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GRYTSENKO, A. A. (https://orcid.org/0000-0002-5030-864X),
and LYPOV, V. V. (https://orcid.org/0000-0003-3215-0612)
Institute for Economics and Forecasting of the National Academy of Science of Ukraine,
26, Panasa Myrnoho St., Kyiv, 01011, Ukraine,
+380 44 280 1234, eip@ief.org.ua

PLATFORM COOPERATIVISM AND ITS APPLICATION IN RENEWABLE ENERGY

Introduction. *The advancement of digital technologies is profoundly impacting nearly every aspect of social life, offering new opportunities for sustainable development while simultaneously posing significant challenges to social cohesion.*

Problem Statement. *The proliferation of platform-based business models is accompanied by the monopolization of platform markets and the emergence of platform capitalism. Market power becomes concentrated in the hands of the owners of the core of digital platforms (DPs), who increasingly leverage tools for manipulating consumer behavior as a means to achieve economic success. In this environment, the interests of the actual producers of goods and services-participants in the DP ecosystem-become secondary, exacerbating social imbalances within society.*

Purpose. *This study aims to identify the prerequisites and potential for creating distributed production systems-value creation networks (VCNs)-based on cooperative relationships among participants.*

Materials and Methods. *The research employs a combination of general scientific and specialized methods, drawing on publications by domestic and international researchers, as well as statistical data from national and international organizations.*

Results. *As an alternative to platform capitalism, the study proposes a model of platform cooperativism that envisions DPs initiated and organized by producers themselves as VCN members. In this model, producers assume multiple roles, including management team, owners, contractors, employees, and consumers. The study also analyzes the impact of platformization on the changing social context of production during the third industrial revolution and uncovers the socio-cultural prerequisites for the development of platform capitalism and platform cooperativism models. The creation of cooperative DPs in Ukraine, particularly in the context of military conflict and post-war reconstruction, is highlighted as a matter of particular relevance.*

Conclusions. *Cooperative DPs in the renewable energy sector have demonstrated the potential of a cooperative movement founded on digital platforms, combining the benefits of spatial or niche localization (specialization) with the globalization of activities.*

Keywords: digital economy, digital platforms, local microgrids of renewable energy generation, value creation network, platform capitalism, platform cooperativism.

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The transition from an industrial-market economy to an information-network economy represents a fundamental shift in modernity. This evolution progresses through three natural stages: the information-analog, information-digital, and neural network stages [1]. Presently, society is situated at the information-digital stage. The widespread digitization profoundly impacts the transformation of all societal components. The integration of digital technologies facilitates increased labor productivity, broadens the range of goods and services available, and enhances their quality. Additionally, it prompts a radical transformation in the organizational forms of social interaction.

However, the initial optimism surrounding the sharing economy has rapidly shifted to concern over the social implications of widespread digitalization. A notable example is the evolving policy of the People's Republic of China concerning the development of the sharing economy [2]. The perception of digital platforms (DPs) as a means of strengthening social interaction has changed with the recognition of their role in increasing the threats of growing social inequality in society.

DPs have emerged as the dominant organizational form of business operations, laying the groundwork for the platform capitalism model. The concentration of functions such as data accumulation, analysis, control, and redistribution has transformed DPs into key instruments for profit generation in the digital era. The networked structure of business organization introduces several productivity-enhancing effects [3]. Nevertheless, this structure often leads to the prioritization of the interests of DP owners, who concentrate the management of external economic resources in their hands. This concentration exacerbates social inequality, contributing to the deepening of societal divisions. According to McKenzi's analysis, this emerging model may present challenges that are more severe than those associated with traditional capitalism [4].

The evolution of capitalism, driven by the technological foundation of digital platforms, significantly alters socio-economic relations, pushing them beyond the boundaries of traditional capitalist frameworks. However, this shift does not equate to socialism. As H. V. Kolodko suggests, what we are witnessing is something "third" [5]. An alternative to platform capitalism within the context of contemporary information and digital transformations can be conceptualized as platform cooperativism. This model is characterized by a group of independent producers, each contributing individual components of goods and services, who collaborate within a distributed production system formed by a value creation network (VCN).

Platform cooperativism reimagines the organizational principles of production by leveraging the capabilities of digital platforms to merge ownership, management, and participation in the production process among all its members. This model preserves the social foundations of the labor distribution system, ensuring a more equitable approach to production and resource management.

The development of the platform cooperativism model is particularly pertinent in the context of Ukraine's ongoing military conflict and the challenges of post-war economic recovery. The loss of substantial human, material, and capital resources necessitates the exploration of more active and efficient methods of utilizing existing assets. DPs provide a means to unite independent developers of R&D innovations, technological expertise, and owners of material and financial resources, all of whom remain equal participants in the production process. This approach facilitates the creation of distributed production structures based on cooperative interaction, which aligns with the group-cooperative values inherent in the national culture [6]. A promising example of the application of platform cooperativism in Ukraine is the development of local microgrids of renewable energy generation (LMRE).

The objective of this study is to explore the potential of cooperative forms of organizing local microgrids for renewable energy generation based on digital platforms as a means of promoting the sustainable development of local communities.

The publication of N. Srnicek's *Platform Capitalism* has brought attention to the profound changes induced by the widespread adoption of platform-based business models [7]. Scholars have increasingly focused on the ambiguous social consequences of centralized control and monopolization within these platforms [8]. This has renewed the search for alternative forms of business organization. Researchers are now examining the potential of solidarity as a business model, particularly in the context of cooperatives where co-owners share in the management and benefits of the enterprise [9]. The discussion emphasizes the positive impact of digitalization on transforming management and property relations, and on the formation of platform cooperativism [10]. The growing recognition of the importance of revitalizing the cooperative movement through digitalization is exemplified by the establishment of the UN Secretariat's Research Panel on Digital Cooperation [11]. The Panel's central idea is to shift from a model in which individuals work for a platform to one where the platform serves the people who participate in its ecosystem. Platform cooperativism seeks to blend the rich heritage of the cooperative movement with the technological potential of the 21st century [12]. Research has increasingly focused on specific mechanisms for fostering cooperative interaction on digital platforms [13]. M. Mannan and S. Peck, for example, note the simplification of interactions between households, the physically independent nature of work, and the relatively high value of scale achievable with modest initial investments in ecosystem development [14]. V. Arets explores various models of cooperative structures based on digital platforms [15], with a particular focus on balancing individual and collective interests [16], as well as the cultural prerequisites for the success of cooperative movements in the digital age [17]. The necessity of a multidisciplinary approach in this research is widely acknowledged [18]. The historical experience of cooperative movements in Ukraine, as documented by scholars such as M. Tugan-Baranovsky [19], V. Marochko [20], and O. Shmorgun [21], provides valuable insights into the origins, foundations, and future prospects of cooperative interaction within digital platform ecosystems in the country.

The field of small renewable energy generation holds significant potential for the development of cooperative structures based on digital platforms. The complex nature of the tasks involved has led to a wide array of research aimed at addressing specific components of local microgrids of renewable energy (LMRE) formation. Key areas of investigation include the search for models of federalizing prosumers — small electricity producers within virtual power plants [22], mechanisms for market interaction within LMREs [23], the assessment of their potential in advancing renewable energy generation [24], and the role of DPs in their establishment [25]. Additionally, research focuses on the development of the green economy [26], the unique aspects of cooperative interaction among LMRE participants [27], and the prosumerization of the energy generation market [28]. The survey *Energy Prosumers in Europe* offers valuable insights into the successful organization of small electricity producers in the creation of virtual power plants [29]. Attention is also given to the social implications of the cooperative nature of energy platforms [30]. A collective study led by K. Zame has put forth recommendations for supporting the development of smart grids and electricity storage [31]. Increasing attention is being paid to the challenges and prospects for the development of LMREs in Ukraine, particularly those based on cooperative DPs [32, 33].

DIGITAL PLATFORMS AND RESTORATION OF COOPERATIVE MOVEMENT

The introduction of digital technologies is driving fundamental transformations, with a depth comparable to the changes brought about by previous industrial revolutions [34]. A key factor in the division of labor in global markets is the ability to replicate specific production functions within

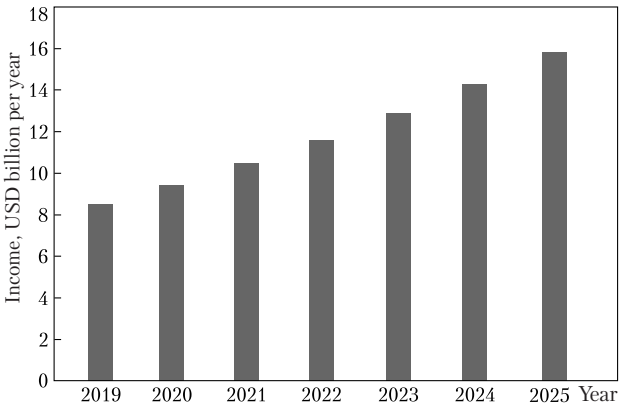

Fig. 1. Dynamics of growth in DP income in 2019—2025

value creation networks through digitalization. Digitized data has become a critical economic resource, with the "digital hand of platforms" replacing both the "visible hand of hierarchical management structures" and the "invisible hand of the market." Networked interactions among independent participants in the production process enable more efficient use of production resources [35]. The ability to pursue personal interests within a distributed production system unleashes participants' initiative, coordinated by the digital platform core. Members of the DP ecosystem can act as prosumers, combining the roles of both consumers and producers of goods or services.

The digitization of the energy sector and the implementation of digital platforms offer significant opportunities to transform distributed energy generation and storage systems. These advancements are key components of the energy transition, promoting democratized access to renewable energy, sustainable and affordable energy supply, and supporting overall sustainable development [36].

The platformization of markets has led to the monopolization of digital platforms, which have emerged as a transformative innovation radically altering the institutional landscape. By 2020, more than 10,000 digital platforms were operating in Europe alone [37]. The institutional framework built around these platforms has solidified its competitive edge over traditional hierarchical organizations. By market capitalization, eight of the ten most valuable companies globally were digital platform companies. In 2019, global revenue from digital platforms was estimated at USD 3.8 trillion, with 48% generated in Asia, 22% in the United States, 12% in the Eurozone, and 18% in the rest of the world [38]. The COVID-19 pandemic has further accelerated the growth and profitability of these platforms, as illustrated in Fig. 1 [39].

Social platforms have increasingly become active participants in public discourse, but their business models often rely on monetizing users' personal data. One of the key advantages that digital platforms hold over traditional hierarchical business structures is their ability to externalize certain social functions, such as employee welfare. However, this "efficiency" often leads to irrational outcomes when viewed within a broader social context. The commercialization of skills and resources traditionally confined to the private sphere disrupts established social guarantees embedded within the market economy, leading some to describe the sharing economy as "neoliberalism on steroids" [40].

To mitigate these drawbacks of platformization, cooperative interaction within the ecosystem of digital platforms offers a promising solution. Notably, there is an inherent similarity between the institutional foundations of cooperative relationships and the interactions among participants in a digital platform ecosystem. In both instances, the principles of interaction are heterogenous, blending hierarchical and market relations. Both cooperative members and digital platform participants function as elements within a value creation network. As such, they are embedded within a system of mutual obligations while remaining independent economic agents. This dual role expands the motivation for participation in joint activities beyond that of a traditional employee. In the context of a digital platform cooperative, participants are not only co-owners but also play an active role in managing its operations.

Cooperative interaction within distributed power generation networks presents a fundamentally different motivational framework compared to the *Platform Capitalism* business model. This distinction is vividly articulated by the esteemed Ukrainian economist and prominent researcher of the cooperative movement, M. Tugan-Baranovskyi. According to him, the fusion of personal interests with the collective nature of cooperative activities, alongside the social orientation of outcomes, sets cooperatives apart from the profit-maximizing model of joint-stock companies. Tugan-Baranovskyi defined cooperative as "an economic enterprise formed by several individuals who voluntarily unite, not with the aim of maximizing profit for invested capital, but rather to increase, through collective management, the labor income of its members or to reduce their expenses" [19, 46, 47]. As a socio-economic organization, the cooperative movement transcends the narrow goal of profit maximization, focusing instead on the holistic provision of economic, social, and cultural benefits for its members [30]. The cooperative model is inherently aligned with advancing the goals of its members, fostering cooperation, social responsibility, internal democracy, and civic self-help. It also provides quasi-public benefits and establishes an institutional framework for citizen involvement in the political, social, and financial aspects of renewable energy deployment, thereby democratizing the energy sector.

The success of the cooperative movement is fundamentally rooted in the core values established by the International Cooperative Alliance (ICA) [41]. These values encompass voluntary and open membership, democratic member control, economic participation, autonomy and independence, continuous education and training, cooperation among cooperatives, and a commitment to community care. These principles are further elaborated upon in the main principles and functions outlined in the final report of the High-Level Research Panel on Digital Cooperation, prepared by the UN General Secretariat [11].

Several key characteristics distinguish cooperatives based on digital platforms from the business model of *Platform Capitalism*. Firstly, the primary goal of cooperatives is to address specific social challenges, rather than maximizing profit, which is a hallmark of *Platform Capitalism*. Secondly, as alternatives to market and hierarchical structures, cooperatives operate within certain organizational limitations. Thirdly, the relationships among cooperative members are fundamentally different, characterized by less formalization and a greater emphasis on fairness and trust — essential elements for success in environments where the utility of each participant is interdependent on the utility of others. Fourth, the impact of cooperatives on market interactions diverges from that of profit-oriented firms [42]. Finally, in the field of renewable energy, the motivation of participants and customers within DP cooperatives extends far beyond the mere production, consumption, and purchase of inexpensive electricity.

A DP-cooperative is collectively owned by the participants of its ecosystem, who are all granted the opportunity to partake in its management. Efficiency is driven by the functional specialization of members and the reliance on the professional competencies of those initiating management decisions. Member investments serve as the primary source of funding for the cooperative. Membership is not only a prerequisite for participation but also a vital tool for achieving shared objectives. However, this model comes with certain limitations, such as the scale of operations, which is often constrained by spatial localization or the specific nature of the cooperative's joint activities. Despite these limitations, the cooperative model opens pathways for spatial-niche glocalization — an approach that leverages in-depth specialization while removing spatial restrictions on participation within the value creation network.

While common goals unite cooperative members, competitive relationships among them are not precluded. Data generated within the cooperative is considered the collective property of all its members. The ecosystem itself may exhibit a

dual-loop structure: the first loop consists of cooperative members, while the second encompasses potential consumers who are not members of the cooperative.

A key factor in the success of DP-cooperatives is the multifaceted roles assumed by their members. These roles include acting as owners of production assets and the platform itself, managers, producers, employees, consumers, participants, and coordinators within the value creation network (distributed production system), as well as members of the local community (in cases where there is spatial localization). Each of these roles entails specific conditions for engagement with the DP-cooperative, along with distinct short-term and long-term expectations and objectives. The comprehensive consideration of these roles is crucial to ensuring the success of the cooperative.

SOCIOCULTURAL PRECONDITIONS FOR PLATFORMIZATION MODELS

The unconditional dominance of global markets by digital platforms originating from the United States, where individualistic values prevail, contrasts sharply with the limited presence of DPs in China, a country characterized by communitarian culture, and the near absence of DPs from the European Union (EU), where corporatism is more prevalent. This disparity can be seen as significant evidence of the influence of cultural factors on the commercial success of platform capitalism. Despite the EU's comparable market scale, which in some aspects even surpasses that of its more successful rivals, its DPs have not achieved the same level of global success.

In China, the rapid progress of corporations representing the People's Republic of China has notably slowed following the government's revised policies on digital giants. This policy shift was largely driven by an increasing awareness of the negative social consequences resulting from the monopolization of digital markets. Conversely, the EU has concentrated on establishing a robust legal framework to govern the functioning of digital platforms, with a particular focus on the social aspects of digital businesses.

One of the EU's key strategies in addressing these issues has been the promotion of corporate and cooperative traditions deeply rooted in European culture, particularly in the context of digitization. These traditions are seen as vital tools for unifying and coordinating collective efforts to solve specific challenges. Platformization, in this sense, is perceived as a means to revitalize these traditions.

However, the dispersion of ownership rights in distributed production systems complicates the distribution of authority within a DP ecosystem. In the case of platform capitalism, the DP core is typically controlled by an entrepreneur who seeks to maximize personal gain by leveraging the potential of ecosystem participants. In contrast, the platform cooperativism model proposes an alternative approach, wherein the DP is initiated and controlled by the potential participants themselves, ensuring that the core of the DP remains under the collective control of its ecosystem members.

Production cooperation based on digital platforms acts as an intermediary between private and state forms of entrepreneurship, enabling the alignment of personal interests with the social objectives of production. Participants in the production process not only make decisions within their direct areas of expertise but also gain the right to influence the overall policy of the DP. The dominance of individualistic (USA), cooperative (EU), and communitarian (China) cultures gives rise to distinct models of platform capitalism, platform cooperativism, and state-controlled platform capitalism, respectively.

In the European Union, efficiency is often achieved by returning to the principle of corporatism, which is deeply rooted in European culture. Digital technologies facilitate the reinforcement of group-cooperative values, where individuals perceive themselves as integral parts of a larger social order. According to this worldview, everyone must find their role, voluntarily sub-

mit to higher goals, fulfill their duties, and realize their purpose through cooperative interaction with others. Harmonizing public and individual interests is achieved by democratizing the process of making socially important decisions [43]. The introduction of Information and Communication Technologies (ICT) and the active platformization of industries provide opportunities to deepen the involvement of DP ecosystem participants in realizing these values.

At the enterprise level, there is a resurgence of the corporation-cooperative model, reminiscent of medieval Europe, where the cooperative spirit is revitalized [10, 17]. This model minimizes the role and significance of intermediary links between owners and the management decision-making system. There is a growing interest in cooperation, shared responsibility [13], and collaboration [16] among participants in the DP ecosystem, reflecting a shift towards a more participatory and the evolution of Ukrainian business culture presents a unique mix of individualistic and communitarian elements, which creates both challenges and opportunities for integration into the EU economy, particularly through the lens of corporatism. As Ukraine seeks to develop a strategy for its national economy, it is crucial to consider the potential advantages and limitations that come with adopting a business model of platform cooperativism.

The versatility of digital platforms as an organizational model offers substantial opportunities for application across nearly all sectors of economic activity. Notably, DP cooperatives can be established on both commercial and non-commercial bases. Ukraine retains a significant reservoir of scientific, technical, and educational potential, which positions it well to leverage the benefits of digitalization. This context underscores the importance of developing state policies that stimulate the innovative activities of DP cooperatives, particularly those aimed at revitalizing local communities. Such policies should encourage the exploration and creative commercial use of the new opportunities emerging through digital transformation. Additionally, the multifaceted roles that members of DP cooperatives can assume represent an effective policy tool for fostering human capital development [44].

Supporting the cooperative movement through platformization is particularly vital for Ukraine as it grapples with the severe social consequences of Russia's military aggression. The inherent universality of DPs, coupled with the diverse roles available to members of DP cooperatives, can serve as a powerful mechanism for mitigating the societal threats posed by the hybrid nature of the aggressor's actions [45].

The creation of small VCNs is a vivid example of the potential opportunities opening up in the field of developing the DP-based cooperative movement.

RENEWABLE ENERGY GENERATION AND PLATFORM COOPERATIVISM

An important component in enhancing the resilience of Ukraine's energy system against threats from Russian aggression is the active development of local microgrids for renewable energy generation. The data presented in Table 1 underscore the impressive growth of renewable energy in Ukraine between 2011 and 2021, despite the significant loss of capacity in 2014, when the Autonomous Republic of Crimea and parts of the Luhansk and Donetsk regions were occupied. Even amid ongoing military conflict, Ukraine managed to commission approximately 312 MW of new renewable energy sources (RES), in 2022, and 350 MW, in 2023, demonstrating the sector's continued resilience and growth potential [46].

Among the factors complicating the development of renewable energy sources in Ukraine, several challenges stand out: a significant lag in the development of the regulatory framework, limited financial resources among potential participants, insufficient return on investment, the necessity of expanding storage capacities in parallel, complex bureaucratic procedures for connec-

ting to energy networks, significant dependency on weather conditions, and high investment risks exacerbated by Russia's military aggression. Additionally, the curtailment of "green tariff" practices has also posed a major obstacle [48].

A notable feature of RES development in Ukraine has been the concentration of a significant portion of these resources in the Southern and South-Eastern regions. Consequently, in the early months of the war, up to 40% of RES power plants — or approximately 1,120—1,500 MW of installed capacity — were adversely affected. RES assets valued at over USD 5.6 billion found themselves in active war zones, with an additional USD 3.6 billion in neighboring regions. During the initial phase of the military aggression, energy generation was reduced by more than half. Besides the destruction caused by direct hostilities and measures taken to prevent damage to electrical equipment, the conflict also introduced challenges in balancing supply and demand [49]. As noted by M. Topalov, the share of RES in total energy generation dropped from 13.4% to around 5—6% [50].

The distinctive features of DP cooperatives in the energy sector are shaped by the unique characteristics of energy as a product around which interaction is structured. The homogeneity, universality, massiveness, and immateriality of energy make it easier to quantify the contributions and consumption of microgrid participants. This, in turn, significantly facilitates the digitalization of processes and the use of algorithmic methods for managing energy flows, making cooperative interaction in this sector particularly well-suited to a platform-based approach.

The formation of a DP-based cooperative by small RES producers addresses several issues impeding renewable energy development. It establishes an institutional framework that integrates political, social, and financial aspects, fostering active citizen participation and democratizing the energy sector. Table 2 presents the results of a survey on the perception of energy cooperatives as a democratic organizational form.

The creation of DP cooperatives for small renewable energy generation mobilizes investment by uniting the efforts of local communities, SMEs, and households. This collective approach at the community level facilitates the search for funding, the preparation of necessary documentation, and the execution of projects supported by grants, subsidies, and loans. It also fosters increased trust among participants.

Table 1. **Dynamics of the RES Growth in Ukraine, in 2011—2021, MW**

Electricity generation	Years										
	2011	2012	2013	2014*	2015	2016	2017	2018	2019	2020	2021
Wind	151	194	334	651.8	426	438	465	533	1170	1314	1673
Solar	191	326	616	818.9	432	531	742	1388	4925	6094	6227
SES	—	—	—	0.1	2	17	51	157	553	779	1205
Small HES	71	73	75	80	87	90	95	99	114	116	121
Biomass		6	17	35	35	39	39	52	55.9	91	152
Biogas		—	7	14	17	20	34	46	70.3	103	124
Total	413	599	1049	1599.8	999	1135	1425	2275	6888.2	8497	9502

* Until 2014, given the capacities located in the Autonomous Republic of Crimea and the occupied parts of the Luhansk and Donetsk Oblasts (a total of 633.7 MW)

Source: [47].

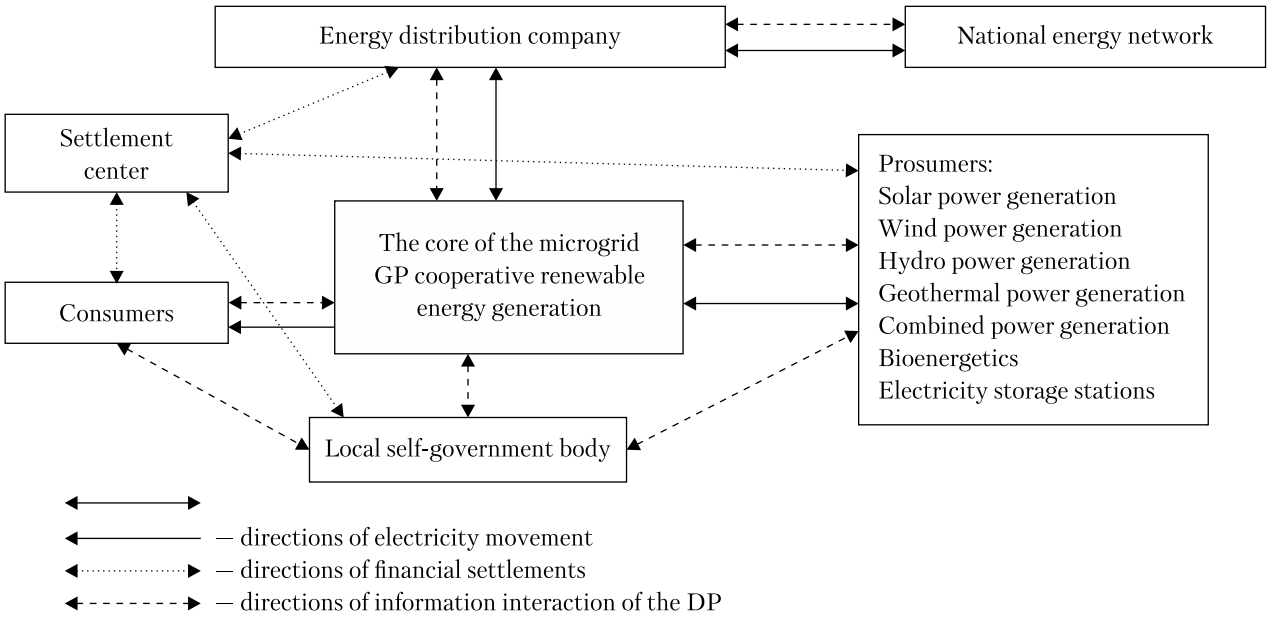

Fig. 2. Structural and functional complementarity of elements of DP microgrid cooperatives

Source: Prepared by the authors based on [48].

Building a distributed power generation system reduces the risks of destruction from hostile actions and mitigates the likelihood of total power outages. Local communities benefit from additional energy sources, and the national energy generation and distribution system is strengthened by the integration of local renewable microgrids. Entities within these microgrids can accumulate and redistribute surplus energy within the community, optimizing equipment usage and shortening payback periods while reducing the load on centralized power generation systems.

Figure 2 illustrates the structure of a DP-cooperative microgrid for renewable energy generation. This microgrid integrates the electricity generation and storage resources of households, SMEs, and farms, and those collectively owned by the local community. The core of the DP facilitates data exchange regarding energy flows among cooperative members, external consumers, and the energy distribution company.

The local self-government body plays a crucial role, acting as an initiator and one of the investors, coordinating the activities of other cooperative members, and liaising with state authorities, external investors, and the energy distribution company. This body may also own energy generation equipment and centralized storage facilities.

A banking institution, using data provided by the DP core, handles financial transactions between cooperative members for electricity supplied or consumed and for storage services. Cooperative members include those with energy genera-

Table 2. **Reasons for Perceiving the Energy Cooperatives as Democratic Organization Form (several answers possible) [30]**

Description	Share, % (n = 1872)
Possible financial participation	27.88
Possible participation with a small investment	41.29
Voting right for all members	54.75
One participant — one vote	59.03
Possible active participation in meetings of cooperative members	33.92

tion and storage equipment connected to the microgrid. Consumers may be community members who do not generate their own power, are not cooperative members, or contribute by investing in new power generation installations.

By connecting to the national energy grid, the cooperative-DP can address imbalances in electricity production, storage, and consumption. The cooperative thus functions as a semi-autonomous "energy peninsula," balancing local needs with broader grid demands.

The activities of energy cooperative members can be categorized into the four levels of participation: information, coordination and consultation, interaction, and mutual settlements: the first level involves the exchange of information and the training of participants, ensuring they are well-informed about the microgrid's operations and the broader energy ecosystem; at the second level, actions are coordinated through the DP core, which acts as an intermediary to streamline efforts and decision-making processes among cooperative members; the thrid level covers the actual generation, use, storage, and redistribution of energy flows within the microgrid, facilitating the cooperative's core operational activities; the forth level involves financial transactions between participants, enabling the economic exchange for electricity generated, consumed, and stored. This framework highlights the hybrid nature of DP cooperatives in renewable energy. These cooperatives combine the features of digital experience platforms, which engage consumers in the utilization of services created by the DP, with those of digital industrial platforms, which unite participants in value creation networks focused on the production, storage, and distribution of electricity. Additionally, they perform transactional functions by mediating between microgrid participants and organizational functions by facilitating the exchange of energy flows.

In the context of integrating digital platforms into the energy sector, S. Clopenburg and M. Boycelo [48] identify platforms of origin that allow users to choose potential producers and buyers of electricity, such as *Powerpeers* in the Netherlands and *Piclo* in the UK. They also highlight access platforms that facilitate investment, often through crowdsourcing, into small-scale renewable energy projects, like *SunShare* in the USA. Additionally, they note community platforms, or virtual power plants, that enable the formation of distributed energy generation systems, such as *SonnenCommunity* in Germany, *City-zen* VPP in the Netherlands, and *Shinehub* in Austria. *Powerpeers* (Netherlands) allows consumers to choose the producer from whom they want to buy electricity, while *SonnenCommunity* (Germany) offers a similar service, including small electricity producers with lithium batteries who share their excess energy. *SunShare Community Solar* (USA) allows investors to buy into "solar gardens" and save on utilities due to their share in energy generation.

The purpose of establishing the latter group of DPs can range from increasing the autonomy of the local energy community (community), reducing energy prices through market trading, or providing network balancing services. In this case, the collective interaction of project participants can take the form of cooperation for self-sufficiency, as well as purely economic motivation to maximize the return on investment.

The types of DP proposed by researchers differ in three parameters. First, according to the degree of influence on network connections (supporting the exchange and registration of energy flows or algorithmic management of these flows). Secondly, according to the nature of the services provided to the participants (joining the microgrid as a consumer or producer of energy, promoting the development of private power generation as part of the microgrid, the possibility of participating in its development as an investor-stakeholder). Thirdly, according to the participant's degree of freedom to influence electricity traffic.

In turn, the authors of the study *Renewable Energy Cooperatives as Gatekeepers or Facilitators?* [30], in the context of the structural support of their organization on VCNs, distinguish cooperatives according to their main activity into those specia-

lized in generation/production, distribution/transmission, or trading of electricity. The historical framework of the creation of cooperatives in the energy sector, features of financing, membership, social structure, and involvement in their activities are chosen as additional classification criteria.

Modeling, particularly the mathematical modeling of cooperative-DP renewable energy generation, is challenging due to the lack of practical experience in establishing energy cooperatives in Ukraine and the significant differences in the conditions they face compared to European countries. These differences are not only reflected in the cost of electricity but also in the opposite approaches to pricing. In European countries, the price for households is significantly higher than for businesses, which contrasts with the situation in Ukraine. In the modeling process, it is necessary to account for various quantitative and qualitative factors. These include the impact of war risks on price fluctuations for equipment, installation, and maintenance works; regional differences; the dependence of renewable energy generation efficiency on weather conditions; and seasonal fluctuations, such as the varying capacity factors (VCF) for wind and solar generation. Additionally, factors like consumption, daily and seasonal demand peaks, and the specifications of equipment from different manufacturers shall be considered. Consequently, the modeling and calculation of a project's investment attractiveness shall always be tailored to the specific area under consideration.

Of course, like any investment project, installing power generation stations requires a preliminary calculation of payback periods. For instance, the estimated cost of a home solar power generation station with a capacity of 10 kW is approximately UAH 250,000. Considering the 17.9% VCF, as declared by the All-Ukrainian Energy Assembly, the annual production would be 15,680 kWh. With the tariff for household consumers at UAH 4.32 per kWh, the annual production cost would be UAH 67,736, leading to a payback period of 3.69 years.

If the entire volume of energy generated were sold at the green tariff (set at 0.146 EUR/kWh for 2024), this would yield EUR 2,289.28, which, at the exchange rate of 41.2635 on 03.04.2024, amounts to UAH 94,463.7, reducing the payback period to 2.64 years. However, it is important to note that the majority of household energy generation is typically used for self-consumption. Additionally, there remains the risk of payment delays under the green tariff scheme.

Moreover, it is essential to consider that according to Resolution No. 2653 of the NKREKP, dated 29.12.2023, Ukraine's government plans an annual reduction of 10% in the green tariff rate for electricity produced by generating units of private households.

In this context, the inherent effect of cross-subsidization within digital platform cooperatives becomes particularly significant. For renewable energy generation cooperatives, this is achieved by integrating legal entities — consumers and households involved in energy generation — into a single local microgrid. Households can sell their surplus energy to legal entities, who are also members of the cooperative, at prices higher than the standard tariffs set for them. In return, the legal entities can purchase this energy at a lower price than they would typically pay. The cooperative members negotiate the price premium/discount among themselves. Additionally, legal entities with excess energy can offer it to other participants within the cooperative. As a result, even without the reliance on green tariffs, the investment return on renewable energy generation facilities can be enhanced for all groups involved.

An important supplementary factor in the creation and development of local renewable energy microgrids based on DP is ensuring the stability of energy supply within the community, particularly during natural disasters. For instance, on January 8, 2024, the Ministry of Energy reported blackouts in populated areas across eight regions due to severe weather conditions [52].

Digital platform cooperatives in the renewable energy sector offer a viable alternative to platform

capitalism. Unlike the profit-driven, extraterritorial nature of traditional DP business models, these cooperatives are locally focused and emphasize community engagement. They present a competitive counterpoint to the monopolies of large energy generation and distribution companies. The operational foundation of DP cooperatives is grounded in data related to energy production and consumption within the ecosystem, and their use of algorithmic management ensures objectivity, rapid response, and stability of microgrid operations. Legislative and regulatory changes in 2023 have paved the way for the development of local renewable energy microgrids based on DP cooperatives in Ukraine.

CONCLUSIONS

The rise of digital technologies has fundamentally altered business models, with digital platforms becoming the dominant structure. This shift has led to the characterization of the modern economy as platform capitalism, where the accumulation, analysis, control, and redistribution of data become the primary means of generating profit. However, this model often prioritizes the interests of platform owners, exacerbating social inequality.

Platform cooperativism offers a promising alternative. This model fosters collaboration among independent producers who contribute various components of goods and services, creating a distributed production system within a value creation network. Key to its success is the integration of management, ownership, and participation in the production and consumption processes by cooperative members.

The relevance of platform cooperativism is particularly heightened in the context of Ukraine's military operations and postwar economic recovery. The loss of significant human, material, and capital resources necessitates innovative approaches for active involvement and efficient resource utilization. Digital platforms can unite independent innovators, owners of material assets, and financial resources. The cooperative organizational form allows these stakeholders to retain ownership, management, and participation rights within the production process.

In Ukraine, the development of local renewable energy microgrids exemplifies a promising area for the advancement of platform cooperativism. This approach could offer a compelling alternative to the entrenched model of platform capitalism, aligning with the cooperative values inherent in the national culture.

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А.А. Гриценко (https://orcid.org/0000-0002-5030-864X),
В.В. Липов (https://orcid.org/0000-0003-3215-0612)

Інститут економіки та прогнозування Національної академії наук України,
вул. Панаса Мирного, 26, Київ, 01011, Україна,
+380 44 280 1234, eip@ief.org.ua

ПЛАТФОРМНИЙ КООПЕРАТИВІЗМ ТА ЙОГО ЗАСТОСУВАННЯ У ВІДНОВЛЮВАНІЙ ЕНЕРГЕТИЦІ

Вступ. Розвиток цифрових технологій суттєво впливає практично на всі складові суспільного життя. Відкриваються нові можливості забезпечення сталого розвитку, водночас, породжуються виклики соціальній єдності суспільства.

Проблематика. Поширення платформної бізнес-моделі супроводжується монополізацією платформних ринків, формуванням «капіталізму платформ». Ринкова влада концентрується в руках власників ядра цифрової платформи (ЦП). Посилюється інструментарій маніпулювання поведінкою споживачів. Монетизація ринкової влади ядром ЦП стає засобом досягнення економічного успіху. У цих умовах інтереси реальних виробників товарів та послуг — учасників екосистеми ЦП, набувають третинного, похідного характеру. Посилюються соціальні дисбаланси в суспільстві.

Мета. Визначення передумов і потенціалу створення розподілених виробничих систем-мереж (ланцюгів) створення доданої цінності (М(Л)ДЦ) на основі кооперативних відносин між учасниками.

Матеріали й методи. Матеріалом слугували публікації вітчизняних та закордонних дослідників, статистичні дані національних та міжнародних організацій. Застосовано комплекс загальнонаукових та спеціальних методів.

Результати. Як альтернативу «капіталізму платформ» пропонується модель «платформного кооперативізму», яка передбачає ініціювання організації ЦП самими виробниками — учасниками М(Л)ДЦ. Останні поєднують ролі учасника управлінської команди, власника, виконавця робіт, найманого працівника, споживача. Проаналізовано вплив платформізації на зміну соціального змісту процесу виробництва. Розкрито соціокультурні передумови формування моделей «капіталізму платформ» та «платформного кооперативізму». Обґрунтовано особливу актуальність створення кооперативних ЦП в Україні в умовах військових дій та повоєнного відновлення.

Висновки. ЦП-кооперативи відновлюваної енергогенерації демонструють перспективи кооперативного руху на основі ЦП як важливого інструменту посилення стійкості національної економіки.

Ключові слова: капіталізм платформ, локальні мікромережі відновлюваної енергогенерації, мережа (ланцюжок) створення доданої цінності, платформний кооперативізм, цифрова економіка, цифрові платформи.