicator on the basis of expert opinion

Indicator	expert opinion(n=5)					Total indicator on the basis of expert opinion $X_{mcp} = \sum_{i=1}^n X_{mi}/n$	Weighting factor of the indicator $k_{mcp} / \sum_{i=1}^m X_{icp}$
	expert 1	expert 2	expert 3	...	expert n		
Indicator 1	X11	X12	X13	...	X1n	X1cp	K1
Indicator 2	X21	X22	X23	...	X2n	X2cp	K2
Indicator 3	X31	X32	X33	...	X3n	X3cp	K3
...
Indicator m	Xm1	Xm2	Xm3	...	Xmn	Xmcp	Km
Total	-	-	-	-	-	$\sum_{i=1}^m X_{icp}$	$\sum_{i=1}^m k_i = 1$

$$k_m = X_{mcp} / \sum_{i=1}^m X_{icp} \tag{1}$$

By calculating weights for enterprise indicators and activities, experts assess the relevance of the indicator to the objectives of innovative sustainable development.. Points are given from 0 to 1, where 0 is a complete compliance, 1 is a maximum compliance. Then the integrative correspondence of the group of indicators according to the algorithm is evaluated (Filipishyna L.M., 2017):

$$I_{o1} = \sum_{i=1}^n k_i f_i \tag{2}$$

where n – the number of indicators in a group indicator,

k_i – weighting factor of the indicator,

f_i – point score.

The final step in assessing the sustainable innovation development of an enterprise is the second iteration of the integrated indicator:

$$I = \sum_{i=1}^7 K_{oi} * I_{oi} \tag{3}$$

де K_{oi} weighting factor of the group of indicator,

I_{oi} – the first level of integrated conformity assessment.

Based on the results of the integrated indicator, the characterization of sustainable innovation classes is developed, where:

0 ≤ I ≤ 0,24 – low level;

0,25 ≤ I ≤ 0,49 – minimum acceptable sustainable development;

0,5 ≤ I ≤ 0,74 – normal level of stability;

0,75 ≤ I ≤ 1 – high level (Shyshlo S., Usevych V., Androsyk Yu., 2016).

Once the level of sustainability has been determined, it is possible to draw conclusions and decide on the prospects for further innovation programs. It is also possible to identify factors that hurt the investment activity of an enterprise and to diagnose the weaknesses of the business (overcoming which will lead to a higher level of sustainable innovation of the enterprise) and raise the level of competition (Panova E.A., 2015).

Since this integrative indicator has a clear focus on the business activities of the enterprise and the environment in which it operates, it is necessary to consider the environmental and social activities separately, indicating the opportunities and challenges of the enterprise in these areas. Once the nature of the impact of social and environmental factors on an enterprise's performance has been defined, one can conclude that the innovation enterprise is generally resilient.

5. Conclusions

The notion of sustainable innovation required for research is closely linked to overall innovation and enterprise capacity. This is reflected in the economic, social, and environmental directions, in line with the concept of sustainable enterprise development. Research into the level of sustainable innovation development and implementation of the project is relevant for any enterprise. There is a correlation between continuous innovation by an enterprise and economic output.

The general principles of the sustainable innovation algorithm determine the transparency and systematization of the approach. The most effective method for enterprises is the evaluation method for the integral indicator. It provides an opportunity to evaluate each indicator and to combine them into one level of sustainable innovation. This rating system is relevant for industrial enterprises with a complex organizational structure and a high technology base and tourism enterprises with their specific characteristics of innovation organization.

The level of sustainable innovation and the introduction of innovative projects influence the performance of social and environmental environments. For example, by reducing carbon emissions, solid waste generation, energy and water needs, and occupational safety standards. The innovative project will make it possible to feel the economic impact of the sustainable innovative development of the enterprise in the short term. This is possible through the economy and efficient use of resources and social and environmental performance.

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