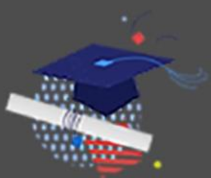
SUSTAINABLE DEVELOPMENT:
MODERN THEORIES AND BEST PRACTICES



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Materials of the Monthly International Scientific and Practical Conference (October 31 – November 1, 2024)

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The collection consists of materials from the Monthly International Scientific and Practical Conference "Sustainable Development: Modern Theories and Best Practices". They represent scientific research results in such scientific areas as financial and economic, managerial and legal, social and cultural, ecological and technical, educational and pedagogical issues of sustainable development on local, regional and international levels.

Keywords: Sustainable Development, Financial Issues of Sustainable Development, Economic Issues of Sustainable Development, Managerial Issues of Sustainable Development, Legal Issues of Sustainable Development, Social Issues of Sustainable Development, Cultural Issues of Sustainable Development, Ecological Issues of Sustainable Development, Technical Issues of Sustainable Development, Regional Features of Sustainable Development, International Cooperation for Sustainable Development, Educational Institutions and Pedagogy for Sustainable Development.

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CONTENT

FINANCIAL AND ECONOMIC ISSUES OF SUSTAINABLE DEVELOPMENT

ENVIRONMENTAL AND TECHNICAL ISSUES OF SUSTAINABLE DEVELOPMENT

INTERNATIONAL COOPERATION FOR SUSTAINABLE DEVELOPMENT

investors and consumers. Main advantages: raising funds without attracting large investors; expansion of the market base through pre-sales; testing the market, checking the interest of consumers.Crowdfunding is suitable for projects that may be of interest to a wide range of people, including technologies with a social component.

9. *Service-Based Model.* In this model, technology is not sold as a product, but is used to provide services. For example, artificial intelligence or data processing technologies can be provided as a service (SaaS). Main advantages: constant income due to subscriptions to services; accessibility for customers without the need to purchase expensive equipment; the ability to quickly scale your business. The service model is suitable for technologies that are easily integrated into customers' business processes.

The theoretical and methodological essence of breakthrough technologies includes an understanding of their role in changing economic, social and technological systems, as well as approaches to assessing, implementing and forecasting their impact. Thanks to a comprehensive analysis and the right choice of implementation methods, breakthrough technologies can create a significant economic effect and contribute to the development of society. The choice of commercialization model depends on the type of technology, the company's resources, access to markets and the level of risks. Each model has its own advantages and limitations, and successful commercialization often involves a combination of multiple models to effectively implement disruptive technologies in the market.

METHODOLOGICAL FRAMEWORK FOR CHOOSING OPTIMAL STRATEGIES FOR SUSTAINABLE HOUSEHOLD POWER IN UKRAINE

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The destruction of Ukraine's energy infrastructure due to the war has intensified the issue of sustainable energy supply for domestic households. Numerous outages of electricity, gas, and water supply, both planned and emergency, lead to energy grid overloads, premature wear and tear, and increasing utility costs. As a result, there is a growing need for the decentralization of energy supply for residential consumers, transforming them into prosumers who generate their own energy for personal needs. However, creating decentralized energy supply hubs within individual households requires significant investment amid the growing energy poverty of the Ukrainian population. This situation highlights the importance of developing methodological approaches to selecting cost-optimal energy strategies for homes, which would ensure the most efficient combination of energy sources for sustainable household power supply.

In general, the energy strategy of a household, as an entity not seeking to maximize economic profit, should aim to create the most comfortable living conditions for its members at the lowest possible economic cost. Thus, a household seeks to minimize its energy expenses while meeting its needs for heating, water heating, cooking, lighting, etc. Modern decentralized power supply technologies offer various options for installing autonomous energy-generating sources in the residential sector, particularly in private homes. For instance, in Ukraine, private households can install small solar and wind power plants with capacities of up to 30 kW and take advantage of the preferential feed-in tariff for selling excess generated but unused electricity, which is available until December 31, 2029 (Verkhovna, 2024).

Another option is installing diesel generators and battery storage systems to cover electricity needs during outages in centralized power grids. However, relying solely on diesel generators and/or batteries does not solve the issue of sustainable household energy supply in the long term or during extended power outages. The cost of diesel fuel, the challenge of safely storing it on the household's premises, and the negative environmental impact of burning it make diesel generators less attractive, although they are an effective solution during short-term emergency outages. Battery storage systems can also provide electricity to households during brief outages, but they require periodic and often prolonged charging, creating additional load on electrical grids that are already operating at their limits during the ongoing war in Ukraine. Therefore, from the perspective of energy security and sustainable power supply, developing household-owned autonomous energy generation using renewable sources is the best option. However, installing small solar and wind power plants requires significant investment, which must be carefully analyzed when forming and selecting the optimal household energy strategy.

To create a pool of potential power supply strategies as part of our research, it is advisable to consider typical groups of private households based on the technologies they can utilize. Table 1 demonstrates typical groups of such households, as well as the components of their costs when using different energy supply technologies. In this study, we consider households that own a private home with autonomous heating connected to centralized gas and electricity networks, as well as a cold water supply.

Table 1
Characteristics of typical groups of private households and their energy costs depending on the power supply technologies used

Typical household group	Components of household energy costs
1 Do not have their own independent power supply sources	• annual total heating costs, which consist of the household's current expenditures on energy carriers for heating, depending on various options for their use during the heating season, as well as fixed costs for equipment maintenance under different heating options in the household (Sotnyk et al., 2024); • annual costs for water heating for household needs; • annual household energy costs for cooking; • annual household costs for lighting and air conditioning; • household economic losses due to emergency and scheduled disconnections from the power supply grids; • annual economic savings from energy-saving measures implemented by the household (excluding the installation of battery storage systems, diesel generators and small renewable energy power plants)
2 Use a battery storage system to meet their own electricity needs	• all costs of the households from group 1; • annual operating costs for maintaining the battery storage (including depreciation costs associated with the purchase, installation, and setup of the battery, as well as its replacement at the end of its service life, and current maintenance costs); • savings generated by shifting peak loads and purchasing electricity during off-peak periods for storage and later consumption (for example, using night tariffs), as well as potential earnings from selling stored electricity during peak hours)
3 Use a diesel generator to meet their own electricity needs	• all costs of the households from group 1; • annual operating costs for maintaining the diesel generator (including depreciation costs associated with its purchase, installation, and setup, as well as current maintenance costs); • annual operating costs for diesel fuel, which account for the purchase price, expenses for setting up fuel storage tanks, and logistical costs for fuel delivery
4 Use both diesel generators and a battery storage system to meet their own electricity needs	• all costs of the households from group 2; • annual operating costs for maintaining the diesel generator; • annual operating costs for diesel fuel
5 Have installed and operate on-grid small solar, wind, or hybrid wind-solar power plant to meet their own electricity needs and sell surplus electricity under the feed-in tariff	• all costs of the households from group 1; • annual operating costs for maintaining the household's on-grid power plant (including annual maintenance and depreciation costs associated with purchasing, installing, connecting to the grid, setting up, and decommissioning the power plant (Kurbatova et al., 2024); • savings from consuming self-generated green electricity instead of purchasing it from an electricity supplier; • annual additional income from selling surplus green electricity generated by the household under the feed-in tariff (Sotnyk et al., 2023)
6 Have installed and operate on-grid small solar, wind, or hybrid wind-solar power plant with a battery storage system to meet their own electricity needs and sell surplus electricity under the feed-in tariff	• all costs of the households from group 5; • annual operating costs for maintaining the battery storage system connected to the on-grid home power plant (including depreciation costs associated with the purchase, installation, and setup of the battery, as well as its replacement at the end of its service life, and current maintenance costs); • savings from shifting peak loads and purchasing electricity during off-peak periods for storage and later consumption when self-generation of green electricity is impossible due to technical reasons or insufficient for household needs
7 Have installed and operate off-grid small solar, wind, or hybrid wind-solar power plant with a battery storage system to meet their own electricity needs	• all costs of the households from group 1; • annual operating costs for maintaining the off-grid home power station (including annual maintenance and depreciation costs associated with purchasing, installing, connecting, setting up, and decommissioning the power plant (Kurbatova et al., 2024); • savings from consuming self-generated green electricity instead of purchasing it from an electricity supplier; • annual operating costs for maintaining the battery storage system connected to the off-grid home power plant (including depreciation costs associated with purchasing, installing, and setting up the battery, as well as its replacement at the end of its service life, and current maintenance costs)

Based on the cost structure of households in each typical group, the selection of the optimal energy strategy from the seven analyzed in Table 1 should be guided by the criterion of minimizing costs. However, non-economic benefits such as improved stability and independence of power supply and positive environmental impacts should also be considered when making the final decision. Overall, this methodology allows for the consideration of natural and climatic conditions, energy prices, household energy-saving measures, the use of green energy generation technologies, state energy and environmental policies, etc., and is an important decision-making tool at both the household level and for adjusting state sectoral policies.

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PROSPECTS FOR THE USE OF THE KAIZEN-COSTING SYSTEM IN UKRAINE

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The kaizen-costing system originated in Japan in the mid-20th century along with the development of the kaizen philosophy, which became the basis for continuous improvement of production processes. The kaizen approach itself began to develop after World War II, when Japanese enterprises needed effective methods to rebuild their economies and increase competitiveness.

Kaizen-costing as a tool for optimizing costs and improving processes gained popularity in the early 1980s in large Japanese corporations such as Toyota. Companies have begun to implement continuous improvement through the active involvement of all employees in the process of minimizing costs and improving quality, which has become an important component of their production philosophy.

So, kaizen-costing was formed as a system at the same time as the spread of kaizen in production processes, around the 70s and 80s of the 20th century. Its main idea is that even the smallest process improvements can lead to significant cost reductions and increased efficiency in the long run.

Nowadays, the kaizen-costing system is a popular tool for increasing efficiency and reducing costs, which is successfully used in many countries, especially in Japan. For Ukraine, its implementation also has prospects, as it allows to optimize processes and increase the competitiveness of companies in the market.

We have formed and substantiated the key prospects for the use of kaizen costing in Ukraine. We propose to include the following provisions.

1. Optimization of production processes. Kaizen-costing is aimed at continuous improvement of production processes by minimizing costs at each stage. This is suitable for Ukrainian enterprises seeking to use resources efficiently. Continuous analysis and