Elena G. Popkova¹ Victoria S. Ustenko Yelena S. Petrenko Elena A. Bratukhina

> Article info: Received 22.05.2023. Accepted 17.01.2024.

UDC - 502.131.1 DOI - 10.24874/IJQR18.04-15



ENVIRONMENTAL FRIENDLINESS OF PRODUCTS AS A MEASURE OF QUALITY: MANAGEMENT FROM THE POSITION OF SUSTAINABLE DEVELOPMENT

Abstract: The modern economy is gradually losing the course of industrial growth and promotion of the goals of an increase in consumption, which is predetermined by the state of ecology and its influence on the health and viability of the current and next generations. New economic solutions and transformations of spheres are connected with the course at the creation of a well-balanced economic ecosystem, which ensures the environmental friendliness of products – as the top-priority indicator of their quality. Program goals of the UN in the sphere of sustainable development of ecology cover the main priorities in this direction.

This paper was aimed at the determination and assessment of the directions for the achievement of environmental friendliness of products as a measure of products' quality at the level of certain leading production in the context of management from the position of sustainable development.

The methodological basis of this paper is the method of systematisation, induction, and comparative analysis. We systematised the main directions for ensuring the environmental friendliness of products (as the indicator of quality), which include the implementation of responsible production and consumption (organic products); and implementation of climate measures to reduce harmful emissions in the environment (smart production, issue of analogue products). We distinguished countries and leading companies in the sphere of implementation of these directions of the achievement of the UN goals in the sphere of sustainable development.

The scientific novelty of this paper consists in determining the specific features of positive directions for improvement of the ecosystem of countries and regions due to an increase in environmental friendliness of products, as the indicators of quality.

Keywords: environmental friendliness of products, quality, management, sustainable development, responsible production and consumption, climate measures, reduction of CO2, organic products.

¹ Corresponding author: Elena G. Popkova Email: <u>210471@mail.ru</u>

1. Introduction

The concept of sustainable development, which was founded and declared by the program frameworks of the UN (United Nations, 2017), involves the establishment and achievement of goals in the economic, social, and environmental spheres at the global level and national levels, in the context of the companies' activities. Adoption of these goals is connected with the striving for the achievement of a better future and sustainable perspectives for all citizens, taking into account the necessity to overcome socioeconomic and environmental problems. Environmental problems of modern society, connected with environmental pollution due to the life activities of the mankind and functioning of the economy and infrastructure, are an important global threat to the preservation of life on Earth. Possibilities of reducing and levelling this threat are defined within the given UN goals, which include socioenvironmental goals (SDG 6 and SDG 7); and environmental goals (SDG 12, 13, 14, Responsible production of 15). and environmentally friendly products is the target goal of companies that make responsible decisions on the development of business given environmental protection and improvement. Also, this direction is important for a country striving toward the leading positions in the sphere of export of high-quality products, achieved due to the environmental friendliness of products.

The goal of this paper was to identify the direction for the achievement of environmental friendliness of products as a measure of quality at the level of leasing production in the context of management from the position of sustainable development. To reach this goal, the following tasks were set: substantiating the level of environmental friendliness of products as the indicator of quality in management from the position of sustainable development; determining the directions for

the achievement of environmental friendliness of products in the practice of companies aimed at sustainable development.

2. Materials and method

The issues connected with sustainable development the sphere in of environmentally friendly products were studied in various scientific and analytical works (Abbass, 2024). Popkova (2023) demonstrated the development of smart farms in China, as the organisational structure of the agrarian sector, in which the set of innovative environmental tools is implemented, ensuring high quality and safety of agricultural products. Cui and Wang (2023)presented factors of implementation of various innovative tools of smart farms in China, which facilitate the production of environmentally friendly and quality agricultural products. Wang and Cui (2023) dwelt on the assessment of Chinese policy in the sphere of creation and regulation of national demonstration zones that provide preferences to the subjects of the agricultural market that is oriented on creation and organisation of smart farms. Ferreira et al. (2022) and Kombolo Ngah et al. (2023) proved the alternative to the implementation of artificial meat as the precondition of sustainable socioeconomic and environmental development. Maier (2023) considered the opportunities and factors of the formation of partnership in the sphere of recycling, as the basis for the growth of environmental and economic sustainability reduction and of environmental pollution. Espuny et al. (2022) elaborated on the dependence between the indicators of environmental friendliness of organic products and the health of consumers as the indicator of quality, the focus on which is the alternative perspective for sustainable responsible production and consumption in the future. Cabrini and Elustondo (2022) presented an analysis of the formation of organic

agriculture in Argentina and demonstrated the experience of local farms in the management of product quality, connected with consumer properties, environmental friendliness, focus on new technologies, and implementation of processes connected with biodiversity protection. Despite the large number of studies in the selected sphere, it is necessary to systematise the experience of leading production companies of the world that strive towards quality of products due to an increase in environmental friendliness.

The selected methodological tools were used to reach the designated tasks. The method of systematisation was used to choose data on production companies of the world that implement the practice of responsible production, connected with the implementation of the elements of environmental friendliness as the indicators of product quality. The method of induction was utilised to distinguish the specifics of management of eoclogisation of production as the basis of product quality from the position sustainable development. of Comparative analysis was used to assess the efficiency of the considered companies in the direction of the achievement of environmental goals of sustainable development.

3. Results

The focus on the environmental friendliness of products as the indicator of product quality is connected with declaring this concept within the system of promotion of products for the final consumer and positioning of companies at the national and global markets. The trend for connection between these components (environmental friendliness and quality of products) was established in the provisions of the UN program basis (United Nations, 2017). After this, countries began adopting obligations in this sphere, and this trend was adopted by environmentally responsible companies, which declared product quality through the

environmental features of products.

One direction of achieving environmental friendliness of products, which ensures product quality, is the dissemination of responsible production and consumption, the measures of implementation of which are agreed with SDG 12.

Within this direction, we can distinguish the transition to production and consumption of organic products, which are to reduce the damage to the ecology and improve consumers' health. The indicator of healthy diet is an important indicator of the population's quality of life. Ensuring a minimal impact on the environment is a sign that organic products are a stable alternative for future generations (Espuny et al., 2022). According the forecast to analysis (Organicseurope, 2023), the planned (until 2030) achievement of the coverage of agricultural land by organic production of the 25% level in the EU member states will allow reducing CO2 emissions by 25 million tons and reducing ammonia emissions by 13% annually; increasing the level of biodiversity in the territory of organic agricultural land by 30%; decreasing the use of pesticides by 90%. According to Organicseurope (2023), in 2020. the indicator of coverage of agricultural land by organic production in the EU member states was below 10%. Initiatives aimed at its growth, adopted by the EU member states, will allow raising the quality of agricultural products due to its positive influence on consumers' health.

According to FiBL (2022), as of the beginning of 2020, 187 countries had a certain level of development of organic agricultural land and non-agricultural land used for organic production (aquatic products, forestry products, honey, wild nature products). The highest development of these sectors is observed in the following countries (FiBL, 2022):

- Australia and Oceania (35.8 million hectares of land used for organic production), including Australia (35.69

million hectares), which is ranked 1st in the world by organic production and export. The main types of organic products are as follows (Statista, 2024): fruit and vegetables (52 % of the total volume of this category of production in Australia); beef (19%, cattlebreeding using organic forage), and other types of products (29 %, including meat, dairy products, forage, etc.). A specific feature of the organisational development of the studied sector of organic agriculture in Australia is the acquisition of small farms and the creation of large farms, which become important participants of the national and world markets in this sphere (Agropages, 2020);

- Europe (27.1 million hectares). In Europe, the 1st position in the sphere of organic production and export belongs to Spain (3rd position in the world – 2.354 million hectares). According to Statista (2023d), the largest shares of land used in organic agriculture in Spain are occupied by walnut trees (262.3 thousand hectares); olive trees (256.5 thousand hectares); cereals made of grain (241.9 thousand hectares); crops grown in greenhouses (187.3 thousand hectares); vineyards (142.2 thousand hectares). Spain successfully implements the program goal of the EU to the achievement of 25% of the total agricultural land for organic production by 2030. While in 2020 this indicator equalled 10% - the average indicator for the EU - there was observed further growth at the level of 4.8%, which is supposed to ensure 58% of coverage by 2030. According to Cultifort (2024), such results are achieved due to natural reasons, which include favourable climate, soil, irrigation resources, affordable energy, and access to the workforce of the EU; internal corporate results, which include the use of certified products to improve the quality of organic products, including various biostimulators and bioactivators of growth, means of protection from various biological and (antibacterial climate influences and antifungal agents). Accordingly, the focus of Spanish farmers on the implementation of the means of support and protection of organic products despite external favourable factors is a sign of the potential of using their experience by other countries of the EU. The absence of hazardous substances, used in organic production, is the indicator of their quality, and this connection is promoted during the positioning of products at domestic and external markets;

- Latin America (13 million hectares). In this region, the leader in organic agricultural production is Argentina. This country is ranked 2nd in the world by areas under farms working in this sector (3,672.3 thousand hectares). An important trend in the formation of organic agricultural production in Argentina is an increase in informing consumers on the quality and processes (including environmental friendliness of (OIA. 2022). Thus. rival products) companies strive towards the promotion of true and exhaustive information on products in the national market for internal consumers. An important component of the development successful of organic agricultural production is the government's participation in its technological growth. This allows access to the creation of technologies and means of protection of crops based on research organisations, which were financed with the help of government support (Cabrini & Elustondo, 2022).

An important direction for the management of implementing the environmental friendliness of products as the indicator of product quality from the position of sustainable development is the achievement of climate measures for the reduction of emissions that negatively influence the environment. This is connected with the achievement of SDG 13. These appropriate measures include the following:

1) Comprehensive implementation of smart production with robotised systems of management, which allows reaching the planned climate indicators. According to Popkova (2023) and Cui and Wang (2023), smart production became very popular in China's agriculture (modern smart farms). Most of the smart farms that function in the sphere of crop research in China are created along the roads. The dynamics of their functioning are shown in Table 1.

1 auto	e 1. Main indicators of the formation	
	Indicators of the functioning of	Characteristics of the indicators
	smart farms	
1	The market value of smart farms	2016 - 30 billion yuans, 2020 - 68.5 billion yuans, 2022 -
		74.3 billion yuans (approximate numbers)
		Growth in 2016-2022 – 147.6%
2	Factor of the growth of smart	Mass implementation of modern innovative digital tools for
	farms' value	the organisation of smart farms. These tools include
		equipment for assessing the main climate indicators and
		indicators of the use of fertilisers; drones used for monitoring
		and other functional tasks (planned irrigation); robotised
		equipment; apps with big data for the control of smart farms,
		etc.
2.2	Autonomous system of smart	2017 – 0.23 %.
	farm management	2020 - 0.51 %.
	(implementation of ICT without	2022 – 1,4 %.
	the use of workforce)	2025 (forecast) – 6,5 %.
		2035 (forecast) – 20 %.
3	The efficiency of implementing	2012 – 57%.
	innovative digital tools in the	2021 – 72 %.
	organisation of the activities of	2025 (forecast) – 75 %.
	agricultural farms (an indicator	
	of harvest, %	
4	Leading companies in the sphere	Rice farms (located in Northern China, Heilongjiang
	of smart technologies in China's	province).
	agriculture	Area – 1,647 acres.
		Technical and technological features of the smart farm: 24/7
		monitoring of the climate state with the help of drones and
		video cameras; the use of cloud computing to ensure the
		control of the process of planting, growing, harvesting, and
		sales of rice; digital sensors that regulate the use of resources
		(water, energy, fertilisers), which ensure environmental
		friendliness of products (rice).
5	Influence of the implementation	Reduction of cultivated land in China by 5.4 % (334 million
	of smart farms on the level of	acres in 2012, 316 million acres in 2021).
	biodiversity preservation on land	
	(SDG 15)	
6	Implementation of the practice	Mechanisms: the creation of demonstration areas in which
	of stimulation of the creation of	the company can organise business and demonstrate its
	smart farms in the sphere of	achievements for the public to attract investments, initiation
	small and medium business and	of the creation of similar companies.
	micro business	Tax subsidies are provided within demonstration areas.

Table 1. Main indicators of the formation of smart farms in China.

Source: Compiled by the authors based on (Statista, 2022; van Wyk, 2022; Researchinchina, 2022; Wang and Cui, 2023)

Mass implementation of smart farms in China's agriculture led to significant economic and environmental effects. Their development in China is connected with an important role of the national government and provinces' administrations in financial; support and provision of land resources and workforce. 2) Transition to analogue production with higher consumer qualities and without negative environmental effects.

Here we speak of a wide range of products, production and consumption of the initial samples of which might lead to threats to the environment and perspectives for future generations. These types of products include the following:

- Meat and meat processing products, cattlebreeding products. According to Statista (2023a), the volume of CO2 emissions from or production and consumption of 1 kg of beef equals 99.5 kg of CO2; 1 kg of lamb – 39.7 kg of CO2 (3rd position among all types of food products by the level of negative impact); 1 kg of cheese (various types) – 23.9 kg of CO2 (7th position); 1 kg of pork – 12.3 kg of CO2 (9th position); 1 kg of poultry – 9.8 kg of CO2 (10th position); 1 kg of eggs – 4.7 kg of CO2 (11th position); 1 kg of milk – 3.1 kg of CO2 (16th position);

- Cotton, used in the textile industry. According to Bettercotton (2021), production of 3 million tons of cotton produces 8.7 million kg of CO2.

- Energy produced from fossil fuels. According to 360Energy (2020), the production of electric energy from 1 kg of anthracite coal leads to the emission of 3.3 kg of CO2; from 1 of hard coal -2.42 kg of CO2; production of 1 litre of petrol (diesel fuel) leads to emission of 2.3 kg of CO2.

Many other types of products have a negative effect on the state of the environment in the process of production and the process of use or utilisation. To achieve SDGs 13, 14, and 15, companies work on projects on the production and promotion of products with more neutral or lower influence on the environment. Here it is possible to note meat replacements or artificially produced meat and meat products, which, according to researchers, have higher environmental friendliness compared to traditional meat. According to Kombolo Ngah et al. (2023) and Ferreira et al. (2022), the argument in favour of the

environmental sustainability of these products is that the production is performed without growing and use of various types of cattle and poultry.

It is necessary to mention textile productions that manufacture products from clothing waste, which leads to the reduction of waste and CO2 emissions. The key factors determining the possibility of transitioning to waste recycling include the size of companies, territorial proximity to the infrastructure, experience and loyalty of partner companies (Maier, 2023). The worldleading companies realising such projects are as follows:

Khaloom, with the main office and production in India (Karnataka state), with production departments in Indonesia, Kenya, and the Netherlands (office). The company attracts institutional and private investors to participate in its projects on the creation of new production, which facilitates the reduction of waste in the world, economic growth, and an increase in employment. Processing results in the production of regenerated fibres on new modern equipment, with the use of digital sensors that regulate the main consumer qualities of the product. The fibres are used for further textile production, with the following export. 20 thousand tons of waste result in 11,000 meters of final products per month at all production capacities (as of early 2023) (Enviu, 2024);

- Kishco, with the main office and production capacities located in India (Kishco, 2024). The company also has offices in China, the UAE, and Bangladesh. Raw materials for processing and further production are purchased in India and imported from Europe and the USA. Two general categories of imported products are production leftovers and worn textile products, classified by various types. Similar to other leading companies in India in this sphere, Kishco receives regenerated fibres in the process of recycling these types of imported textile products. The company is ranked 3rd in the world (Thebrainyinsights, 2021) by recycling of textile waste. In 2021, the income from the activities in this sphere equalled USD 25 million (Kishco, 2024). The market for textile recycling is expected to grow. In 2020, its revenues were USD 6.2 billion (with the domination of manufacturers from the Asian-Pacific region, which includes Kishco). According to forecasts, this indicator is to reach USD 10.37 billion by 2028 (Thebrainyinsights, 2021). We can assume that this growth was predetermined by an increase in textile industry waste from initial production and from the consumer sphere. The main indicator of the quality of products that are manufactured by Kishco (regenerated fibres) is the guarantee of their recycling.

The energy sector plays one of the most important roles in the sphere of production of analogue products, which are characterised by high consumer qualities and do not have a negative effect on ecology. As for the fuel used in the transport sector (private and infrastructural needs), it is offered to use electric energy produced from renewable sources, and transition to electric cars. The need for energy produced from fossil fuels in the production sphere, infrastructure, and private sector should be satisfied by energy produced with the help of renewable sources (wind, solar, and hydro energy). To implement this energy transition, the UN promotes the necessity to reduce CO2 emissions through the use of renewable energy. Production and consumption of clean renewable energy are implemented at the level of the companies of the energy sector, and infrastructural and industrial sectors, which have their power plants (wind, solar, and thermal).

It is important to determine whether the indicator of environmental friendliness of such a specific product as energy (renewable) is the indicator of its quality. Analytical materials (Terrafiniti, 2024) allow identifying the components of the quality of renewable energy, which include cleanness (absence of impact on the environment during production and use); scale and accessibility, as well as renewability – in certain cases, it is possible to organise production at the level of isolated subjects for individual needs; prices for renewable energy are lower than prices for production of energy from fossil fuels; possibility of timely production and supply of renewable energy (since power plants of each of the types of such energy are installed based on natural conditions, its production is quick and uninterrupted).

Let us consider the leaders (among countries) by production of renewable energy, as the alternative, by the quality indicator, to traditional energy and the indicator of the focus on the achievement of sustainable development (Table 2).

Let us consider the influence of the production and consumption of renewable energy on the achievement of the UN goals on the reduction of CO2 emissions in the environment.

Mass implementation of renewable energy capacities led to a decrease in CO2 emissions in China: in 2017, the volume of emissions grew by 443 MtCO2 compared to 2016, while the growth in 2020 equalled 220 MtCO2. In 2021, this indicator grew by 484 MtCO2. This is partially due to the fact that operators of renewable energy production were not able to quickly restore capacities after the pandemic. During the pandemic, many production companies left the energy market, while non-renewable energy sources were used. In 2022, this indicator was reduced by 290 MtCO2, which was a sign of the large-scale transition to the use of renewable energy in industry and infrastructure. In 2023, the growth of emissions volume equalled 542 MtCO2, which was due to the prolonged destructive influence of the consequences of the pandemic on the national economy and losses of renewable energy producers, which led to their bankruptcy and the use of nonrenewable fossil fuels (Myllyvirta, 2023). The absence of the offer of renewable energy

led to the return to the consumption of products of oil and coal processing, which, in turn, led to a high level of CO2 emissions in the environment. According to forecasts, this indicator will be reduced by 249 MtCO2 in 2024, and in 2025 – by 64 MtCO2

(Myllyvirta, 2023). Such planned results are substantiated by the continuation of the course towards reduction of CO2 emissions in the environment and mass transition to the use of clean energy, as the only option for future generations of the country.

 Table 2. The main indicators of the growth of renewable energy production in the world

 Country indicators

	Country, indicators	Characteristics
1	Growth of capacities for	2017 - 177.1 GW, 2020 - 285.7 GW, 2022 - 335.7 GW, 2024
	renewable energy production	(forecast) – from 462.5 to 540.8 GW
	in the world, GW	
1.1	Including:	
1.1.1	Bioenergy	2017 - 6.4 GW, 2020 - 9.2 GW, 2022 - 7.8 GW, 2024 (forecast) -
		from 7.9 to 11 GW
1.1.2	Offshore wind energy	2017 - 3.8 GW, 2020 - 5.9 GW, 2022 - 11.4 GW, 2024 (forecast) -
		from 18.1 to 21.7 GW
1.1.3	Hydropower plants	2017 - 24.5 GW, 2020 - 18.4 GW, 2022 - 32.4 GW, 2024 (forecast)
		– from 24 to 28.1 GW
1.1.4	Solar (autonomous)	2017 - 35 GW, 2020 - 61.1 GW, 2022 - 107.4 GW, 2024 (forecast) -
	photovoltaic stations	from 140.3 to 167.8 GW
1.1.5	Onshore wind power stations	2017 – 43.7 GW, 2020 – 104.1 GW, 2022 - 63 GW, 2024 (forecast) –
116		from 103.1 to 119.5 GW
1.1.6	Photovoltaic (solar) stations	2017 - 63 GW, 2020 - 86.5 GW, 2022 - 112.6 GW, 2024 (forecast) -
117	Other correction	from 167.2 to 191.3 GW 2017 - 0.7 GW, 2020 - 0.7 GW, 2022 - 1.1 GW, 2024 (forecast) -
1.1.7	Other capacities	2017 - 0.7 GW, $2020 - 0.7$ GW, $2022 - 1.1$ GW, 2024 (forecast) - from 1.9 to 1.4 GW
2	Countries (unions of	110111 1.9 to 1.4 GW
2	countries) that are leaders in	
	renewable energy production	
	in the world, GW	
2.1	China	2022 – 1,161 GW
2.2	USA	2022 – 352 GW
2.3	Germany, France, Spain, Italy	2022 – 341GW
2.4	Brazil	2022 – 175 GW
2.5	India	2022 – 163 GW
2.6	Japan	2022 – 118 GW
2.7	Canada	2022 – 106 GW
3	Countries (unions of	
	countries) that are leaders in	
	renewable energy production	
	growth in the world, GW	
3.1	China	2022 – 31 GW, 2024 (forecast) – 62 GW
3.2	European Union	2022 – 13.7 GW, 2024 (forecast) – 15 GW
3.3	USA	2022 – 8 GW, 2024 (forecast) – 10 GW
3.4	Brazil	2022 – 3 GW, 2024 (forecast) – 2.9 GW
3.5	India	2022 – 1.8 GW, 2024 (forecast) – 3.6 GW
4	Leaders in consumption of	1 st position – China, 2 nd position – USA, 3 rd position – Brazil.
	renewable energy in the world	A high level of consumption is connected with the needs of the inductry (China and the USA are leader in CDP, Brazil is among the
	(industry, infrastructure, and	industry (China and the USA are leaders in GDP, Brazil is among the
	consumers)	top 10); an important role belongs to the development of technologies that ensure the implementation and exploitation of the capacities of
		renewable energy, and the number of population.
L		(IEA, 2022, Statista, 2022.)

Source: Compiled by the authors based on (IEA, 2023; Statista, 2023c)

The COVID-19 pandemic has had a negative effect on the mass implementation and transition to renewable energy production and consumption in most countries of the world. Despite the impact of crisis factors, it is possible to achieve the UN goal of the reduction of CO2 emissions. Each country deals with this task according to its potential and the level of striving towards sustainable development.

The considered leading countries (China and the USA) do not demonstrate the leading positions as to such indicators as the share of produced and consumed renewable energy in the total volume of national energy. The leaders by this indicator are as follows (The Enerdata Yearbook, 2023):

- Norway – the share of renewable energy in 2020 was 98.4 % in the total volume of energy production in the country; in 2021 – 99.1 %; in 2022 – 98.5 %;

- Brazil - 2020 - 84.2 %; 2021 - 77.4 %; 2022 - 89.2 %;

- New Zealand - 2020 - 80.4 %; 2021 - 81.4 %; 2022 - 86.6 %;

- Colombia – 2020 – 65.8 %; 2021 – 73.4 %; 2022 – 75.1 %;

- Canada - 2020 - 67.1 %; 2021 - 67.1 %; 2022 - 68.8 %;

- Sweden - 2020 - 68.5 %; 2021 - 67.4 %; 2022 - 68.5 %.

Over 2020-2022, most of the above countries demonstrated the growth of this indicator (except for Sweden), which was predetermined by the striving towards reduction of environmental pollution and adoption of the course towards reduction of the dependence on fluctuations of prices for non-renewable energy sources.

Leaders by the growth of the level of implementation of renewable energy and leaders by the level of energy transition implement this process due to the use of their technologies and components for electric power stations and due to import. According to (Statista, 2023b), China is the world leader in the production of solar PV modules (the share in world production was 77.8 % in 2022), while the 2nd position belonged to Vietnam (6.4 %), 3rd - to Malaysia (2.8 %), 4th - to India, the USA and South Korea (1.9 %). China exports these products and realises them in the domestic market, with the attraction of participants of the "One Belt One Road" initiative, e.g., Uzbekistan.

4. Discussion

The distinguished and analysed directions for ensuring the environmental friendliness of products (an indicator of quality) can be expanded given the emergence of new ICT, which can replace the human workforce and reduce the use of less effective technologies and equipment. An important debatable issue is the problem of preservation of human labour resources, protection of their rights, stimulation of comprehensive and development. This facilitates the support for social guarantees and the creation of a flexible economic model, which involves quick and quality adaptation of human potential to the change of technologies and professions that are in demand in the labour market. This task does not have a negative effect on the environmental friendliness of products and sustainable development. When achieving this task, it is necessary to implement - at the national, supranational, and corporate levels - the programmes to inform labour resources of climate change, the role of humans in this, and the influence of products' ecologisation on product quality. It is also possible to use the adaptation programmes. connected with energy transition and reduction of certain sectors of the economy, which were traditional in the past. An example of this is companies in the coal industry in Germany and other countries.

An important problem is the lack of cooperation of countries at the international level in the transfer of technologies that stimulate the creation of an ecosystem protected from negative influences. Given this, an important direction is the creation of conditions for the implementation of technologies exchange and transfer, which would facilitate the achievement of the UN goals in the sphere of sustainable development.

5. Conclusion

In the course of this research, we proved the connection between ensuring the environmental friendliness of products and positioning at the level of countries and corporations, as well as the supranational level, of the course at this indicator's being the indicator of product quality. This strategy is adapted from the provisions of the UN programme on the focus on the achievement of the Sustainable Development Goals in the environmental sphere, where ecologisation is the indicator of consumers' health, level of safety, and protection of the entire biodiversity. The considered directions for the achievement of environmental friendliness of products are at the stage of formation in various regions and countries. Leaders in various sectors of the market were able to successfully adapt to the modern policy of large-scale ecologisation, creating and implementing innovative projects that help achieve the Sustainable Development Goals. The experience of these companies can be adapted at the sectorial level, which will allow other countries to achieve certain results in the search for the balance of the economy and improvement of the ecosystem's level.

References:

- Agropages (2020). 71.5 million hectares of organic farmland worldwide Australia, Argentina and China have the largest number of hectares used for organic crops. Retrieved from https://news.agropages.com/News/News/Detail---37173.htm Accessed: 05.02.2024
- Abbass, A. (2024). Waste Heat Recovery: An Energy-Efficient and Sustainability Approach in Industry. *Journal of Sustainable Development Innovations*, 1(1), 30-37. 10.61552/JSI.2024.01.004
- Bettercotton (2021). Better Cotton Releases First Study on GHG Emissions. Retrieved from https://bettercotton.org/better-cotton-releases-our-first-study-on-ghg-emissions/ Accessed: 05.02.2024
- Cabrini, S. M., & Elustondo, L. (2022). Organic agriculture in Argentina's Pampas. A case study on Pampa Orgánica Norte farmers. *Renewable Agriculture and Food Systems*, 37(1), 5–13. doi:10.1017/S1742170521000338
- Cui, L., & Wang, W. (2023). Factors Affecting the Adoption of Digital Technology by Farmers in China: A Systematic Literature Review. *Sustainability*, *15*, 14824. https://doi.org/10.3390/su152014824.
- Cultifort (2024). Spain, leader of Organic Agriculture in Europe. Retrieved from https://www.cultifort.com/en/spain-leader-organic-agriculture-europe/ Accessed: 05.02.2024
- Enviu (2024). Khaloom. Retrieved from https://enviu.org/work/khaloom/ Accessed: 05.02.2024
- Espuny, A.L.G., Espuny, M., Costa, A. C., da Motta Reis, J. S., de Souza Sampaio, N. A., Motta Barbosa, L. C. F., ... & de Oliveira, O. J. (2022). Determinants of intent to purchase organic products to improve quality of life. *International Journal for Quality Research*, *17*(2), 441–454. doi: 10.24874/IJQR17.02-09.

- Ferreira, C. S. R., Alves, E. S., Costa, J. C. M., Ferreira, C. M. R., Friedrichsen, J. S. A., Frigo, G., ... & Santos, O. O. (2022). Produção de carne artificial como uma alternativa sustentável: Revisão. *Research, Society and Development*, 11(7), e47011730346-e47011730346. doi: 10.33448/rsd-v11i7.30346.
- FIBL (2022). The World of Organic Agriculture 2021: Statistics and Emerging Trends 2021. Retrieved from https://www.fibl.org/fileadmin/documents/shop/1150-organic-world-2021.pdf Accessed: 05.02.2024
- IEA (2023). Renewable Energy Market Update June 2023. Retrieved from https://www.iea.org/reports/renewable-energy-market-update-june-2023/executive-summary Accessed: 05.02.2024
- Kishco (2024). Textile Recycling. Retrieved from http://kishcogroup.com/service/textile-recycling/ Accessed: 05.02.2024
- Kombolo Ngah, M., Chriki, S., Ellies-Oury, M.-P., Liu, J., & Hocquette, J.-F. (2023). Consumer perception of "artificial meat" in the educated young and urban population of *Africa. Front. Nutr.*, *10*, 1127655. doi: 10.3389/fnut.2023.1127655
- Maier, B. (2023). Formation quality of a strategic alliance the development of a scoring model takes into account the specific characteristic of the recycling industry. *International Journal for Quality Research*, *17*(4), 1151–1170. doi. 10.24874/IJQR17.04-12.
- Myllyvirta, L. (2023). Analysis: China's emissions set to fall in 2024 after record growth in clean energy. Carbon Brief. Retrieved from https://www.carbonbrief.org/analysis-chinas-emissions-set-to-fall-in-2024-after-record-growth-in-clean-energy/ Accessed: 05.02.2024
- OIA (2022). Organic Food Production keeps growing in Argentina. Retrieved from https://www.oia.com.ar/index.php/en/organic-food-production-keeps-growing-in-argentina/
- Organicseurope (2023). Study on the environmental impacts of achieving 25% organic land by 2030 published. Retrieved from https://www.organicseurope.bio/news/study-on-theenvironmental-impacts-of-achieving-25-organic-land-by-2030-published/ Accessed: 05.02.2024
- Popkova, E. G., Litvinova, T. N., Kolieva, A. E., Dugina, T. A., & Agalakova, O. S. (2023). Increasing food quality at smart farms as a promising path for the sustainable development of agriculture and food security. *International Journal for Quality Research*, 17(4), 1265– 1276. doi: 10.24874/JJQR17.04-20.
- Researchinchina (2022). China Smart Agriculture and Autonomous Agricultural Machinery Market Report, 2022. Retrieved from http://www.researchinchina.com/Htmls/Report/ 2022/71781.html Accessed: 05.02.2024
- Statista (2024). Share of products organically produced or grown in Australia in 2021, by type. Retrieved from https://www.statista.com/statistics/1409928/australia-share-of-organicproducts-by-type/ Accessed: 05.02.2024
- Statista (2023a). Average greenhouse gas emissions per kilogram of major food products worldwide(in kilograms of carbon dioxide equivalent). Retrieved from https://www.statista.com/statistics/1201677/greenhouse-gas-emissions-of-major-food-products/ Accessed: 05.02.2024
- Statista (2023b). Distribution of solar photovoltaic module production worldwide in 2022, by country. Retrieved from https://www.statista.com/statistics/668749/regional-distribution-of-solar-pv-module-manufacturing/ Accessed: 05.02.2024
- Statista (2023c). Leading countries in installed renewable energy capacity worldwide in 2022 (in gigawatts). Retrieved from https://www.statista.com/statistics/267233/renewable-energy-capacity-worldwide-by-country/ Accessed: 05.02.2024

- Statista (2023d). Leading crops in organic agriculture in Spain in 2021, by type(in hectares). Retrieved from https://www.statista.com/statistics/1218878/leading-organic-crops-spain/Accessed: 05.02.2024
- Statista (2022). Estimated market value of smart agriculture in China from 2016 to 2020 with estimates until 2022. Retrieved from https://www.statista.com/statistics/1258253/china-market-size-of-smart-agriculture/ Accessed: 05.02.2024
- Terrafiniti (2024). Sustainable Energy the many dimensions of energy quality. Retrieved from https://www.terrafiniti.com/sustainable-energy-the-many-dimensions-of-energy-quality/ Accessed: 05.02.2024
- Thebrainyinsights (2021). Recycled Textile Market Size by Type (Recycled Cotton, Recycled Wool, Recycled Polyester, Recycled Nylon), Textile Waste Type (Pre Consumer Waste, Post-Consumer Waste), End User, Regions, Global Industry Analysis, Share, Growth, Trends, and Forecast 2021 to 2028. Retrieved from https://www.thebrainyinsights.com/report/recycled-textile-market-12566 Accessed: 05.02.2024

The Enerdata Yearbook (2023). Share of renewables in electricity production. Retrieved from https://yearbook.enerdata.net/renewables/renewable-in-electricity-production-share.html Accessed: 05.02.2024

- United Nations (2017). Resolution adopted by the General Assembly on 6 July 2017. Work of the Statistical Commission pertaining to the 2030 Agenda for Sustainable Development. Retrieved from https://ggim.un.org/documents/a_res_71_313.pdf Accessed: 05.02.2024
- van Wyk, B. (2022). China's plans for 'smart' agriculture. Retrieved from https://thechinaproject.com/2022/09/07/chinas-plans-for-smart-agriculture/ Accessed: 05.02.2024
- Wang, N., Cui, D. (2023). Impact of demonstration zone policy on agricultural science and technology innovation: evidence from China. *Humanit Soc Sci Commun, 10*, 800. https://doi.org/10.1057/s41599-023-02292-8
- 360Energy (2020). How Does Using Energy Create Carbon Emissions? Retrieved from https://360energy.net/how-does-using-energy-create-carbon-emissions/ Accessed: 05.02.2024

Elena G. Popkova

Armenian State University of Economics, Yerevan, Armenia <u>210471@mail.ru</u> ORCID 0000-0003-2136-2767

Victoria S. Ustenko School of Social and Behavioural Sciences, Amrita Vishwa Vidyapeetham, Kerala, India victoria.ustenko@ammachilabs .org ORCID 0000-0002-3863-5904

Yelena S. Petrenko

Plekhanov Russian University of Economics, Moscow, Russia <u>petrenko yelena@bk.ru</u> ORCID 0000-0001-6892-2392

Elena A. Bratukhina

Vyatka state university, Kirov, Russia <u>ea bratuhina@vyatsu.ru</u> ORCID 0000-0001-5163-6154