

УДК 330.13.009.12

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DOI: 10.32702/2306-6792.2024.13.14

## **FINANCIAL AND PRODUCTION PRINCIPLES OF ENTREPRENEURSHIP IN ALTERNATIVE ENERGY AND TELECOMMUNICATIONS FIELDS**

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### **ФІНАНСОВІ ТА ВИРОБНИЧІ ЗАСАДИ ПІДПРИЄМНИЦТВА У СФЕРАХ АЛЬТЕРНАТИВНОЇ ЕНЕРГЕТИКИ ТА ТЕЛЕКОМУНІКАЦІЙ**

The article aims to investigate the financial and production principles of entrepreneurship in alternative energy field and telecommunications. The financial foundations of entrepreneurship in the alternative energy and telecommunications sectors are defined by the main directions of capital attraction and profit distribution, which are quite specific in the context of the crisis in Ukraine. In the alternative energy sector, this specificity is formed through the attraction of capital and distribution of profits in energy efficiency and import substitution, restoration and protection of infrastructure, and innovation. In the telecommunications sector, this specificity is formed through the attraction of capital and distribution of profits in the areas of infrastructure restoration and protection, ensuring uninterrupted communication and access to information, and digitalization and development of new services. It has been proven that for the alternative energy sector, the list of inherent financial principles of entrepreneurship is broad and varied, as it's aimed at strengthening the basic aspects of social responsibility and environmental sustainability while for the telecommunications sector, it is narrowly focused (given the focus on the financial stability of the enterprise and its adaptation to new market realities). It has been proven that the production foundations of entrepreneurship in the fields of alternative energy and telecommunications, unlike financial foundations, have significant uniqueness. Regarding the telecommunications sector,

entrepreneurs provide communication services, infrastructure, and technology development. Therefore, the list of production foundations may include infrastructure development and modernization, implementation of new technologies, and optimization of production business processes. In the field of alternative energy, production refers to the process of transforming natural resources into energy. In alternative energy, the outlined aspects may include expansion and modernization of production capacities, enhancing technological innovation, and localization of component production. Thus, production in this context prioritizes a flexible approach to energy harvesting, transformation, and delivery, as opposed to conventional manufacturing of physical products.

Стаття спрямована на дослідження фінансових та виробничих засад підприємництва у сфері альтернативної енергетики та телекомунікацій. Фінансові засади підприємництва у сфері альтернативної енергетики та телекомунікації визначаються за основними напрямками залучення капіталу та розподілу прибутку, які в умовах кризи в Україні доволі специфічні. Так, по сфері альтернативної енергетики ця специфічність формується шляхом залучення капіталу та розподілу прибутку за напрямками енергоефективності та імпортозаміщення, відновлення та захисту інфраструктури, інноватизації. По сфері телекомунікацій така специфічність формується шляхом залучення капіталу та розподілу прибутку за напрямками відновлення та захисту інфраструктур, забезпечення безперебійного зв'язку та доступу до інформації, цифровізації та розвитку нових сервісів. Доведено, що для сфери альтернативної енергетики, перелік властивих їй фінансових засад підприємництва є широким та варіативним, оскільки націлений на посилення базових аспектів соціальної відповідальності та екологічної стійкості, а для сфери телекомунікації — вузькоспрямованим (враховуючи фокус на фінансовій стійкості підприємництва та його адаптації до нових реалій ринку). Доведено, що виробничі засади підприємництва у сферах альтернативної енергетики та телекомунікацій, на відміну від фінансових, мають значну унікальність. В телекомунікаційному секторі підприємці надають комунікаційні послуги, забезпечують розвиток інфраструктури та технологій. Тому, до переліку їх виробничих засад можна віднести: розвиток і модернізацію інфраструктури; впровадження нових технологій; оптимізацію виробничих бізнес-процесів. У сфері альтернативної енергетики виробництво є процесом перетворення природних ресурсів в енергію. Тому, до їх переліку можна віднести: розширення та модернізацію виробничих потужностей; посилення технологічних інновацій; локалізацію виробництва компонентів. За змістом наведених положень констатовано, що ефективний формат фінансових та виробничих засад підприємництва в кризових умовах забезпечує сталий розвиток сфери альтернативної енергетики та телекомунікацій та підвищення конкурентоспроможності підприємців.

*Key words: entrepreneurship; renewable energy sources; grids; internet of things (IoT); mobile and fixed communication; external financing; solar energy; wind energy; bioenergy.*

*Ключові слова: підприємництво; відновлювані джерела енергії; мережі; інтернет речей; мобільний та фіксований зв'язок; зовнішнє фінансування; сонячна енергія; вітрова енергія; біоенергія.*

## PROBLEM STATEMENT

The financial and production principles of entrepreneurship in the alternative energy and telecommunications sectors are a complex of interconnected aspects that adjust and shape the success of economic activity. These processes are based on entrepreneurs achieving desired economic and social results from the production, transmission, and/or distribution of energy from renewable sources (solar, wind, hydro, bioenergy, etc.), as well as the provision of telecommunications services (mobile and fixed communication, internet, data transmission) and profit generation. However, the main challenge of these principles lies in the fact that their formation in Ukraine is taking place amidst a severe economic crisis caused by the consequences of the Russian invasion. This crisis is characterized by persistently high inflation, stricter financial conditions, labor shortages, supply chain disruptions, and damage to key infrastructure, all of which significantly impact the stability and predictability of these principles.

## THE ANALYSIS OF RECENT RESEARCHES AND PUBLICATIONS

Among the research and publications that have initiated the study of the financial and production features of entrepreneurship development in the fields of alternative energy and telecommunications, the works of H.M. Kaletnik, M.V. Pindyk, H.H. Heletukha, T.A. Zhelezna, A.I. Bashtovyi, A.A. Hlushenkova, L.V. Lazorenko, and others stand out. Noted that the outlined works are relevant for classic conditions. However, at present, all entrepreneurs operate in a crisis environment caused by the aftermath of the Russian invasion of Ukraine. Therefore, the content of financial and production aspects acquires specificity, the nature of which needs to be researched and systematically characterized.

## GOAL SETTING (FORMULATION OF GOALS OF THE ARTICLE)

The research aims to study the financial and production foundations of entrepreneurship in the fields of alternative energy and telecommunications.

**Table 1. Specification of financial foundations in the fields of alternative energy and telecommunications in the conditions of crisis in Ukraine**

Sphere of entrepreneurship	Financial principles of entrepreneurship			General focus of development
	list of principles	characteristics of capital raising	profit distribution characteristic	
alternative energy	Focus on infrastructure recovery and protection	It is aimed at the restoration of damaged infrastructure objects, modernization of existing ones, and construction of new ones, taking into account safety and resilience to external influences.	To strengthen infrastructure, create reserve capacities and protection systems, and finance measures to enhance the reliability of energy supply.	Social responsibility, including a focus on ensuring energy security, environmental responsibility, supporting local communities, and promoting sustainable development of the country
	Focus on energy efficiency and import substitution	It focuses on projects for equipment modernization, implementation of energy-saving technologies, and development of own energy sources (e.g., renewable energy).	To further increase energy efficiency, reduce dependence on imported energy resources, and create reserves for financing new projects	
	Focus on innovation	Focus on research and development of new technologies in the field of alternative energy, implementation of innovative solutions, and establishment of modern manufacturing facilities	To finance further research, development, and implementation of innovations, support startups, and develop the scientific and technical potential of the industry	
telecommunications	Focus on digitalization and development of new services	Focused on developing and implementing new digital solutions, cloud technologies, services based on artificial intelligence, Internet of Things, and so on	Focused on developing digital services, expanding their functionality, and improving customer service quality. In financing research and development in the field of telecommunications.	Financial stability and adaptation to new market realities, particularly where entrepreneurs are focused on seeking new sources of financing, optimizing costs, managing risks, and ensuring continuity of business processes
	Focus on ensuring uninterrupted communication and access to information	They are aimed at expanding network coverage, increasing its bandwidth, and ensuring stable communication even under high load or in emergency situations	To support network resilience, equipment upgrades, funding for measures ensuring access to information for all layers of the population, especially in crisis regions	
	Focus on restoring and protecting infrastructure	It focuses on restoring damaged infrastructure assets and upgrading existing ones to enhance their resilience to external influences. It focuses on constructing new facilities with considerations for security and uninterrupted communication needs	For further strengthening of infrastructure, creating backup capacities and protection systems, as well as funding initiatives for enhancing cybersecurity and data protection measures	

Note / \* The development of renewable energy sources contributes to diversifying the energy supply and reducing dependence on imported energy resources.

Source: formulated by the author based on [1—2; 4; 6].

**THE PAPER MAIN BODY WITH FULL REASONING OF ACADEMIC RESULTS**

Within the research, attention is drawn to the importance of financial and production foundations of entrepreneurship in crisis conditions, as their proper format and effective combination ensure sustainable development in the fields of alternative energy and telecommunications and enhance the competitiveness of their activities (in particular, allowing these entities to compete effectively in the market) [1—2; 5—6].

Indeed, the financial foundations of entrepreneurship in the fields of alternative energy and telecommunications are paramount, as they define the core aspects of an entrepreneur's financial activities through the fundamental principles of

capital and profit utilization, especially in the context of the crisis in Ukraine. In addition to a high dependence on external financing, the outlined aspects may have a specificity of financial adaptation to changing conditions, which affects the nature of capital attraction and profit distribution.

So, in the field of alternative energy, this specificity of financial adaptation is formed through capital attraction and profit distribution in such directions as energy efficiency and import substitution, infrastructure restoration and protection, and innovation. In the telecommunications sector, this specificity is formed through capital attraction and profit distribution towards infrastructure restoration and protection, ensuring

uninterrupted communication and access to information, digitization, and new services development.

Note that regarding the sphere of alternative energy, the list of its financial principles, broader and more diverse, aimed at strengthening the main aspects of social responsibility and environmental sustainability [1]. As for the telecommunications sector, it's more narrowly focused, considering a focus on financial stability and adaptation to new market realities [2]. So, the results of specifying the financial principles in the spheres of alternative energy and telecommunications amidst the crisis in Ukraine are presented in Table 1.

The difference in capital attraction and profit distribution is driven by the disparity in development priorities between the alternative energy and telecommunications sectors amidst the crisis in Ukraine.

Alternative energy, from an entrepreneur's perspective, involves a range of technologies and methods to generate renewable sources of energy, which serve as alternatives to traditional fossil fuels [3]. For entrepreneurs, priorities include ensuring the country's energy security and independence, developing renewable energy sources as alternatives to traditional ones, and promoting sustainable development. Naturally, the financial principles of such entrepreneurship encompass a wide range of directions, including attracting external financing and government support for developing innovative technologies and business models grounded in social responsibility and environmental sustainability (illustrated in Table 2).

The outlined specificity arises because alternative energy plays a key role, given that its development has a positive impact on ecology, economy, and society.

So, regarding the telecommunications sector, from an entrepreneur's perspective, involves a range of technologies and methods for providing communication services and developing specific infrastructure and technologies. In this context, the priority for such an entrepreneur is ensuring uninterrupted communi-

**Table 2. Specifics of forming financial principles in the field of alternative energy entrepreneurship**

Direction	Ecological aspect	The economic aspect	The social aspect
Sub-directions	Reduction of negative environmental impact 1 Conservation of natural resources 2 Combatting climate change 3	Energy independence 4 Job creation 5 Infrastructure development 6 Energy efficiency 7	Improvement of quality of life 8 Energy accessibility 9 Increase in living standards 10 Support for local communities 11

**Note**

1 Alternative energy does not produce harmful emissions, which helps reduce air, water, and soil pollution. It positively impacts human health and ecosystems.

2 Renewable energy sources such as solar, wind, and hydroelectric power are inexhaustible, unlike fossil fuels. Their use contributes to conserving natural resources for future generations.

3 Alternative energy helps reduce greenhouse gas emissions, a major cause of global warming. It contributes to mitigating the effects of climate change and ensuring sustainable development.

4 The development of domestic renewable energy sources reduces dependence on imported energy resources, which positively impacts the balance of payments and economic stability of the country.

5 The alternative energy sector is science-intensive and innovative, creating new jobs in production, installation, maintenance, and research fields

6 Investments in alternative energy contribute to infrastructure development, including electrical grids, which positively impact regional economies.

7 The renewable energy sources used can reduce electricity costs for households and businesses.

8 Clean energy contributes to improving air and water quality and positively impacts public health.

9 The development of alternative energy can provide access to electricity in remote and hard-to-reach areas where centralized grids are not available

10 The development of the sector contributes to economic growth and creates new opportunities for the population.

11 Enterprises in the alternative energy sector can invest in the development of local communities, creating jobs and supporting social projects.

Source: formulated by the author based on [1; 3-4].

cation and access to information for the public and businesses, supporting critical infrastructure, and adapting to new market demands. Naturally, the financial principles of entrepreneurship focus on adapting to new market realities by utilizing new financing sources, optimizing costs, managing risks, and ensuring the continuity of business processes (illustrated in Table 3).

The specific nature is driven by the fact that telecommunications continue to exist and evolve

**Table 3. The specifics of forming financial foundations of entrepreneurship in the telecommunications sector**

Direction	Search for new sources of funding	Cost optimization	Risk management	Ensure business continuity
Sub-directions	Attracting foreign investments Alternative sources of funding Government support Internal resources	Implementation of energy-saving technologies Optimization of business processes Reduction of non-critical expenses	Various risk management strategies, including insurance, supplier diversification, creation of reserve funds, etc.	Investments in the smooth operation of networks and services, the use of backup power sources, cloud technologies and other solutions

Source: formulated by the author based on [2; 5–6].

**Table 4. Specification of production foundations in the telecommunications sector under crisis conditions in Ukraine**

Direction	Production principles of entrepreneurship		General focus of development
	list of principles	characteristics	
Expansion and modernization of infrastructure	Restoration of damaged assets	Repair and replacement of damaged base stations, repeaters, cables, and other equipment	The evolutionary nature and flexibility of the process, which includes providing communication services and developing the infrastructure and technologies necessary to support these services
	Expansion of network coverage	Construction of new base stations, laying fiber optic lines to provide communication access in new areas	
	Installation of new equipment	Modernization of existing infrastructure by installing new, more modern, and efficient equipment	
Implementation of new technologies	Equipment and software updates	Transitioning to new versions of software, installing more productive equipment to enhance service quality and network bandwidth	
	Deployment of 5G	Deployment of fifth-generation networks (5G), providing higher data transmission speeds, lower latency, and the ability to connect a larger number of devices	
	Cloud technologies	Utilizing cloud platforms for data storage, information processing, and service provision, which allows reducing costs on proprietary infrastructure and enhancing business flexibility	
	Internet of Things (IoT)	Implementation of IoT technologies for process automation, network and equipment monitoring, as well as offering new services to customers	
Optimization of production business processes	Automation	Utilizing automation systems for network management, service quality monitoring, customer request processing, and so on	
	Outsourcing	Outsourcing basic functions (including technical support, equipment maintenance) to external companies to reduce costs and increase efficiency	
	Increased energy efficiency	Implementing energy-saving technologies and equipment to reduce electricity costs	

Source: formulated by the author based on [2; 5–6].

through continuous improvement of technologies and infrastructure to meet the growing needs of modern society. Their development depends on the ability to effectively utilize innovations to improve service quality and ensure competitiveness in the market [5–6],

The production foundations of entrepreneurship in the fields of alternative energy and telecommunications, unlike the financial foundations, possess significant uniqueness [2].

Regarding the telecommunications sector, entrepreneurs provide communication services, infrastructure, and technology development. Therefore, the list of production foundations may include [5–6]:

1. Infrastructure development and modernization (including restoration of damaged assets, network coverage expansion, installation of new equipment, etc.);

2. Implementation of new technologies (equipment and software updates, deployment of 5G, cloud technologies, the Internet of Things, etc.);

3. Optimization of production business processes (including automation, outsourcing, and improving energy efficiency).

The results of specifying the financial foundations in the telecommunications sector under the crisis conditions in Ukraine are presented in Table 4.

Therefore, in this context, production foundations are focused on the flexibility and evolutionary nature of the process, which includes providing communication services and developing the infrastructure and technologies necessary to support these services.

In the field of alternative energy, production refers to the process of transforming natural resources into energy [1; 3]. So in alternative energy, the outlined aspects may include [1; 4]:

**Table 5. Specification of production principles in the alternative energy sector amidst the crisis in Ukraine**

Direction	Production principles of entrepreneurship		General focus of development
	list of principles	characteristics	
Expansion and modernization of production capacities.	Construction of new power plants	Creation of new solar, wind, hydroelectric power stations, biogas plants, and other alternative energy facilities to increase the production volumes of «green» energy	A flexible process of energy collection, conversion, and distribution, unlike traditional manufacturing of physical goods
	Modernization of existing power plants	Implementation of new technologies and equipment at existing facilities to enhance their efficiency, productivity, and reliability.	
	Development of distributed generation	Establishment of small-scale power stations located near consumers to reduce energy transmission losses, improve energy supply reliability, and promote local community development	
Enhancement of technological innovativeness	Implementation of new energy production technologies	Utilization of more efficient solar panels, wind turbines, inverters, control systems, etc.	
	Energy storage systems	Development and implementation of energy storage systems to address the instability of renewable energy sources and ensure uninterrupted power supply.	
	«Smart» grids	Implementation of intelligent power grid management systems to optimize power generation and consumption and improve energy system efficiency	
Component production localization	Development of in-house production of alternative energy equipment	Establishment and support of domestic industries manufacturing solar panels, wind turbines, inverters, cables, and other equipment essential for alternative energy infrastructure	

Source: formulated by the author based on [1; 3—4].

1. Expansion and modernization of production capacities (including the construction of new power plants, upgrading existing ones, and developing distributed generation);
2. Enhancing technological innovation (specifically implementing new energy production technologies, energy storage systems, and "smart" grids);
3. Localization of component production (particularly developing domestic equipment manufacturing for alternative energy in Ukraine).

The outcome of specifying the financial principles in the field of alternative energy and telecommunications during the crisis in Ukraine is presented in Table 5.

Thus, production in this context prioritizes a flexible approach to energy harvesting, transformation, and delivery, as opposed to conventional manufacturing of physical products.

**CONCLUSIONS FROM THIS STUDY AND PROSPECTS FOR FURTHER EXPLORATION IN THIS DIRECTION**

The financial and production principles of entrepreneurship in the alternative energy and

telecommunications sectors have unique characteristics, leading to the following conclusions:

1. Financial principles in alternative energy and telecommunications entrepreneurship define key aspects of an entrepreneur's financial activities, particularly capital attraction and profit distribution strategies amidst the Ukrainian crisis. In addition to a high dependence on external financing, the outlined aspects may be characterized by: in the field of alternative energy — the specificity of financial adaptation to changing conditions through attracting capital and distributing profits for energy efficiency and import substitution, restoration and protection of infrastructure, innovation; in the field of telecommunications, the specificity of financial adaptation to changing conditions through attracting capital and distributing profits for the restoration and protection of infrastructure, ensuring uninterrupted communication and access to information, digitalization, and the development of new services. However, the financial principles specific to alternative energy are more extensive and varied, emphasizing social

responsibility and environmental sustainability, while those in telecommunications are narrower, focusing on financial stability and adaptation to the evolving market.

2. It has been proven that the production foundations of entrepreneurship in the alternative energy and telecommunications fields, unlike financial foundations, have significant uniqueness. Regarding the telecommunications sector, entrepreneurs in the telecommunications sector do not manufacture physical goods but provide communication services and infrastructure and technology development. Therefore, the list of production foundations may include infrastructure development and modernization, new technologies implementation, and optimization of production business processes. In the field of alternative energy, production refers to the process of transforming natural resources into energy. In alternative energy, the outlined aspects may include expansion and modernization of production capacities, enhancement of technological innovation, and localization of component production. Thus, production in this context prioritizes a flexible approach to energy harvesting, transformation, and delivery, as opposed to conventional manufacturing of physical products.

3. It is evident that financial and production principles of entrepreneurship in crisis conditions are crucial for sustainable development in the field of alternative energy and telecommunications, as well as for increasing their competitiveness.

The analysis of the above provisions allows us to identify, as a prospect for further research in this direction, a detailed study of the impact of war on the financial and production principles of entrepreneurship in the field of alternative energy and telecommunications. The outlined direction may include an analysis of changes in sources of funding, investment attractiveness, cost of resources, logistical chains, and other factors that affect the activities of such entrepreneurs.

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*Стаття надійшла до редакції 26.06.2024 р.*