STAKEHOLDER CONFLICT RESOLUTION MECHANISM IN THE PROCESS OF ACCELERATION OF TECHNOLOGICAL DEVELOPMENT AND DIGITALIZATION OF ENERGY MARKETS AND SERVICES

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Abstract: The energy sector is an important component of the national security of any state. Companies in the energy sector of Ukraine face a considerable number of obstacles. One way to significantly improve energy enterprises' market position is the digital transformation of business. Introducing digital technologies in the energy market has several advantages for the company and the industry. A transformation strategy should always focus on products, processes, and people. In the energy industry, stakeholders must be considered: traditional energy suppliers, third-party suppliers and service partners, technology providers, consumers, and regulatory and audit authorities. The main trends that should be taken into account when developing a business strategy are 1) oil remains the main source of primary energy, but more and more countries and companies are increasing the use of renewable energy sources and adopting policies to reduce their carbon footprint; 2) in the technology market, the share of IoT in the energy market is expected to increase to 133.35 billion US dollars by 2032; by the end of 2024, the number of smart home users worldwide will reach 422.119 million, and this figure will increase in the coming years, by 2026, the global the market will have 200,132 exabytes of unstructured data compared to 21,046 exabytes of structured data; 3) 49% of energy companies pay significant attention to updating systems and platforms; 4) to increase resilience to attacks, 66% of energy companies invested in cybersecurity and information security in 2022 and are considering increasing these budgets; on average, organizations save $1.76 million per breach using security artificial intelligence and automation tools; 5) remote monitoring and control tools help optimize energy infrastructure, reduce downtime, and improve safety. The components of the mechanism of leveling and reconciliation of stakeholder conflicts in the process of accelerating technological deployment and digitalization of energy markets and services are stakeholders, state of the energy market, technological market, system modernization, data processing and analytics, cyber security, remote monitoring and control, smart home and transport, integration and renewable energy management, carbon reduction, decentralized energy systems. The study's results can be used to develop a digitalization and business transformation strategy.

Keywords: energy market, stakeholders, digitalization, business transformation, renewable energy, cyber security, enterprise strategy.

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1. Introduction. Changes in energy policy and intense competition are forcing enterprises to increase their budget for digital transformation annually. Increasing energy efficiency stimulates renewable energy companies to gain more weight in the sector and become more competitive. The environmental goals of the European Union require the support of digitalization both in the production of electricity and in the management of interconnected electrical systems (Stelmashchuk, 2024).

The main problems of the energy sector are the price increase for energy carriers, which is associated with the depletion of organic and nuclear fuel deposits and accidents at nuclear power plants (Nexusintegra, 2024). One of the key global trends in the development of the energy industry is the development of renewable energy sources and the digitalization of the energy industry. According to forecasts, by 2050, about 50% of all electricity will come from renewable sources (Tech Stack, 2024).

The industry is characterized by expensive network infrastructure, lack of innovation in natural monopolies, complexity of energy production and dependence on other sectors; dependence on the laws of physics (energy extraction enterprises depend on various physical conditions that cannot be fully controlled); high risk for health and safety (any phase of the energy life cycle carries potential risks for all participants); dependence on third parties (established cooperation with all stakeholders along the energy supply chain is the basis of the company's success); low interest in innovation (the industry is built on caution, not innovation, which leads to adherence to old methods of technology); different legal and operational environment (Stelmashchuk, 2024; Nexusintegra, 2024; Tech Stack, 2024;).

Although renewable energy has accelerated at a breakneck pace over the past decade, overall energy consumption remains largely fossil fuel-based, and the industry faces obstacles, including geographically distributed energy data, making it impossible to use it meaningfully; lack of an integrated platform preventing industry players from making informed decisions, leaving data isolated and untested in the market; inability to track assets from historical patterns to supply and demand trends, tracking needed to optimize clean energy supply; the lack of clear goals, in particular, the lack of a road map for the introduction of new technologies and an action plan hinders progress in the direction of energy efficiency (Stelmashchuk, 2024;Nexusintegra, 2024).

Therefore, digitization is a valuable tool for combating climate change or optimizing electricity production processes to reduce emissions and achieve the goal of decarbonizing the energy model (Hryb et al., 2020). Understanding the main obstacles and critical points before creating a digital transformation strategy will help you choose the best tools, avoid unnecessary costs, and prepare your energy business for the future.

2. Literature review.

Ukrainian and foreign scientists analyzed various aspects of the functioning of energy markets.

Anthony Bagherian, Mark Gershon, Sunil Kumar and Manoj Kumar Mishra (Bagherian et al., 2023) studied the challenges associated with the digital era and its impact on sustainable energy solutions.

Barbara Siuta-Tokarska, Sylwia Kruk, Pawel Krzeminski, Agnieszka Thier and Katarzyna Zmija (Siuta-Tokarska et al., 2022) investigated the factors influencing the digitalization processes of companies in the energy sector and the business models already or soon to be implemented in the energy sector thanks to the opportunities offered by digitalization in response to the observed trends in the energy market. Na Yun (Yun, 2024) analyzed the impact of digitalization, natural resources, renewable energy consumption, and energy efficiency on China's economic growth from 1988 to 2021. Lijuan Xu and Sana Ullah (Xu & Ullah, 2023) assessed the impact of financial efficiency, education, and digitalization on renewable energy consumption in China from 1994 to 2020.

Morteza Aghahadi, Alessandro Bosisio, Marco Merlo, Alberto Berizzi, Andrea Pegoiani, and Samuele Forciniti (Aghahadi et al., 2024) studied the transformative impact of digital technologies on network planning, network operation, and the dynamics of energy markets of electricity distribution networks. Umit Cali, Marthe Dynge, Md. Sadek Ferdous and Ugur Halden (Cali et al., 2022) studied the increase in cyber-physical risk of energy systems in general, particularly the undisclosed aspects of the democratization of energy systems and future conventions on the digital shared economy.

Klaus Mainzer (Mainzer, 2022) described an example of energy-efficient digitalization associated with a sustainable circular economy. The work of Ziyi Shi, Lawrence Loh, Hongshuang Wu and Dongri Han (Shi et al., 2024) covers models to investigate the multifaceted impact of energy digitization on carbon productivity.

At the same time, there is almost no work on the leveling and harmonizing stakeholder conflicts during the digitalization of energy markets. Digital transformation can reduce the disadvantages associated with the involvement of third parties, improve logistics management, and create a reliable platform to ensure secure collaboration.

The article aims to develop a mechanism for leveling and harmonizing stakeholder conflicts in accelerating technological deployment and digitalization of energy markets and services.

3. Results.

Modernizing energy enterprises based on digitalization is necessary to make them more competitive and efficient. Digitalization makes it possible to improve the availability, stability, and sustainability of the energy system. The introduction of digital technologies in the energy market has several advantages (Table 1).

Table 1. Benefits and advantages of the implementation of digital technologies in the energy market

Advantage	Benefits of implementing digital technologies in the energy market
Cost reduction.	It helps to optimize operations, identify areas of cost savings, detect the need for maintenance early, and reduce fuel consumption during transportation.
Creation of new sources of income.	It helps businesses explore new opportunities and predict market demand that will lead to the creation of new services and products. For example, the possibility of building a solar power plant in a partner country helps to diversify energy production. Integrating remote monitoring and control systems helps control the operation of the plant without involving additional labour.
Increased work efficiency.	Enables companies to optimize energy production and distribution, monitor equipment health and avoid downtime.
Decentralization of production.	Remote connectivity and mobility help energy companies decentralize their facilities and resources and manage energy production more efficiently.
Competitive advantage.	Introducing new technologies improves the quality of final products and streamlines operations to help gain an edge over competitors.
Advanced decision-making.	It provides the ability to analyze data to provide stakeholders with reliable information to make better decisions.
Faster response to market changes.	It enables more rapid recovery after an unexpected market disruption.
Cultural innovations.	It involves the re-planning of processes, which will facilitate a review of culture and policy; it will help companies to modernize and update their business culture according to the new market standards and meet the requirements.
Improved integration and collaboration.	The company's IT infrastructure and related work processes become more flexible, creating business readiness for further technology adoption.
Attracting talent.	Unique technological challenges make it necessary to look for niche experts who can join the team, help optimize processes and share expert opinions.
Construction of renewable energy stations with automated processes.	They are the basis for more decentralized generation, avoiding isolated "energy islands"; such platforms reduce downtime by offering alerts based on predictive maintenance and predicting asset maintenance.
Using artificial intelligence and machine learning.	Enables optimization of design and construction of new renewable sources and plants, shortens time to market, providing benefits of free C02 generation and increased production.

Source: constructed by authors based on data (Stelmashchuk, 2024; Nexusintegra, 2024; Yadoshchuk, 2024)

Thus, implementing digital transformation in the energy sector, particularly the renewable energy sector, helps to work with large volumes of data. A key benefit is that it influences decision-making, increasing business value. It is the companies that can process large amounts of data using machine learning technology and provide business predictions that will impact the entire future of energy management systems.

Digital transformation in the energy business depends on the human, technological, financial, ICT, and infrastructure resources it possesses.

Several aspects should be taken into account when planning digital transformation in energy. This list will vary from company to company, but no matter what changes plans, the transformation strategy should always centre around products, processes, and people.

1. Stakeholders. Before innovating or modernizing any part of the energy business, it is essential to identify the critical stakeholders involved or affected by the transformation. It will allow you to determine the scope of work and assess the impact of the transformation.

The following stakeholders are distinguished in the energy industry (Nexusintegra, 2024):

- energy business: traditional energy suppliers (utilities, power generation companies, oil, coal and gas companies);
- third-party suppliers and service partners (companies that supply equipment and maintain energy infrastructure);
- technology providers (companies specializing in digital technologies, software solutions, Internet of Things devices, and cyber security; technical consulting firms);
- consumers (household and industrial consumers involved in energy transmission and consumption);
- regulatory and audit bodies (legal and regulatory bodies that oversee the energy industry set standards and guidelines for processes, and ensure compliance).

Identifying the stakeholders of digital transformation in energy will help companies embrace the necessary changes across the business and prepare for future innovations at scale.

Before creating a transformation strategy, consider the state of the energy and technology markets.

2. Situation on the energy market. It is essential to monitor changes in the energy market. Thus, tracking changes in primary consumption by fuel type allows you to determine the priorities for implementing digital technologies in business and predict the area where it will be most profitable.

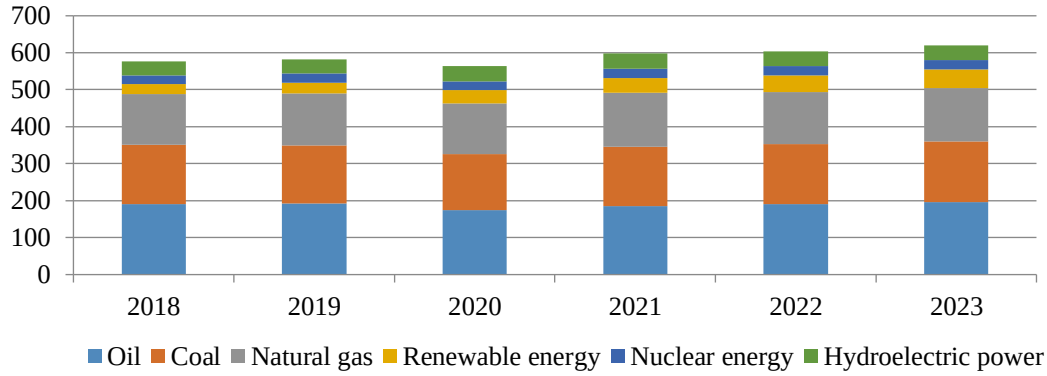

Figure 1. Global primary energy consumption from 2018 to 2023 by fuel type.
Source: developed by authors based on data (Statista, 2024)

Figure 1 shows that oil is the world's primary energy source. In 2023, 196.43 petajoules of oil were consumed. There is a trend of increasing demand for fossil fuels. Demand for fossil fuels remains high as the demand for primary energy continues to grow. Without considering the coronavirus pandemic's consequences, oil use is steadily increasing every year. Consumption of other non-renewable fuels was more diverse. The world's consumption of natural gas is growing more or less steadily. Its properties as a fossil fuel with a lower carbon content than coal have led to an increase in its use in the energy sector, overtaking the use of coal in major economies such as the United States.

3. Technological market. Introducing new technologies is of primary importance for ensuring digital transformation in the energy industry. Sometimes, the motivation for such a change is imposed from outside. Thus, in 2020, the COVID-19 pandemic forced 77% of energy enterprises to switch to digital technologies, which prompted the further implementation of digital solutions throughout the industry (Nexusintegra, 2024).

Internet of Things (IoT) technologies will be needed to improve communication between systems and devices. The Internet of Things market is one of today's most promising technological trends, and its possibilities have yet to be exhausted (Figure 2).

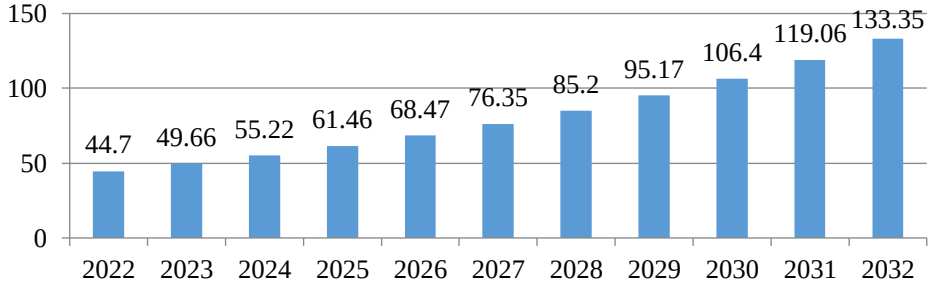

Figure 2. Internet of Things (IoT) in the size of the energy market in 2022-2032, billion dollars. USA
Source: developed by authors based on data (Nexusintegra, 2024)

The share of IoT in the energy market is expected to grow from approximately USD 44.7 billion in 2022 to USD 133.35 billion by 2032. It shows the industry's massive demand in the future, especially with the new policies and incentives for digitization.

There are also many different trends affecting the technology market. Deploying the 5G communication standard is a game changer for enabling fast communication between various IoT devices. Another critical technology trend is edge computing instead of cloud computing, making processes faster by performing data collection or analysis directly on the IoT device. Artificial Intelligence of Things (AIoT) integrated into IoT is changing business and providing a tool for making accurate decisions. However, with the rapid growth of connected devices in the IoT market, there is a growing demand for security that protects the IoT system from threats and vulnerabilities.

4. System dodernization. Digital transformation is only possible with scalable and secure operating systems and platforms. 49% of energy companies pay significant attention to updating systems and platforms in 2023, 17% more than in 2022 (Nexusintegra, 2024). Modernized legacy systems will allow energy companies to implement new technologies throughout the business, improve safety, and increase efficiency at various levels (Vakulenko et al., 2022).

5. Data processing and analytics. Using more platforms and sensors means more unstructured data. According to IDC Research INC., by 2026, the global market will have 200,132 exabytes of unstructured data compared to 21,046 exabytes of structured data (Figure 3).

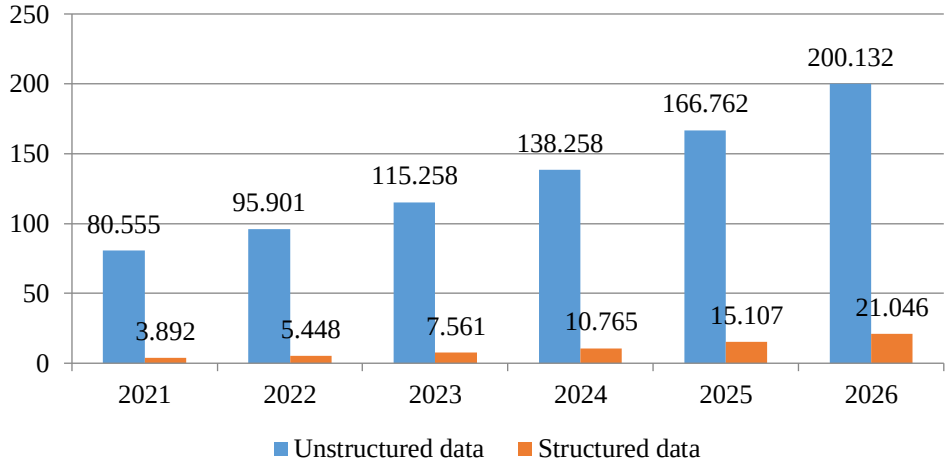

Figure 3. Global forecast of data distribution in the world in 2022-2026, exabyte
Source: developed by authors based on data (Nexusintegra, 2024; Rainsel et al., 2020)

To harness the power of information, companies should implement data mining and analytics tools to get the most out of their process data. Therefore, for 26% of oil and gas companies in 2023, more efficient use of data was the main priority (Nexusintegra, 2024).

Increasing data volume also requires expanding data storage capacity. It will lead to broader adoption of cloud solutions, modernization of legacy systems, and data extraction tools. It will also require more investment in cyber security.

In addition, companies seek to centralize data management and delivery (e.g., online video streaming, data analytics, data security, and privacy) and use data to control their business and user interactions (e.g., machine-to-machine communication, Internet things, constant profiling of personalization). The responsibility of maintaining and managing all of this consumer and business data is fueling the growth of cloud service provider's data centres. As a result, the role of the enterprise as a data manager continues to grow, and consumers not only allow but also expect it (Rainsel et al., 2020).

More than 5 billion consumers interact with data daily - by 2025, this number will reach 6 billion, or 75% of the world's population. In 2025, every connected person will have at least one data interaction every 18 seconds. Many of these interactions are related to the billions of IoT devices connected worldwide, which are expected to generate more than 90 ZB of data in 2025 (Rainsel et al., 2020).

6. Cyber security. Widespread adoption of connected devices requires companies to step up their cybersecurity efforts to protect more and more network and customer data. According to IBM data, the energy industry ranks fourth in the top five industries most attacked by cybercriminals. In 2022, the cost of a data breach in the energy sector reached $5.01 million. In 2023, the cost of an average security incident in the energy sector reached $4.78 million (Nexusintegra, 2024).

On average, organizations save $1.76 million per breach using security AI and automation tools (compared to companies that don't). Cybersecurity tools with ML can also learn to adapt more quickly to new threats (10guards, 2024).

To increase resilience to attacks, 66% of energy companies invested in cybersecurity and information security in 2022 and are considering increasing these budgets.

Cyber security should become a top priority when planning a company's digital transformation; it will help increase system resilience, ensure availability, and prevent reputational damage (Tech Stack, 2024).

7. Remote monitoring and control. With remote monitoring and management, the business provides real-time visibility, increases operational efficiency, and provides predictive maintenance. Remote monitoring and control tools help optimize energy infrastructure, reduce downtime, and improve safety. They are also crucial for achieving sustainable development goals and ensuring competitiveness in the evolving energy landscape.

8. Smart housing and transport. More customers are considering the transition to autonomous production and energy use.

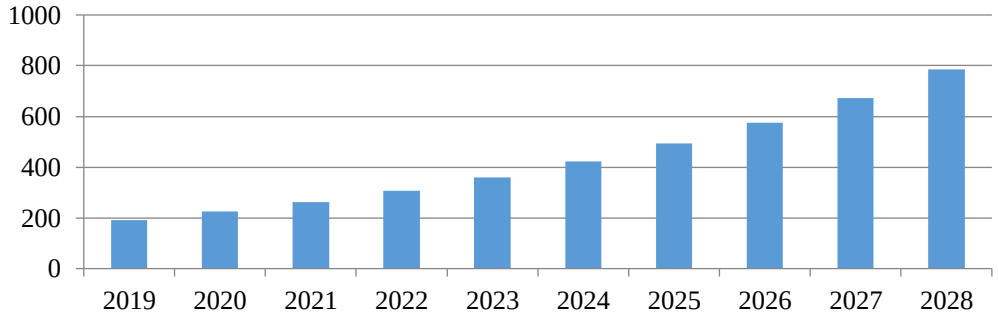

Figure 4. Number of smart home users worldwide in 2019–2028, million people
Source: developed by authors based on data (D'Souza & Jambhale, 2024)

According to Statista (D'Souza & Jambhale, 2024), the number of smart home users worldwide is expected to reach 422.119 million by the end of 2024, and this figure will increase in the coming years.

This demand drives energy companies to make decisions that allow residential and industrial customers to optimize their energy consumption and trade. Digital transformation in the energy sector also contributes to the broader adoption of electric public transport. It will help communities reduce emissions and achieve sustainable development goals faster.

9. Integration and management of renewable energy. Increasing the use of renewable energy sources is on the agenda of many countries and companies to strengthen their sustainable development efforts and achieve greater autonomy (Khomenko et al., 2022). For this, energy companies must ensure a smooth transition and connection. Digital transformation in the renewable energy sector can optimize alternative energy production, storage, and transmission. In addition, they will help households and industries trade excess electricity generated, reducing dependence on fossil fuels.

10. Carbon reduction. More countries and organizations are adopting policies to reduce carbon footprint (Chygryn et al., 2024). Global Net-Zero initiatives and regional climate change strategies force energy companies to change how they manage their carbon emissions and commit to action to help the world become climate-resilient. Energy companies that have enabled digital transformation are more likely to manage their carbon footprint. For example, implementing blockchain technologies can help companies manage carbon offsets. It will also allow better calculation, tracking, and reporting of carbon reductions across the value chain.

11. Decentralized energy systems. Digital transformation in energy and utilities is imperative to creating reliable decentralized energy systems. Transitioning from traditional large power plants to smaller and versatile production facilities with smart grids can help improve energy availability, increase autonomy and system reliability, and meet specific regional needs (Nexusintegra, 2024).

Scheme of the mechanism of leveling and harmonization of stakeholder's conflicts in accelerating technological deployment and digitizing energy markets and services.

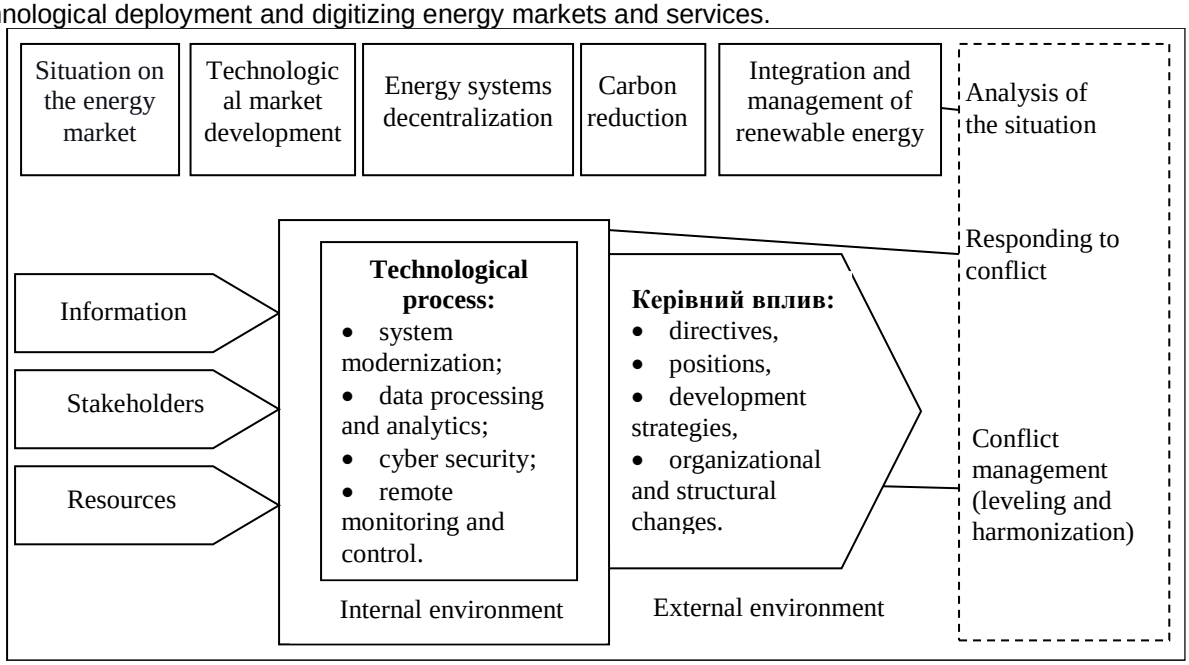

Figure 5. The mechanism of leveling and reconciliation of stakeholder conflicts in the process of accelerating technological deployment and digitalization of energy markets and services
Source: authors' own development

This mechanism covers the stages of working with conflicts: situation analysis, conflict response, and conflict management (leveling and harmonization).

At the stage of analysis of the situation it is carried out the factors of the external environment, in particular, the situation on the energy market, the technological market development, the energy system decentralization, measures to reduce carbon emissions, integration and management of renewable energy.

The company reacts to the conflict based on the collected information, interaction with stakeholders, and available resources. At the same time, changes are made to the technological process: system modernization, data processing and analytics, increasing the level of cyber security, carrying out remote monitoring and control.

At the company's management level, conflict management (leveling and harmonization of interests) is carried out through the adoption of directives, development of the company's development strategy, organizational and structural changes are made, and participants are selected for implementation.

Thus, considering these aspects and coordinating with stakeholders will allow the development of an effective strategy for the digitalization of the energy company, which will provide long-term advantages in the market.

The study's results confirm the significance and economic efficiency of the proposed components of the mechanism.

4. Conclutions.

The energy sector is an essential component of the national security of any state. Companies in the energy market of Ukraine face a large number of problems, such as expensive network infrastructure, lack of innovation in natural monopolies, the complexity of energy production and dependence on other sectors; dependence on the laws of physics, high risk to health and safety; dependence on third parties; low interest in innovation; different legal and operational environments.

One way to significantly improve an individual enterprise's position in the market and the development of the industry is the digital transformation of business.

It has several advantages for a company participating in the energy market: reducing costs, creating new sources of income, increasing work efficiency, decentralizing production, achieving competitive advantages in the market, ensuring enhanced decision-making, faster response to market changes, implementing cultural innovations, and improving integration and collaboration, attracting talent, building renewable energy plants with automated processes, implementing the use of artificial intelligence and machine learning.

The main components of the mechanism of leveling and harmonization of stakeholder conflicts in the process of accelerating technological deployment and digitalization of energy markets and services are stakeholders, state of the energy market, technological market, system modernization, data processing and analytics, cyber security, remote monitoring and control, smart housing and transport, integration, and management of renewable energy, carbon reduction, decentralized energy systems.

Digital transformation in the energy sector is necessary to open up new economic opportunities and solve global climate problems. Adopting digital technologies and building company processes around digitalization increases energy efficiency, integrates renewable energy sources, strengthens grid resilience, promotes sustainability, and reduces dependence on energy suppliers.

The study's results can help to develop a digitalization and business transformation strategy.

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References

1. Aghahadi, M., Bosisio, A., Merlo, M., Berizzi, A., Pegoiani, A., & Forciniti, S. (2024). Digitalization processes in distribution grids: a comprehensive review of strategies and challenges. *Applied Sciences, 14*(11), 4528. [CrossRef]
2. Bagherian, A., Gershon, M., Kumar, S., & Mishra, M. K. (2023). Analyzing the relationship between digitalization and energy sustainability: a comprehensive ISM-MICMAC and DEMATEL approach. *Expert Systems with Applications, 236*, 121193. [CrossRef]
3. Cali, U., Fogstad Dynge, M., Sadek Ferdous, M., & Halden, U. (2022). Improved resilience of local energy markets using blockchain technology and self-sovereign identity. *2022 IEEE 1st Global Emerging Technology Blockchain Forum: Blockchain & Beyond (iGETblockchain)*, Irvine, CA, USA, pp. 1-5. [CrossRef]
4. Chygryn, O., Kwilinski, A., & Khomenko, L. (2024). Ecosystem transformation of the energy sector: Climate neutrality and inclusive balance. In *AIP Conference Proceedings* (Vol. 3033, No. 1). AIP Publishing. [CrossRef]
5. D’Souza, J. & Jambhale, R. (2024). Smart Home Devices Statistics By Users, Segments, Devices and Facts. *Coolest-gadgets* .[Link]
6. Digital transformation in the renewable energy sector. nexusintegra.io. (2024). *Nexusintegra.* [Link]

7. Hryb, O.G., Senderovych, G. A., Dyachenko, O.V., Karpalyuk, I.T., & Shvets, S.V. (2020). Analysis of prospects for the development of digital energy in Ukraine. *Bulletin of the National Technical University "KhPI". Series: Hydraulic machines and hydraulic, 1*, 85-90. [CrossRef]
8. IBM Cost of a Data Breach Report 2023 reveals huge business data breach costs. (2024). 10guards. [Link]
9. Is Digital Transformation the Future of the Energy Industry? (2024). *Tech Stack.* [Link]
10. Khomenko, L., Chygryn, O., Shevchenko, K., Bilan, Y., & Ponomarenko, I. (2022). Carbon neutrality of Ukraine by 2050. *Vìsnik Sums'kogo deržavnogo unìversitetu*, *2022*(4), 152–158. [CrossRef]
11. Mainzer, K. (2022). Renewable Energy and Sustainable Digitalisation: Challenges for Europe. *Chemistry-Didactics-Ecology-Metrology, 27*(1-2), 5–23. [CrossRef]
12. Primary energy consumption worldwide from 2018 to 2023, by fuel type. (2024). *Statista*. [Link]
13. Rainsel, D., Gantz, J., Rydning, J. (2020). The Digitization of the World From Edge to Core. *IDC.* [Link]
14. Shi, Z., Loh, L., Wu, H., & Han, D. (2024). Smarter and cleaner: How does energy digitalization affect carbon productivity? *Energy Strategy Reviews, 52*, 101347. [CrossRef]
15. Siuta-Tokarska, B., Kruk, S., Krzemiński, P., Thier, A., & Żmija, K. (2022). Digitalisation of Enterprises in the Energy Sector: Drivers—Business Models—Prospective Directions of Changes. *Energies, 15*(23), 8962. [CrossRef]
16. Stelmashchuk, K. (2024). How to ensure successful digital transformation in energy industry. *N-iX.com*. [Link]
17. Vakulenko, I., Minchenko, M., & Khomenko, L. (2022). Costs on innovative activities as a driver of the transfer innovations intensification in the energy field. *Market Infrastructure*, (69), 8-13. [CrossRef]
18. Xu, L., & Ullah, S. (2023). Evaluating the impacts of digitalization, financial efficiency, and education on renewable energy consumption: new evidence from China. *Environmental Science and Pollution Research 30.* [CrossRef]
19. Yadoshchuk, V. (2024). Digital transformation in the energy industry: overview and tips. *Waverley*. [Link]
20. Yun, N. (2024). Resources curse via natural resources utilization: Linking digitalization and resources markets for economy perspective. *Resources Policy, 90*, 104774. [CrossRef]

МЕХАНІЗМ ВИРІШЕННЯ КОНФЛІКТІВ ЗАЦІКАВЛЕНИХ СТОРІН У ПРОЦЕСІ ПРИСКОРЕННЯ ТЕХНОЛОГІЧНОГО РОЗВИТКУ ТА ДІГІТАЛІЗАЦІЇ ЕНЕРГОРИНКІВ ТА ПОСЛУГ

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Енергетична галузь – важлива складова національної безпеки будь-якої держави. Компанії енергетичного рину України стикаються з величезною кількістю перешкод. Одним із шляхів суттєвого поліпшення позицій на ринку енергетичних підприємств є цифрова трансформація бізнесу. Впровадження цифрових технологій на енергетичному ринку має ряд переваг як для компанії, так і для галузі. Стратегія трансформації завжди має зосереджуватися навколо продуктів, процесів і людей. В енергетичній галузі потрібно враховувати групи стейкхолдерів: традиційні постачальники енергії, сторонні постачальники та сервісні партнери, постачальники технологій, споживачі, органи регулювання та аудиту. Основні тенденції, які мають бути враховані при розробці стратегії бізнесу, це: 1) нафта залишається основним джерелом первинної енергії, однак все більше країн та компаній збільшують використання відновлюваних джерел енергії та приймають політику щодо зменшення свого вуглецевого сліду; 2) на технологічному ринку частка IoT на енергетичному ринку має зрости до 133,35 млрд доларів США до 2032 року, до кінця 2024 року кількість користувачів розумного дому в усьому світі досягне 422,119 мільйона, а в найближчі роки цей показник збільшиться, до 2026 року глобальний ринок матиме 200 132 ексабайти неструктурованих даних порівняно з 21 046 ексабайтами структурованих даних; 3) 49% енергетичних компаній приділяють значну увагу оновленню систем і платформ; 4) для підвищення стійкості до атак, 66% енергетичних компаній інвестували в кібербезпеку та інформаційну безпеку в 2022 році та розглядали можливість збільшення цих бюджетів, в середньому організації економлять 1,76 мільйона доларів США на кожному зломі, використовуючи штучний інтелект безпеки та інструменти автоматизації; 5) інструменти віддаленого моніторингу та керування допомагають оптимізувати енергетичну інфраструктуру, зменшити час простою та підвищити безпеку. Складовими механізму нівелювання та узгодження конфліктів стейкхолдерів в процесі акселерації технологічного розгортання та диджиталізації енергетичних ринків та послуг є: стейкхолдери, стан енергетичного ринку, технологічний ринок, модернізація системи, обробка та аналітика даних, кібербезпека, віддалений моніторинг і контроль, розумне житло та транспорт, інтеграція та управління відновлюваною енергією, зменшення вуглецю, децентралізовані енергетичні системи. Результати дослідження можуть бути використані при розробленні стратегії диджиталізації та трансформації бізнесу.

Ключові слова: енергетичний ринок, стейкхолдери, диджиталізація, цифровізація, трансформація бізнесу, відновлювальна енергетика, кібербезпека, стратегія підприємства.