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CONTENTS

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Agritourism for a Green Future: An Ecological, Economic, and Social Perspective

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Abstract

In this context, the article provides a systematic analysis of the functions of agritourism in terms of its contribution to a green economy. The purpose of this study is to provide the rationale behind the potential of agritourism from the perspective of income diversity, resource efficiency, preservation of culture, and promotion of social inclusion in rural areas. This analysis is framed within the scope of the green economy paradigm. The analysis of empirical and conceptual sources shows that agritourism, by creating integration between agriculture and tourism, creates conditions for maintaining added value at the local level, activating family businesses and women's entrepreneurship, and protecting biodiversity and landscapes. At the same time, agritourism is a development model that strengthens urban-rural relations, promotes ecological behavior, and expands the functional content of rural areas. Consequently, it is necessary to evaluate agritourism not as a separate tourism initiative but as an integral part of the green transition, regional development, and sustainable rural policy. In the Azerbaijani context, the cluster approach to regions and liberated territories is of particular importance.

Keywords: Agritourism, Green economy, Rural development, Sustainability, Ecological tourism

JEL Codes: Q01, Q56, R11, Z32

1. Introduction

At the current stage, the assessment of economic development cannot be based solely on growth rates and expansion of production. Climate change, degradation of water and soil resources, loss of biodiversity, income instability in rural areas, and regional development disparities require a new content of economic policy. In that context, the concept of a green economy is perceived as a development model aimed at reconciling prosperity growth, social inclusion, and environmental security. UNEP characterizes a green economy as an economic system that enhances human well-being while reducing environmental risks and resource scarcity (United Nations Environment Programme, 2011).

The role of agriculture and tourism stands out when it comes to the sectoral application areas of the green economy. Agrotourism has become a real instrument of sustainable development in rural areas, as seen from numerous scientific works and publications of international organizations. According to FAO, agritourism is an opportunity to build sustainable and flexible agri-food systems (Partalidou & De Matteis, 2024). At the intersection of the economic, environmental, and social roles of agrotourism, this theme acquires its relevance in the context of a green transition. Agrotourism is a multi-functional model that combines agricultural production, cultural traditions, rural way of life, and services. Under this model, the farm functions not only as a commodity production enterprise; it is also an entrepreneurial entity that provides opportunities for accommodation, tasting, participatory experiences, the sale of locally produced goods, and the promotion of cultural heritage. The bibliometric analysis has shown that the core themes of scientific literature about agritourism include economic sustainability, environmental management, cultural heritage, and social welfare (Ndhlovu & Dube, 2024).

The purpose of this paper is to provide a systematic study on the conceptual framework of agritourism in relation to the green future, its mechanisms for income generation and employment creation, ecological preservation, and social outcomes. The central research questions include: What are the impacts of agritourism in income generation and employment creation; through what ways can it help in conserving nature and biodiversity; and what outcomes would arise through this approach in relation to the green future?

2. Theoretical and Methodological Framework for Green Economy and Agritourism

The green economy is a development model that combines economic efficiency with environmental responsibility and social justice. The main content of the concept is related to resource efficiency, low-carbon growth, protection of natural capital, and enhancement of social well-being. A green economy can be considered an approach that ensures the implementation of the idea of sustainable development through economic mechanisms (United Nations Environment Programme, 2011).

To define the theoretical boundaries of agrotourism, it is important to distinguish it from rural tourism and ecotourism. Rural tourism encompasses a wider range of recreational and hospitality activities carried out in rural areas. Ecotourism is primarily concerned with the natural environment, environmental education, and conservation. The central element in agritourism is the direct connection with agricultural activities. Farming, production processes, seasonal labor, local food culture, and agrarian lifestyle become key components of the tourism product (Yasin & Bacsi, 2025).

In the modern literature, three main methodological approaches are distinguished in relation to agritourism. The first approach explains agritourism as a tool for the diversification of the rural economy. In that approach, agritourism is associated with an additional source of income, the expansion of local entrepreneurship, and the extension of the value chain. The second approach considers agritourism as a mechanism for transforming socio-cultural capital into economic value. National cuisine, craftsmanship, family labor traditions, and rural identity become resources that shape the authenticity of the tourism product. The third approach values agritourism as a mechanism for environmental sustainability. In this approach, the protection of the landscape, water, and soil resources, and biodiversity is considered as the basis for ensuring the competitiveness of rural areas (Ndhlovu & Dube, 2024).

The concept of “multifunctional rural development” is of particular importance in the scientific explanation of agrotourism. In accordance with this perspective, the rural area is not only the location for agriculture but also a much more complex entity, including social, environmental, cultural, and recreational values. Agritourism can be regarded as a manifestation of the multifunctional value of the rural area expressed in economic terms. The main topics related to agritourism-rural development research are discussed by Yasin and Bacsi, including the economic impact, policies, motivations, ecology, and landscape preservation (Yasin & Bacsi, 2025).

The relationship of agritourism with the green economy is structural. The green economy requires the optimization of resource use within environmental constraints. Agrotourism allows natural and cultural capital to be transformed into an income-generating form without degradation. The FAO technical document notes that agritourism stimulates local development, creates employment opportunities for women and youth, and shifts agrifood systems in a more inclusive and sustainable direction (Partalidou & De Matteis, 2024). Therefore, agritourism should not be considered a separate tourism service but rather as a territory-based green development mechanism.

3. Economic, Ecological, and Social Impact Mechanisms of Agritourism

3.1. Economic Impact Mechanisms

Agritourism primarily plays a role in diversifying income. In traditional farming, income depends mainly on crop production and market sales. In agrotourism, activities such as accommodation, food service, tastings, excursions, master classes, direct sales of local products, and event tourism create additional revenue channels. This model partially reduces the dependence of agriculture on seasonal and price risks.

The second economic mechanism is related to keeping added value at the local level. The "farm to fork" approach, short sales channels, and family-based forms of service increase the circulation of money in rural areas. Thanks to agritourism, local processing, local presentation, and local consumption are taking shape, rather than a model based on the export of raw materials from the countryside. Studies analyzing research directions for the pandemic and post-pandemic period show that agritourism is an important tool for revitalizing local economies and community-based development (Turtureanu et al., 2025).

The third economic impact is related to employment and entrepreneurship. Agrotourism leads to the expansion of activities in rural areas such as hospitality, culinary, digital marketing, guiding, handicraft sales, and small-scale processing. This increases the productivity of family labor and may weaken the economic incentives for rural-urban migration. Bibliometric studies confirm the close connection between agritourism and sustainable rural development, and its contribution to the regional economic structure (Yasin & Bacsi, 2025).

3.2. Ecological Impact Mechanisms

The ecological essence of agrotourism is that the protection of natural capital becomes a necessary condition for the sustainability of economic activity. Rural landscape, soil fertility, water quality, biodiversity, clean air, and traditional rural scenery are key elements of tourist attractions. Therefore, ecological degradation not only harms nature but also the market value of the agritourism product. In line with the basic logic of the green economy, welfare growth here is based on the conservation of resources (United Nations Environment Programme, 2011).

The impact of integrating agriculture and tourism on agricultural eco-efficiency is also empirically confirmed. Wang and co-authors show that integrating agriculture and tourism improves environmental efficiency, and the positive impact increases as the level of integration increases (Wang et al., 2024). This finding indicates that agritourism is not merely a marketing instrument but also a variable that influences the resource-use logic.

The second important ecological dimension involves behavioral transformations. Given that the farm tourism environment involves direct interactions between tourists and the production process, ecological cycles, and space, ecological responsibility is created not only based on information but also experientially. Hassan et al. found a positive correlation between ecological behavior, personal values, and tourist well-being in the context of farm tourism (Hassan et al., 2024). Therefore, agritourism also plays an essential role in ecological education and behavioral transformation.

It should be noted that the environmental advantages of agritourism are not achieved by default. Commercial overexploitation in combination with ineffective management may lead to an increased likelihood of environmental deterioration, construction pressure, and resource depletion. Iannucci et al. focus on the dynamic interplay between tourism development and landscape degradation, noting that it is critical to maintain a balance between income generation and ecological sustainability (Iannucci et al., 2022).

3.3. Social Influence Mechanisms

The social impact of agrotourism is related to the transformation of the internal potential of the rural community into an economically visible form. Rural life, local cuisine, crafts, seasonal labor habits, and hospitality practices gain market value through agritourism. In such circumstances, cultural heritage becomes not only a protected object but also a form of social capital that generates sustainable income (Turtureanu et al., 2025).

Research on the pandemic and post-pandemic period shows that agritourism plays an important role in strengthening cultural heritage and community-based development. In agrotourism, food preparation, hospitality, presentation of local knowledge, sale of handicrafts, and small service activities often enable women's labor to enter market relations. Akpinar and co-authors show that agritourism is a direction that can strengthen the socio-economic position of rural women (Akpinar et al., 2005).

Agrotourism also serves to reduce the socio-cultural distance between cities and villages. For city dwellers, direct familiarity with the origin of food, the production process, and the rhythm of rural life leads to the formation of more conscious consumption behavior. This leads to a strengthening of trust between producers and consumers,

interest in rural areas, and a sense of closeness to nature. Thus, agritourism is not only a service sector but also a plane of social learning and mutual understanding.

3.4. Overall Assessment

The economic, ecological, and social impact mechanisms of agrotourism operate as an interconnected system. Income diversification stimulates the protection of ecological quality; ecological quality increases tourist attractiveness; social and cultural capital increases the authenticity and market value of the service. That is why agritourism should be considered a multifunctional mechanism for sustainable rural development. Modern scientific literature consistently confirms that conclusion (Ndhlovu & Dube, 2024; Yasin & Bacsi, 2025).

4. Conclusion

The theoretical and analytical analysis conducted shows that agritourism is one of the flexible and multifunctional forms of green economy that can be applied in rural areas. The green economy model, which reconciles increased economic prosperity with reduced environmental risks and enhanced social inclusion, finds practical expression at the local level through agritourism (United Nations Environment Programme, 2011).

The research results confirm that agritourism has significant potential in terms of income diversification, activation of local entrepreneurship, expansion of short value chains, and increased employment in rural areas. At the same time, it stimulates the protection of biodiversity, landscape, water, and soil resources and creates environmental responsibility and behavioral change. From a social perspective, it creates a favorable environment for the preservation of cultural heritage, the strengthening of women's and family entrepreneurship, and the deepening of urban-rural relations (Partalidou & De Matteis, 2024; Akpinar et al., 2005).

For the realization of the potential of agrotourism, the institutional framework, infrastructure provision, service standards, digital visibility, training, and financial support are of particular importance. In this regard, agritourism should not be considered a separate tourism activity but as an integral part of green transition, regional development, and sustainable rural policy.

The development of agrotourism in Azerbaijan opens up important prospects for the socio-economic revitalization of regions, the expansion of the non-oil sector, and the efficient use of local resources. The application of a cluster approach, especially in regions and liberated areas, can more clearly reveal the strategic role of agritourism in relation to the green economy.

Author Contributions

All authors have read and approved the final version of the manuscript.

Conflict of Interest

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References

Akpinar, N., Talay, I., Ceylan, C., & Gündüz, S. (2005). Rural women and agrotourism in the context of sustainable rural development: A case study from Turkey. *Environment, development and sustainability*, *6*(4), 473-486. https://doi.org/10.1007/s10668-005-5633-y

Hassan, T. H., Fazia, C., Abdelmoaty, M. A., Bekzot, J., Gozner, M., Almakhayitah, M. Y., & Salem, A. E. (2024). Sustainable pathways: understanding the interplay of environmental behavior, personal values, and tourist outcomes in farm tourism. *Discover Sustainability*, *5*(1), 153. https://doi.org/10.1007/s43621-024-00354-8

Iannucci, G., Martellozzo, F., & Randelli, F. (2022). Sustainable development of rural areas: a dynamic model in between tourism exploitation and landscape decline. *Journal of Evolutionary Economics*, *32*(3), 991 1016. https://doi.org/10.1007/s00191-022-00785-4

Ndhlovu, E., & Dube, K. (2024). Agritourism and sustainability: A global bibliometric analysis of the state of research and dominant issues. *Journal of Outdoor Recreation and Tourism*, *46*, 100746. https://doi.org/10.1016/j.jort.2024.100746

Partalidou, M., & De Matteis, L. (2024). Sustainable agritourism: an opportunity for agrifood systems transformation in the Mediterranean.

Turtureanu, A. G., Creţu, C. M., Pripoaie, R., Marinescu, E. Ş., Sîrbu, C. G., & Talaghir, L. G. (2025). Sustainable development through agritourism and rural tourism: Research trends and future perspectives in the pandemic and post-pandemic period. *Sustainability*, *17*(9), 3998. https://doi.org/10.3390/su17093998

United Nations Environment Programme. (2011). *Towards a green economy: Pathways to sustainable development and poverty eradication*. https://www.unep.org/resources/report/towards-green-economy-pathways-sustainable-development-and-poverty-eradication.

Wang, J., Zhou, F., Xie, A., & Shi, J. (2024). Impacts of the integral development of agriculture and tourism on agricultural eco-efficiency: a case study of two river basins in China: J. Wang et al. *Environment, Development and Sustainability*, *26*(1), 1701-1730. https://doi.org/10.1007/s10668-022-02781-x

Yasin, A. S., & Bacsi, Z. (2025). Agritourism and rural development: A global bibliometric analysis of the state of research, limitations, and future directions. *Agriculture*, *15*(8), 866. https://doi.org/10.3390/agriculture15080866

Formation of a Mechanism for the Development of an Industrial Enterprise in the Context of Digitalization

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Abstract

The purpose of this article is to examine the mechanism for industrial enterprise development in the context of digitalization. A system of key elements is proposed that forms the mechanism for industrial enterprise development in accordance with the Industry 4.0 concept. Distinctive features of the proposed system include characterizing all elements of the mechanism from the perspective of digital technology implementation, as well as describing the areas of transformation, taking into account the specific features and changes that occur with the implementation of digital solutions. The results of the study can be useful in developing industrial enterprise development strategies in accordance with the Industry 4.0 concept. The digital transformation of industrial production enables increased flexibility, productivity, quality, and customer focus, providing enterprises with a competitive advantage. The relevance of this research is determined by modern requirements for the multi-component nature of industrial production, the complex systems used in organizing production processes, and the ever-increasing technological sophistication of modern industrial products. This determines the objective of the study: to identify and scientifically substantiate the key features of organizing industrial production in the context of digitalization. To this end, the following objectives must be achieved: reviewing research on this topic; identifying the key elements of organizing industrial production in the context of digitalization; and developing a sequence for organizing industrial production in the context of digitalization. Successful resolution of these objectives allows us to substantiate the author's hypothesis about the key role and place of a properly developed technology for organizing industrial production in order to meet modern requirements for the digitalization of production.

Keywords: Industrial enterprises, Mechanism, Development, Digitalization, Digital technologies, Industry 4.0

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1. Introduction

Digitalization implies deep integration of various information systems and technologies within an enterprise, enabling end-to-end management of production processes, logistics, maintenance, and other functions, collection, processing, and analysis of big data, remote monitoring and control, adaptability and flexibility of production, and interaction with external ecosystems (Klaus & Devis, 2018). The collection, processing, and analysis of big data through the use of digital sensors and data collection systems in production generate large volumes of information. The application of big data analytics methods allows us to identify patterns, optimize processes, and make more informed decisions. Modeling and simulation of production systems are based on the use of digital twins for virtual testing and optimization of production, enabling the rapid modeling and prototyping of new products and production lines (Trachuk & Linder, 2020). Remote monitoring and control enable remote

management, control, and diagnostics of production assets, and contribute to increased efficiency of equipment maintenance and repair. Adaptability and flexibility of production due to the rapid reconfiguration of production to changing market needs increase the enterprise's ability to adapt to changes in demand and market conditions. Interaction with external ecosystems by integrating enterprise production systems with the digital platforms of suppliers, customers, and logistics providers. Expanding opportunities for cooperation and collaboration within production value chains.

In recent years, the processes of business transformation under the influence of digital technologies have attracted particular interest from researchers and economists. Industrial enterprises committed to digital transformation must develop a methodological base, taking into account the gradually accumulating empirical results and new technological conditions. Enterprise digital transformation must be implemented through a regulated and targeted process that will enable goals to be achieved within a specified timeframe with optimal resource expenditure. This refers to the mechanism for enterprise development in the context of digitalization. Thus, every enterprise is interested in researching, creating, and improving its development mechanisms. This suggests that the topic of developing a mechanism for industrial enterprise development in the context of digitalization is relevant.

2. Literature Review

Issues related to defining the essence of this mechanism as a separate economic category have been addressed by economists such as L. Gurvits, A. Kulman (Kulman, 1993), N. Ivanov, A.N. Bychkova, and others. Research into the mechanisms of sustainable enterprise development was conducted by V.G. Byazrov, E.V. Shestakova, and V.F. Tsakhilova. It is important to note that all authors, when considering this topic, predominantly adopt a systems approach. Issues related to the study of the impact of digital technologies on enterprise activities and the formation of mechanisms for enterprise development in new technological conditions are reflected in the works of A.V. Babkin (Babkin et al., 2022), L.K. Agaeva, A.G. Shcherbakov, and N.S. Vasin, I.G. Gorlovskaya, E.P. Kozlova. However, the research results do not sufficiently reflect the need for enterprises to create a strategy for the implementation of digital solutions as a methodological basis. Thus, existing approaches to the formation of a development mechanism in the context of digitalization, in our opinion, require further clarification and development.

The aim of the article is to study the content of the mechanism for the development of an industrial enterprise in the context of digitalization. In accordance with the aim, the following tasks have been defined: analysis of sources in order to study the essence and features of the concepts of "mechanism", "economic mechanism", "organizational and economic mechanism", "development mechanism"; based on the systematization of the research results of economists, to determine the system of basic elements of the mechanism for the development of an industrial enterprise; To propose the basic elements and examine the specific features of an industrial enterprise development mechanism in the context of digitalization.

3. Methodology

The methodological basis of this study is a systems approach, as well as methods of analysis, generalization, and comparison. The scientific hypothesis is that the most general factor in shaping an enterprise's development mechanism in the context of digitalization is the creation of a strategy for implementing digital solutions. The scientific novelty of this work lies in the following. A system of basic elements is proposed that forms an industrial enterprise development mechanism in accordance with the Industry 4.0 concept. Distinctive features of this system include the use of a process approach and the specification of the "transformation area" element, which acts as the object of direct change. The key stages of developing a strategy for implementing digital solutions as the primary tool for an enterprise's development mechanism in the context of digitalization are proposed.

Having analyzed the works of economists, it can be concluded that the definitions of the economic mechanisms proposed by them are rigorous, universal, and applicable to studies at all levels of the hierarchy (macro, meso, micro). The authors examine the economic mechanism in terms of interactions or processes. L.

Gurvits defines a mechanism as a process of interaction between its constituent elements. A. Kuhlman's achievement is the definition of an economic mechanism as a process with a defined outcome, and its division into closed and open (Kulman, 1993). N. Ivanov subdivides mechanisms into market mechanisms, where hierarchy predominates, and information-network mechanisms, based on horizontal interactions between elements. A.N. Bychkova proposed the following classification of economic mechanisms: management mechanisms (top-down), interaction mechanisms, and regularity-based mechanisms.

M. L. Krichevsky and his co-authors propose a comprehensive methodology for assessing the digital maturity of enterprises, based on a systems approach and taking into account both internal and external factors of digital development (Krichevskiy et al., 2022). Key attention is paid to the distinction between the actual level of maturity and the target state, determined by the company's strategic objectives and the characteristics of the competitive environment. The model developed by the authors includes a multifactor system of indicators grouped into six areas: strategic management, infrastructure, technology, personnel, organizational processes, and interaction with external contractors. Each area is accompanied by a system of significance coefficients, allowing the methodology to be adapted to the specifics of a particular enterprise. The integrated digital maturity indicator is calculated using a formula based on the principles of weighted summation.

The digital passport model for an industrial organisation is currently the most widely used and institutionalised form (Trachuk & Linder, 2020). A three-loop assessment structure is part of the methodology:

– first loop – digitalisation of key industrial procedures;

– second loop – the level of digitalization of auxiliary functions;

– the third circuit – the advancement of IT infrastructure technology.

Specifically, A. V. Babkin, E. V. Shkarupeta, and associates suggest a thorough method that evaluates the digital gap between the present and intended states (Babkin et al., 2022). Formula 1 is used in the process to determine the digital divide index:

$$D = \frac{Z_c - Z_f}{Z_c} \times 100\%, \quad (1)$$

What is the enterprise's actual maturity level, and where is the goal maturity level for each area? The generated values enable businesses to be categorised based on levels that range from "digital lag" to "progressive maturity." Scales for evaluating employees' digital competencies as well as the digitalisation of processes are also part of the technique.

M. L. Krichevsky, who created a multi-indicator model based on a weighted evaluation of six blocks (Krichevskiy et al., 2022): strategy, infrastructure, technology, processes, personnel, and external relations, offered an alternative method. The model can be customised to the unique circumstances of the business since each component is given a weighting coefficient based on industry peculiarities. A weighted summation formula (Formula 2) is used to determine the integrated digital maturity index:

$$Z = \sum_{i=1}^{n} K_i \cdot V_i, \quad (2)$$

where is the weighting coefficient for the i-th area, and is the maturity indicator value for this area. A comparison of the methods taken into consideration reveals certain similarities:

– extensive use of expert assessment and self-assessment principles;

- focus on complex parameters, including both technological and organizational indicators;
- a tendency to incorporate aspects of digital culture and personnel into the maturity framework.

Simultaneously, there are variations in the aggregate logic, the scales' structure, and methods for displaying the outcomes. For instance, the Babkin and Krichevsky models (Babkin et al., 2022; Krichevskiy et al., 2022) concentrate on the strategic interpretation of maturity and its implementation in management, whereas the digital passport model (Trachuk & Linder, 2020) stresses the functional completeness of process coverage.

Thus, domestic approaches to digital maturity assessment demonstrate progress toward institutionalizing methodologies, but require unification of criteria and the development of external verification mechanisms. Ensuring the comparability of results across enterprises and the creation of independent assessment tools free from the influence of subjective factors remains a pressing issue.

Thus, it can be concluded that these terms encompass both organizational and managerial aspects. When examining economic mechanisms, their organizational component is not negated. The definition of an organizational-economic mechanism distinguishes between organizational and economic aspects. Definitions of a sustainable development mechanism (Ilina, 2021; Alieva, 2022) are provided in Part III. This category, along with the organizational one, must be considered in the study, as every enterprise and its external environment change, and this is an objective reality. Within the framework of our study, "forming a development mechanism" can be interpreted as creating a way to improve enterprise performance in an environment of constant change and external influences. The structure of an "industrial enterprise development mechanism" includes a system of basic components that constitute a single, integrated complex. This concept cannot be considered solely in the context of management and organization, interpreted as an unchanging system, or ignored in terms of goals and results. Thus, through an analysis of scientific sources, we will identify the main elements of an enterprise development mechanism.

4. Current State of the Enterprise

Within the framework of the study, taking into account the category "development," the current state of the enterprise represents the initial state of the system, the "input of the mechanism." An analysis of the current state is essential, as its results are the vector of the enterprise's development (Gileva et al., 2021).

Enterprise goals: These are based on the results of an analysis of the existing enterprise strategy, combined with the capabilities and expected results of the development mechanism.

Transformation areas: By analyzing the current state as a starting point and setting goals, areas of the enterprise requiring updates and changes are identified.

Methods and tools: These represent a set of techniques that ensure the interaction of system elements and are necessary for achieving the stated goals. This coordinated interaction is achieved by influencing the transformation areas.

Internal and external factors: In addition to methods, internal and external environmental factors influence the mechanism. To ensure sustainable, effective development, it is necessary to analyze the impact of each factor on the outcome. Internal environmental factors are generated and developed by the enterprise itself; therefore, in this case, control is transparent, and the degree of influence depends on the enterprise itself.

Operational management includes aspects of production organization and is a means of coordination. It is highly intelligent, flexible, and responds instantly to changes and makes adjustments.

5. Expected Results and Efficiency

The theoretical outcome of enterprise development, achieved through a project-based approach, takes into account the proper interaction of all the components described above, as well as the development of a results monitoring system.

Considering the category "development," this represents the "mechanism output" or the practical results of the mechanism's operation over a period of time determined by management.

Thus, having examined the main elements, we conclude that they are integrated and interact, as well as the need for each component of the mechanism to function as a coherent system. As noted above, the content of the mechanism depends on the company's chosen goals, the direction of strategic development, and the operating conditions. In the next stage of the study, an approach to developing a mechanism for industrial enterprise development in the context of economic digitalization will be proposed.

6. Development Mechanism in Digitalization Context

Currently, in the context of digitalization, enterprises must keep up with modern trends to remain competitive, improve, and develop new markets (Shpak, 2022). Industrial enterprises face a number of conditions that hinder their digitalization development, including the obsolescence and deterioration of production and process chains, as well as low personnel qualifications.

One of the most well-known theoretically validated models is the Industry 4.0 Maturity Index, developed by a German scientific consortium with the participation of Fraunhofer IAO and Acatech (Frolov et al., 2019). The model's structure includes six levels of digital maturity: from computerization to adaptability, as well as four assessment areas: resources, information systems, organization, and corporate culture. The transition between levels is interpreted as a gradual increase in the capabilities of autonomous analysis, decision-making, and self-learning. The model is applied through self-assessment followed by expert verification. The full text of the methodology is available on the official Acatech website. Digital maturity levels according to this methodology are presented in Table 1.

Table 1. Digital maturity levels in the Industry 4.0 Maturity Index model.

Maturity Level	Characteristic
Computerization	Basic automation using IT
Coherence	The presence of integration and data exchange between systems
Visualization	Analytical representation of key processes
Predictability	Predictive analysis and scenario modeling
Autonomy	The ability to make decisions without human intervention
Adaptability	Self-learning systems that can be customized based on the results of their own analysis

Source: compiled by the authors based on (Frolov et al., 2019).

The Digital Capability Framework (DCF), another popular instrument, is employed in international business settings. Strategy, digital leadership, culture, IT architecture, innovation management, and customer experience are the six domains of digital capabilities included in the model. Maturity levels and indicators are used to describe each domain, enabling both qualitative and quantitative evaluation. The DCF places more emphasis on the strategic management of digital projects and sustainable development than models that concentrate on industrial processes (Ilina, 2021; Alieva, 2022).

Significant advancements have also been made to the Smart Industry Readiness Index (SIRI) concept, which was created in Singapore for small and medium-sized industrial businesses. The sixteen components of the methodology are divided into three blocks: organisation, technologies, and processes. The SIRI's high level of visualisation is one of its unique features; the resulting maturity profile is shown as a radial diagram, vividly illustrating the advantages and disadvantages of digital progress. The application of the DEMATEL model, which uses cause-and-effect matrices to identify essential digital maturity aspects, is also significant. This approach, which is widely utilised in Southeast Asia, enables the ranking of maturity characteristics as well as the identification of dominating areas of influence that call for managerial intervention. International techniques can be compared to find commonalities:

– comprehensive coverage of all areas of digital transformation;

- a hierarchical structure with clear criteria for transitioning between levels;
- a focus on managerial interpretation and visualization of results;
- the presence of a mechanism for external verification of the obtained data.

It should be mentioned that digital maturity evaluation is regarded as one of the management instruments for digital sovereignty, competitiveness, and industrial safety in many nations and is incorporated into industrial development programmes.

The great maturity of approaches based on repeatable and quantifiable indicators is thus demonstrated by global experience. However, differences in infrastructure and regulations make it difficult for them to be directly adopted in the sector, requiring procedures for adaptation and modification.

The variety of digital maturity evaluation models now in use is a result of both industry peculiarities and variations in application goals. We may determine each method's advantages and disadvantages as well as its potential for integration, modification, and translation into the actual management of industrial companies by conducting a comparative analysis.

Four models are summarised and compared in Table 2. The Industry 4.0 Maturity Index, the Babkin et al. model, the Digital Enterprise Passport (DEP), and the Smart Industry Readiness Index (Gileva et al., 2021). The following standards form the basis of the analysis:

- comprehensive coverage of digital transformation areas;
- the presence of structured maturity levels;
- applicability for internal and external audits;
- adaptability to industry specifics;
- availability of tools and transparency of calculations.

Table 2. Comparative analysis of digital maturity assessment models.

Criterion / Model	Digital Passport	Babkin's Model and Others	Industry 4.0 Maturity Index	Smart Industry Readiness Index
Completeness of coverage	high	average	high	high
Maturity levels	Yes	Yes	Yes	Yes
Applicability to audit	limited	internal	external and internal	external and internal
Adaptation to the industry	partial	Yes	limited	high
Transparency of calculations	partial	high	average	high

Source: compiled by the authors.

A comparative analysis revealed that models developed by international institutions (Industry 4.0 Maturity Index and SIRI) are highly formalized, have an integrated maturity hierarchy, and a clearly defined development logic (Frolov et al., 2019). They are focused on the comprehensive development of organizations and consider not only technological but also cultural and organizational aspects.

At the same time, models proposed by domestic researchers (for example, by Babkin et al.) demonstrate greater flexibility in terms of adaptation to specific enterprise conditions but require further institutionalization and standardization. The GISP digital passport, despite its widespread use, has faced criticism for its excessive detail and the high labor intensity of data collection, which reduces its effectiveness in small and medium-sized enterprises.

The applicability of models for strategic management purposes deserves special attention. Thus, foreign methodologies suggest using assessment results in formulating investment strategies, developing transformation

roadmaps, and adjusting cost structures. Domestic approaches, by contrast, are more often used for diagnostics and ongoing monitoring, not always moving into management planning.

Thus, a comparative analysis confirms the feasibility of searching for a hybrid model that combines:

- the detail and scope of a digital passport;
- the strategic focus of CMMI and Industry 4.0 models;
- the adaptability of proprietary domestic approaches;
- the visualization and managerial applicability inherent in SIRI.

The transition to such models requires the development of a unified set of indicators based on the principles of comparability, reproducibility, and independent verification. This will allow digital maturity assessment to be integrated into the strategic planning of enterprises and industry development.

It's worth noting that when implementing digital technologies, an enterprise changes existing management models, reformatting communications, technologies, and organizational structure. Therefore, the authors believe it is justified and necessary to study the formation of a development mechanism for an industrial enterprise, taking into account the changes that digital technologies bring to its operations. When developing a development mechanism for an industrial enterprise in the context of digitalization, the following tasks must be addressed (Shandova, 2014):

- Assess the current state of the enterprise and identify areas requiring improvement;
- Define the goals and objectives of the mechanism;
- Identify and describe the factors influencing it and the risks associated with its operation;
- Develop a strategy for implementing digital solutions;
- Determine the methods and tools for the development mechanism;
- Determine the outcome and develop a results monitoring system.

7. Components of the Development Mechanism

7.1. Objectives and Management

The implementation of digital technologies leads to increased operational efficiency at an industrial enterprise, namely: increased labor productivity; reduced manufacturing lead times; development of new activities; improved product quality; reduced costs; increased competitiveness; and increased research intensity.

It should be noted that not all enterprises achieve the above effects, and the results largely depend on management. An industrial enterprise is a generator of innovation, technological processes, and scientific potential in its daily operations, requiring the constant investment of financial resources. By implementing digital solutions, management alters existing processes, management models, and reformats communications, technologies, and the organizational structure, risking failure to achieve the desired results.

7.2. Transformation Areas

Human Resources, Project Teams, and Personnel

When implementing digital technologies, management must carefully form internal project teams that, together with the contractor, will begin implementing the digitalization strategy and transform the project into an operating asset. It is also important to consider the role of personnel not involved in the project. Management must also assess risks, such as employee disapproval, reluctance to adapt, and skepticism toward change. It is necessary to develop a system for motivating and engaging staff and project teams, as well as rewarding digital talent.

Organizational Structure

As the digital strategy is implemented, the company's organizational structure is also transformed. Digital transformation requires the implementation of software products, the development of business processes within software, the development of plans for further technological development, and the search for suppliers in the digital technology and services market. Management, therefore, requires a new division (a digital transformation center) and a digital transformation director. This division is functionally divided into two parts: hardware support and software maintenance. They are directly involved in developing the digital development strategy and implementing digital solutions.

Information Base, Regulatory, and Reference Information

One of the fundamental management objectives is the creation and development of regulatory and reference information (RRI), such as technological processes, product groups, regulations, and rules for creating product lists, department and contractor directories, etc. To effectively work with big data and create reliable predictive models based on it, and to utilize artificial intelligence, it is essential that RRI be unified, accurate, and synchronized across all departments and software products. The enterprise's management center must include the development of this management objective at the initial stage of the strategy before implementing any digital solution. The correctness of management decisions depends on the integrity and accuracy of the information.

Financial Base and Cost Structure

The enterprise must finance the implementation of digital technologies. Funding sources must also be identified as part of the implementation of any project. The cost structure also changes during the transformation process. Research and development, acquisition of fixed assets, intangible assets, and third-party services now occupy a special place among cost elements. Management must create project budgets, calculate the effectiveness of their implementation, and account for the process of writing off costs to cost.

Contractor Relations

A distinctive feature of digitalization as it applies to enterprises is the openness and diversity of development trajectories. Not only are enterprises transformed, but also their relationships with suppliers, customers, and other partners. The interactions between them are complex and multifaceted, so a network approach is appropriate and most effective in this case. This interaction is based on horizontal integration between enterprises, which represents a unified information space and entails the widespread exchange of information, products, and technologies. Thus, enterprises embrace innovation, improve product quality, and enhance service, thereby enhancing competitiveness.

Marketing

In addition to the transformation of enterprise interactions, changes in marketing and product promotion strategies are inevitable. In this case, it is important to note the active reorientation and application of digital marketing. This includes testing advertising platforms, traffic promotion, corporate image management, and more. Within the digital marketing system, web analytics should be noted as the source of all marketing information, from information about website visitors to online product sales.

7.3. Methods and Tools

All development methods should be divided into information technology, social, and economic.

Information technology methods within an enterprise's development mechanism represent a set of tools and techniques that optimize production, improve technologies and standards, facilitate information exchange, and enhance the level of scientific and technological progress within the enterprise. This complex consists of the enterprise's scientific personnel, interaction with scientific organizations, automated equipment, and a range of interconnected and integrated software products, which generate a wealth of information.

By social methods, we mean a set of techniques and tools that influence the emotional climate, satisfaction, and moral motivation of the team. Such methods include social planning, moral motivation, and psychological and qualification analysis. In the context of digitalization of the economy, the use of socially oriented methods is particularly important, as the effectiveness of digital solution implementation depends on the readiness and qualifications of personnel.

Economic methods, in our view, represent a set of tools and techniques that enable the analysis, planning, and control of enterprise activities. The main methods include technical and economic planning and forecasting. In other words, developing an enterprise action plan based on goals and desired results. The result of this method is a consolidated plan for all areas of the enterprise's activities, reflecting costs and results, as well as planned indicators for the enterprise's development mechanism. As a result of the digitalization of production, data becomes more accurate and transparent, enabling online monitoring of plan execution and factor analysis of results.

Characteristic features of all these methods are their interaction and interdependence. An acceptable combination of all these methods will achieve a synergistic effect, and such a mechanism for enterprise development is the most effective. It is necessary to define a list of tools as a technology for implementing actions applicable to the digital transformation of an industrial enterprise.

In this regard, we will categorize existing tools based on their role in implementing the enterprise development mechanism in the context of digitalization of the economy. In this regard, we believe it is necessary to highlight a number of tools:

– Technological tools for increasing efficiency (digitalization components, software products);

– Management tools that facilitate the achievement of goals and the effective development of the enterprise (projects, plans, strategies, methodologies);

– Tools that facilitate the development of human resources (experience exchange, retraining, training);

– Regulatory and legislative tools (reduced tax rates, state subsidies and incentives, quality standards, etc.).

In the context of digital transformation, industrial enterprise management must develop a strategy for implementing digital solutions. In a study on the implementation of digital solutions by industrial enterprises, the authors noted that this toolkit should contain a methodological framework, including an analysis of readiness for implementation, goals, stages, budget, and the economic impact of its implementation (Frolov et al., 2019). We propose the following stages for developing a strategy for implementing digital solutions:

– analysis of readiness for the implementation of digital technologies, an audit of infrastructure and software;

– analysis of business processes and identification of priority development areas;

– technology market research, analysis of proposals, and compilation of a list of digital solutions;

– methodological assessment and selection of priority digital solutions;

– development of a digitalization roadmap and a draft of the expected business model;

– strategy approval.

7.4. Internal and External Factors

It should be noted that the areas of transformation, tools, management, goals, and other elements of the mechanism described above are reflected in the block of external and internal factors. The quality of internal factors determines the effectiveness of the enterprise as a whole. Internal factors are subject to the direct influence of management; their ability to be measured, analyzed, and adjusted is higher than that of external factors. External environmental factors, such as the market, political situation, and others, have a strong external influence on enterprises. It's worth noting that the impact of the epidemiological situation currently outweighs other external

factors. Due to the COVID-19 pandemic, businesses are forced to shift to online information exchange and can also take advantage of benefits, reduced tax rates, and other government support tools. Businesses must quickly transform and adapt to external conditions. Remote workstations, flexible schedules, internal task forces, and pandemic safety tools are particularly relevant during the pandemic. Digitalization components are particularly relevant now as a means of effectively facilitating business interaction with the external environment. It's worth noting that with the implementation of digitalization components, the impact of external factors increases, while the outcome directly depends on the quality and readiness of internal factors.

7.5. Risks and Opportunities of Digital Transformation

The risks and opportunities arising during and as a result of the implementation of digital solutions, in our opinion, deserve special attention. The "Risks" section is an important information block that must be reviewed, along with the development of a risk prevention system and the calculation of its impact on the enterprise's development mechanism. One study identified the following key risks (Trachuk & Linder, 2020):

1. problems associated with the implementation of Industry 4.0 technologies themselves;

2. data security;

3. a lack of market demand to create a solution (software product) within the Industry 4.0 framework (Trachuk & Linder, 2020).

The "opportunities" block is not a component of the mechanism, but complements and clarifies the goals and results.

As a result of the implementation of digital technologies, enterprises are changing not only their business processes but also their entire business model. New activities (3D in powder metallurgy) and services using digital technologies (verifying the accuracy of a 3D product model using an online service) are emerging. As a result, new sources of income are emerging, new markets are being developed, and diversification is occurring. The study, which examines the systemic effects of the development of complex economic systems in accordance with the "Industry 4.0" concept, included an expert survey of executives at various levels at more than 40 Russian industrial enterprises, including IT directors and managers in various functional areas. The survey period was October 2017 - May 2018. Participants answered 28 questions regarding their understanding of the Industry 4.0 strategy and the implementation of digitalization processes in industrial enterprises. The authors noted that the greatest impact (84.6%) will be achieved in the area of production optimization. The next most significant impact is expected in the area of the emergence of new business models (71.8%). In third place is an increase in end-user satisfaction (51.3%) (Trachuk & Linder, 2020).

Therefore, taking into account the above, summing up the results of the study, the following can be noted. Improving and optimizing an enterprise's business processes using digital technologies allows the enterprise to increase its efficiency not only internally but also in terms of adaptation to the external environment. Management and the quality of the strategy it develops for implementing digital solutions, as well as the coordinated interaction of all elements of the enterprise's development mechanism, are of key importance in the process of forming an enterprise's development mechanism in the context of the digitalization of the economy.

It should be noted that the development mechanism for an industrial enterprise, as a representative of complex process chains, long processing cycles, and sophisticated technological equipment, should be based not only on conventional models and experience, but also on scientific methods. The design of this highly complex mechanism should be entrusted to methodologists with a thorough understanding of the conceptual components of the processes, methodology, technical capabilities, and the desired outcome.

8. Conclusion

Thus, the study proposed a system of key elements for an industrial enterprise development mechanism in the context of digitalization. It should be noted that the industrial enterprise development mechanism can be viewed in a narrow sense as a set of organizational and economic measures to improve enterprise efficiency and in a

broader sense as a form of organizing the interaction of enterprises as market participants, organizational structures, and business processes, as well as the methods and tools for implementing this interaction. Examining the industrial enterprise development mechanism through the lens of digital technologies allows us to conclude that management and the quality of the digital solution implementation strategy it develops, as well as the coordinated interaction of all elements of the enterprise development mechanism, are of key importance in the process of developing a development mechanism in the context of digitalization.

Developing a development mechanism for an industrial enterprise in the context of digitalization is a comprehensive process of integrating digital technologies (IoT, Big Data, AI, cloud) across all management levels (from operational to strategic) to create a unified system, improve efficiency, optimize processes, and free personnel from routine tasks to solve more complex problems, turning data into a key production factor and the foundation for sustainable growth. Key components of the mechanism:

1. Integration of digital systems: Creating a unified information space that unites production equipment, management, personnel, and safety.

2. Leveraging advanced technologies: Implementing IoT (Internet of Things) for equipment connectivity, Big Data for data analysis, AI (Artificial Intelligence) for decision making, machine learning for optimization, and cloud computing.

3. Digital transformation of processes: Transforming all operations into electronic form, automating routine tasks, creating digital twins and prototypes.

4. Management modernization: Using digital tools to increase productivity and improve production management flexibility.

5. Personnel Development: Retraining employees to work with new technologies, transitioning them to analytical work instead of monotonous labor.

Mechanism Development Stages:

1. Audit and Strategy: Assessing the current state, defining digitalization goals, and developing a roadmap.

2. Selecting and Implementing Technologies: Gradually equipping production with sensors, servers, and software (ERP, MES).

3. Data Integration: Creating a centralized platform for collecting and analyzing information.

4. Training and Adaptation: Training personnel, changing the corporate culture.

5. Scaling and Optimization: Expanding digital solutions, continuously monitoring and improving efficiency.

Increased competitiveness, reduced costs, accelerated decision-making, and the creation of flexible, adaptive production are ready for the challenges of the digital economy.

Thus, the digitalization of industrial production fundamentally transforms its organization, increasing the level of integration, flexibility, analytical support for decision-making, and interaction with the enterprise ecosystem. Key characteristics of industrial production organization in the context of digitalization are: integration and connectivity, flexibility and adaptability, automation and robotics, big data analytics, modeling and digital twins, remote monitoring and management, and interorganizational cooperation. Deep integration and connectivity of various information systems and technologies within an enterprise enable end-to-end digital communication between production, logistics, service, and other processes. Flexibility and adaptability are characterized by the ability to quickly reconfigure production to meet changing market demands and the use of modular, scalable production systems. Automation and robotics involve the widespread use of industrial robots, machine vision systems, automated warehouses, and the implementation of intelligent production process control systems. Modeling and digital twins involve the creation of virtual models (digital twins) of production assets and processes, enabling the rapid simulation and testing of various production scenarios.

Author Contributions

Both authors approved the final manuscript.

Conflict of Interest

The authors declare no conflicts of interest.

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References

Alieva, P. O. (2022). Strategy for sustainable development of industry in the region. *[Bulletin of Scientific Thought]*, (4), 62–68. https://doi.org/10.34983/DTIPB.2022.48.52.001

Babkin, A. V., Shkarupeta, E. V., Gileva, T. A., Polozhentseva, J. S., & Chen, L. (2022). Methodology for assessing digital maturity gaps in industrial enterprises. *MIR (Modernization. Innovation. Research)*, *13*(3), 443-458. https://doi.org/10.18184/2079-4665.2022.13.3.443-458

Frolov, V. G., Trofimov, O. V., & Martynova, T. S. (2019). *Analysis of the readiness of a metallurgical enterprise for" Industry 4.0" and a strategy for implementing digital solutions. Creative Economy, 13 (6), 1117-1132.* https://doi.org/10.18334/ce.13.6.40708

Gileva, T. A., Galimova, M. P., Babkin, A. V., & Gorshenina, M. E. (2021, July). Strategic management of industrial enterprise digital maturity in a global economic space of the ecosystem economy. In *IOP Conference Series: Earth and Environmental Science* (Vol. 816, No. 1, p. 012022). IOP Publishing. https://doi.org/10.1088/1755-1315/816/1/012022

Ilina, E. A. (2021). Modeling the strategy of sustainable development of industrial enterprises. *Organizer of production*, *29*(3), 130-138. https://doi.org/10.36622/vstu.2021.39.13.014

Klaus, Sh., & Devis, N. (2018). *Tekhnologii chetvertoy promyshlennoy revolyutsii* [Technologies of the Fourth Industrial Revolution]. LitRes, Eksmo.

Krichevskiy, M. L., Martynova, Yu. A., & Dmitrieva, S. V. (2022). *Otsenka tsifrovoy zrelosti predpriyatiya* [Assessment of digital maturity of an enterprise]. *Voprosy innovatsionnoy ekonomiki*, 12(4), 2545–2560. https://doi.org/10.18334/vinec.12.4.116786

Kulman, A. (1993). *Ekonomicheskiye mekhanizmy* [Economic mechanisms]. Progress.

Shandova, N. V. (2014). *Podkhody k formirovaniyu strategii ustoychivogo razvitiya promyshlennykh predpriyatiy* [Approaches to the formation of a sustainable development strategy for industrial enterprises]. *Problemy ekonomiki i menedzhmenta*, (2), 30–33. https://cyberleninka.ru/article/n/podhody-k-formirovaniyu-strategii-ustoychivogo-razvitiya-promyshlennyh-predpriyatiy

Shpak, P. S. (2022). The Concept of «Smart Production» as an Effective Tool for the Digital Transformation of an Enterprise. *Administrative Consulting*, (11). https://doi.org/10.22394/1726-1139-2022-11-43-54

Trachuk, A. V., & Linder, N. V. (2020). The Impact of Industry 4.0 Technologies on Improving Productivity and Transforming Innovative Behavior of Industrial Companies. *Strategic Decisions and Risk Management* , *11* (2), 132-149. https://doi.org/10.17747/2618-947X-2020-2-132-149

The Impact of Net Zero Strategies on the Tourism Sector

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Abstract

Tourism produces a large share of the world's greenhouse gases. Aircraft flights, hotels, and cruise ships release most of those gases. A review of every relevant study published between 2015 and 2024 shows how tourism plans to reach net zero emissions, plus what happens when such plans are put in place. The main actions are set targets that follow climate science - install more efficient engines, boilers, and air conditioning - replace fossil fuels with solar, wind, but also other renewable sources, protect and restore forests, wetlands, as well as reefs that absorb carbon; and let Destination Management Organizations lead the way with clear long-term strategies. Success depends on new hardware but also on firm rules, budgets that reward low-carbon choices, or cooperation among governments, businesses, and residents. Local laws next to national laws determine how quickly a place cuts carbon, and if visitors still regard it as attractive. The survey confirms that companies, public agencies plus travelers must act together - one group alone cannot push emissions to zero. More work is needed to track results over many years and to compare airlines, hotels, cruise lines, and also individual resorts in different parts of the world.

Keywords: Net-zero strategies, Sustainable tourism, Carbon reduction, Destination management, Environmental impact

JEL Codes: Q01, Q56, R11, Z32

1. Introduction

The tourism sector has a large environmental impact and also plays a large part in the global economy. International civil aviation, hotel industries, cruises, and other tourism activities emit a large amount of greenhouse gases (Gossling et al., 2015). The tourism sector emitted around 8% of total carbon emissions in 2019 (WTO, 2020). Out of this, a large percentage comes from air travel (WTO, 2022). Thus, the tourism sector plays a vital part in fighting climate change and achieving the Sustainable Development Goals that the world community has adopted. In recent times, the concept of net-zero carbon emissions has become a new strategy adopted by companies and managers in the tourism sector. Net-zero means reducing greenhouse emissions to zero and offsetting the remaining emissions (Higham et al., 2016). This strategy has been adopted in the tourism sector through energy efficiency, renewable energy, sustainable transport, and carbon offsetting (Becken & Hay, 2007).

The strategy has a large impact on the tourism sector, and cost and competitiveness play a vital part in assessing its impact on the economy (Higham et al., 2016). The success of this strategy does not depend on environmental factors alone, and its success also determines its impact on performance and competitiveness in the tourism sector.

The main aim and objective of this study are to assess how the strategy of net-zero carbon emissions impacts the tourism sector and to give insights into a sustainable transformation in the tourism sector through the adoption of the net-zero carbon emissions strategy.

2. Literature Review

The tourism sector is an important sector in the sustainability debate because of its high energy consumption and carbon emissions. Gössling, Scott, and Hall (2015) focused on the carbon emissions generated by the tourism sector and the effects of the activities undertaken in the tourism sector. The authors noted that flights and hotels make up a large percentage of the carbon emissions generated in the tourism sector. The UNWTO (2020) noted that the 8% greenhouse emissions generated by the international tourism sector are almost 'sneaked' into the global emissions, and the need to make carbon-cutting moves is pressing.

The ideas and strategies put in place by the net-zero concept can be applied in the tourism sector. For example, Becken (2017) noted that hotels can make significant cuts in the carbon emissions generated in the tourism sector by making energy-efficient moves and using renewable energy. Higham, Cohen, and Cavaliere (2016) noted that significant moves made in the tourism transport sector to reduce emissions can have significant impacts on the tourism sector, not only in its operations but also in its financial performance. The IPCC (2022) noted that the net zero concept is not only important in the operations of companies but also requires the involvement and cooperation of destinations and policymakers.

The literature is focused on the following three aspects: the sources and intensity of emissions, the viability of the net zero concept, and the impacts and effects. The application of the net zero concept in the tourism sector is likely to have positive impacts on the sustainability of the environment and the operations and competitiveness of the sector.

Table 1. Key findings of net-zero strategies in tourism in the literature.

Source	Focus Area	Net Zero Strategy Application	Findings / Impact
Gössling, Scott & Hall (2015)	Air transport and the hotel sector	Energy efficiency, carbon offsetting	Identified the most emission-intensive areas; high potential for reduction
UNWTO (2020)	International tourism	General sector data	Tourism accounts for 8% of total emissions; an urgent strategy is needed
Becken (2017)	Hotel operations	Renewable energy and efficiency measures	Effective in reducing emissions; requires cost and management optimization
Higham, Cohen & Cavaliere (2016)	Tourist transportation	Radical emission reduction	Potential to transform sector operationally and economically
IPCC (2022)	Policies and strategies	Net zero targets	Requires comprehensive strategies at both sectoral and policy levels

Source: Created by the author.

The major findings that have been established through literature on net zero stuff in the tourism industry are presented in Table 1. It highlights the areas that are responsible for emitting the largest amounts of CO_2 into the atmosphere, such as flights, where people stay, and how people move around, to mention a few, so that one can have an understanding of the areas that need to be addressed (Gossling et al., 2015; WTO, 2020).

The table also highlights the different net-zero approaches that people have used or are still using to ensure that the tourism industry is net-zero. It includes the different approaches, such as the smaller approaches that people take, such as increasing the level of energy efficiency and the use of renewable sources of energy, to the bigger approaches, such as carbon offsetting and sustainable destination management (Becken & Hay, 2007; Giglio et al., 2018). The table highlights the different approaches that people are taking to ensure that the industry is net zero, and this is important because it shows that net zero is a complex issue that affects different areas of the industry.

The table also highlights the different impacts that have been established, such as the positive impacts, including the reduction of greenhouse emissions, and the negative impacts, such as the need for money and planning that is required for the different approaches that are used to ensure that the industry is net zero (Higham et al., 2016). This is important because it highlights the different areas that are affected and, therefore, ensures that one has a clear understanding of the different approaches that are used to ensure that the industry is net zero. This

is important because it is setting the pace for the rest of the article. In conclusion, the expanded perspective shown in Table 1 indicates that attaining net-zero emissions in the tourism sector is a multi-faceted process that needs to take place through various levels, such as at an individual level (for individual firms and modes of transport), at the political/policy level, and at the destination management level.

3. Methodology

In this research, qualitative research is being done with emphasis on conducting a systematic search in the literature in order to analyze the effect that will be caused by the implementation of net-zero strategies on tourism. The academic literature was chosen for gathering the required data; the searches were done specifically in the Scopus and Web of Science databases. Our specific data includes the carbon footprint of tourism globally (Lenzen et al., 2018), the interaction of tourism and climate change (Scott et al., 2016), and the sustainability performance analysis of transport providers (Giglio et al., 2018). Broader theoretical understandings of sustainable tourism (Hall et al., 2015) and net zero frameworks for tourism (WTTC, 2021). They are also part of our analysis.

In terms of analysis, we have used thematic analysis to identify emerging themes in terms of where the emissions are coming from, what the strategic actions are, and what the difficulties are in terms of implementation. While this method provides an in-depth analysis, using literature does mean that we are not using primary data, and also that there could be regional variations in the reporting.

4. Findings and Analysis

The reviewed literature highlights three major dimensions shaping the tourism sector's net-zero transition:

(1) adoption of net-zero strategies and corporate commitment;

(2) policy and institutional engagement;

(3) local and ecological interventions.

Adoption of Net-Zero Strategies and Corporate Commitment: The WTTC's "Net Zero Roadmap" indicates a significant increase in corporate commitments, with 53% of 250 major tourism companies having established climate targets (WTTC, 2024). Jones (2023) reports that tourism companies adopt nature-based solutions, carbon offsetting, and technological investments to achieve net-zero targets. Research by the UQ Business School emphasizes that destinations lacking strong leadership have limited effectiveness in implementing net-zero commitments (UQBS, 2024).

Policy and Institutional Engagement: Yang et al. (2022) find that active involvement of tourism stakeholders in carbon reduction processes leads to tangible emission reductions in transport, construction, and supply chain sectors. According to Guix et al. (2024), strategic planning that emphasizes heritage, infrastructure, and visitors leads to better net-zero results.

Locally and Ecologically-based Solutions: Quan et al. (2025) found that the creation of ecotourism demonstration zones as a result of policy in China decreases carbon emissions from tourism greatly. As noted by McKinsey (2023), although currently costly, renewable energy sources, low-carbon fuels, and energy efficiency are all important. OECD (2025) suggests policy indicators, including carbon intensity, energy efficiency, and infrastructure development, as important factors.

Table 2. Net-zero strategies and adoption in the tourism industry.

Strategy	Implementing Actor	Effect / Outcome
Science-Based Target Setting (SBTi)	Tourism companies (hotels, tour operators)	Increased corporate commitment; clearer carbon reduction plans (WTTC, 2024)
Nature-Based Solutions & Offsetting	Companies, destination management	Long-term net-zero support through ecosystem protection (Jones, 2023)
Technology & Efficiency	Tourism enterprises	Reduced energy costs; improved energy efficiency (McKinsey, 2023)
Leadership & Strategic Planning	Destination Management Organizations (DMOs)	Strategic net-zero roadmaps; planning aligned with visitor profile and infrastructure (Guix et al., 2024)
Local Policy & Stakeholder Engagement	Governments, tourism offices	Policy-driven carbon reduction; low-carbon infrastructure (Yang et al., 2022)

Source: Created by the author.

A general overview of the major strategies for achieving net zero, as well as their effects, is provided in Table 2. As illustrated in Table 2, the scope of net zero strategies is very broad and includes approaches ranging from science-based targets to nature-based solutions, efficiency technologies, and leadership strategies. The following observations can be made from Table 2 about the net zero strategies and their adoption within the tourism sector: first, there are multiple players involved within the tourism sector, including tourism businesses, DMOs, and government agencies, and they each have different responsibilities regarding net zero strategy implementation.

Table 3. Environmental and economic impacts of net-zero strategies.

Impact Category	Findings	Source
Emission Reduction	Tourism sector carbon intensity shows declining trends	WTTC (2024)
Cost Savings & Efficiency	Energy-efficient technologies reduce operating costs	McKinsey (2023)
Governance & Strategic Strengthening	DMOs' leadership increases net-zero success	UQ Business School (2024)
Policy Alignment	Integration of local and national strategies into net-zero targets	OECD (2025)
Social Impact & Competitive Advantage	Net-zero commitments enhance destination attractiveness in sustainable markets	Jones (2023)

Source: Created by the author.

Looking at Table 3, we see how net-zero actions shape both environmental and financial outcomes across tourism. These approaches cut carbon output, boost energy performance, yet trim daily expenses - offering more than just ecological gains. Governance grows clearer under such frameworks, and planning becomes sharper because of long-term thinking built into operations. When regional rules match national goals, results tend to strengthen further through consistent direction. Commitments to zero emissions open doors to better community impact, often lifting a location's appeal among travelers who favor sustainability. Competitive edges emerge quietly, shaped by reputation rather than promotion.

5. Conclusion and Discussion

This paper explored past literature on routes to net zero, sourcing information from peer-reviewed academic studies, government policy documents, and industry reports. Travel emissions arise mainly due to air travel, hotel accommodation, and cruise vacations, while others, such as ground transportation and food services, have minimal contributions (Hall et al., 2015; Klein, 2011). While the extent may differ, several destinations and organizations strive toward achieving quantifiable climate goals, utilizing renewable energy sources, enhancing resource efficiency, using natural systems to capture carbon, and strengthening governance concerning emissions reductions (WTTC, 2024; Jones, 2023; Guix et al., 2025).

Based on these findings, some key takeaways arise. Accommodation providers and travel attractions can currently reduce their emissions via existing methods, whereas airlines and cruise ships will have to await future developments, such as sustainable aircraft fuels and low-emission vessels (McKinsey et al., 2025; Gössling & Humpe, 2020). The trajectory tends to follow leadership's involvement in an organization; effective oversight aids

in meeting net-zero objectives. The more that the tourism industry aligns its actions with local and national regulations, the higher its chances of success become (UQBS, 2024; OECD, 2025). There is also an ecological benefit from nature-based solutions and carbon compensation measures, but the question arises regarding their efficiency in practice and scalability (Jones, 2023; Quan & Wang, 2025). As one can see, future progress in this sphere will depend on coordinated actions. In order to make sure that it will be effective, not only should regulatory frameworks be created, but also funding opportunities should be provided (Limmeechokchai et al., 2023). The combination of innovation and organization leads firms to successful outcomes, especially when accompanied by inclusive communication. As time goes by, research on different destinations and tourism niches will yield interesting insights (Yang et al., 2022). It helps people understand the interactions between the ecological, economic, and social implications. Otherwise, there is a danger that important aspects may go unnoticed.

Author Contributions

Both authors approved the final manuscript.

Conflict of Interest

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References

Becken, S., & Hay, J. E. (2007). *Tourism and climate change: Risks and opportunities* (Vol. 1). Multilingual Matters. https://doi.org/10.21832/9781845410681

Giglio, V. J., Luiz, O. J., Chadwick, N. E., & Ferreira, C. E. (2018). Using an educational video-briefing to mitigate the ecological impacts of scuba diving. *Journal of Sustainable Tourism, 26*(5), 782-797. https://doi.org/10.1080/09669582.2017.1408636

Gössling, S., & Humpe, A. (2020). The global scale, distribution and growth of aviation: Implications for climate change. *Global Environmental Change*, *65*, 102194. https://doi.org/10.1016/j.gloenvcha.2020.102194

Gossling, S., Scott, D., & Hall, C. M. (2015). Tourism and water: Interactions, impacts and challenges. https://doi.org/10.4324/9780203072332

Guix, M., Babakhani, N., & Sun, Y. Y. (2025). Doing all we can? Destination management organizations' net-zero pledges and their decarbonization plans. *Journal of Sustainable Tourism*, *33*(8), 1730-1751. https://doi.org/10.1080/09669582.2024.2357377

Hall, C. M., Gössling, S., & Scott, D. (Eds.). (2015). *The Routledge handbook of tourism and sustainability* (Vol. 922). Abingdon: Routledge. https://doi.org/10.4324/9780203072332

Higham, J., Cohen, S. A., Cavaliere, C. T., Reis, A., & Finkler, W. (2016). Climate change, tourist air travel and radical emissions reduction. *Journal of Cleaner Production*, *111*, 336-347. https://doi.org/10.1016/j.jclepro.2014.10.100

Jones, P. (2023). Towards net-zero emissions in the global tourism industry. *Athens Journal of Tourism,10*(2), 125-136. https://www.athensjournals.gr/tourism/2022-5089-AJT-Jones-05.pdf

Klein, R. A. (2011). Responsible cruise tourism: Issues of cruise tourism and sustainability. *Journal of Hospitality and Tourism Management*, *18*(1), 107-116. https://doi.org/10.1375/jhtm.18.1.107

Lenzen, M., Sun, Y. Y., Faturay, F., Ting, Y. P., Geschke, A., & Malik, A. (2018). The carbon footprint of global tourism. *Nature climate change*, *8*(6), 522-528. https://doi.org/10.1038/s41558-018-0141-x

Limmeechokchai, B., Winyuchakrit, P., Pita, P., & Misila, P. (2023). Climate Change 2022: Climate Change 2022 Mitigation of Climate Change: Buildings. *International Journal of Building, Urban, Interior and Landscape Technology*, *21*(2), 61-69. https://doi.org/10.56261/built.v21.251490

McKinsey & Company, & Skift Research. (2022). Accelerating the transition to net-zero travel: Strategies for action. https://www.mckinsey.com/industries/travel-logistics-and-infrastructure/our-insights/accelerating-the-transition-to-net-zero-travel

Organisation for Economic Co-operation and Development. (2025). Strengthening the evidence base for a sustainable tourism future in Greece: A tailored set of sustainability indicators. OECD Tourism Papers, 2025/04. https://doi.org/10.1787/6e46e845-en

Quan, S., & Wang, F. (2025). Do ecotourism demonstration areas mitigate tourism carbon emissions in China?—A perspective based on quasi-natural experimentation. *Regional Science and Environmental Economics*, *2*(2), 9. https://doi.org/10.3390/rsee2020009

Scott, D., Hall, C. M., & Gössling, S. (2016). A review of the IPCC Fifth Assessment and implications for tourism sector climate resilience and decarbonization. *Journal of Sustainable Tourism*, *24*(1), 8-30. https://doi.org/10.1080/09669582.2015.1062021

University of Queensland Business School. (2024, December). Stronger leadership essential for tourism industry's net-zero transition. https://business.uq.edu.au/article/2024/12/stronger-leadership-essential-tourism-industrys-net-zero-transition

World Tourism Organization. (2020). *International tourism highlights, 2020 edition*. https://www.unwto.org

World Travel & Tourism Council (WTTC). (2021). *A Net Zero Roadmap for Travel & Tourism*. WTTC. https://wttc.org/sustainability/climate#:~:text=The%20first%20ever%20net%20zero,at%20COP26%20in%20Glasgow%2C%202021

WTTC. (2024). Significant surge in travel and tourism businesses' commitment to net-zero reveals WTTC roadmap. https://wttc.org/news/significant-surge-in-travel-and-tourism-businesses-commitment-to-net-zero-reveals-wttc-roadmap

Yang, S., Hao, Q., Wang, Y., & Zhang, C. (2022). Impact of the participation of the tourism sector on carbon emission reduction in the tourism industry. *Sustainability*, *14*(23), 15570. https://doi.org/10.3390/su142315570

Research on the Ecological Efficiency of the Application of Green Technologies in the Light Industry

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Abstract

In modern times, the application of green technologies in the light industry is of strategic importance in terms of both environmental protection and economic sustainability. As this industry is resource-intensive, increasing environmental efficiency has become a key goal. Research shows that the introduction of waste-free technologies in the production process significantly reduces the pressure on natural resources. The establishment of water recycling systems, especially in textile and leather processing enterprises, protects the ecological balance. Replacing chemical dyes with natural substitutes prevents pollution of soil and water bodies. The use of energy-efficient equipment allows us to minimize carbon emissions in production. The use of renewable sources such as solar and wind energy in enterprises is one of the key factors accelerating the green transition. Environmental efficiency also means more efficient use of raw materials and optimization of their specific gravity. The study found that circular economy models facilitate waste management in light industry. Producing new products from recycled fibers is both environmentally friendly and reduces costs. The application of digital technologies in the production chain helps to accurately calculate and prevent resource losses. Businesses that meet environmental standards have a more competitive position in international markets. Green technologies also create a more favorable environment for the health and safety of employees. The introduction of modern filtration systems dramatically reduces the amount of harmful gases emitted into the atmosphere. It is necessary to use modern monitoring methods to assess environmental efficiency. The improvement of the environmental rating of enterprises is an important factor attracting the attention of investors. The methods applied within the framework of the study revealed the real savings indicators of green technologies. Environmental control should be strengthened at all stages, from raw material procurement to the sale of finished products. The use of biodegradable packaging materials reduces the damage to the environment at the end-consumption stage. The introduction of innovative purification devices completely prevents heavy metals from mixing with water. Low-emission technologies are also an indicator of the social responsibility of an industrial enterprise. Proportionality must be maintained between increasing production volumes and managing environmental risks. Government support and green subsidies play a crucial role in the spread of these technologies. The adaptation of local businesses to international ISO 14001 standards improves environmental management. Research results prove that green investments provide high profitability in the long term. Economic growth must be achieved through ecological modernization, without harming the environment. Modern consumers are now increasingly preferring environmentally friendly brands. In light industry, environmental efficiency is not only a technological but also an ethical necessity.

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Future development strategies must be based on the principles of "green growth". Thus, the application of green technologies paves the way for a sustainable future by reducing the environmental footprint of industry. The analyses conducted once again confirm the importance of expanding reforms in this area.

Keywords: Light industry, Green technologies, Environmental efficiency, Circular economy, Resource saving

JEL Codes: Q01, Q56, R11, Z32

1. Introduction

In the modern world, the rapid development of the global economy has brought to the forefront the problems of depletion of natural resources and environmental pollution (Milli Prioritetlər, 2021; Məmmədov, 2022). As in all areas of human activity, preserving ecological balance in the industrial sector is no longer an option, but an absolute necessity (Rüstəmov, 2023). Light industry, especially textiles, clothing, and leather processing, occupies an important place in the world economy, but is also one of the sectors that has the greatest impact on the environment. Production processes in this area require the use of large amounts of water, energy, and chemicals, which increases environmental risks (Muthu, 2020). In the face of global climate change and the increase in natural disasters, radical changes in the operations of industrial enterprises are inevitable.

The concept of "green technologies" arose from this necessity and aims to minimize environmental damage at every stage of production. The application of green technologies in the light industry is based on the principles of efficient resource management and waste reduction (Gardetti & Larios-Francia, 2023). The application of these technologies is not only an ecological but also an important factor that increases the economic profitability of enterprises. In modern times, environmental standards adopted by international organizations and states impose new obligations on industrial sectors. Transitioning to clean technologies in the production chain is a key strategic path to reducing the carbon footprint (European Commission, 2022).

The relevance of the research is related to the scientific and practical justification of the transition from traditional production methods to sustainable models in light industrial enterprises. Recycling waste generated during raw material processing is the foundation of the circular economy. In an era where water resources are limited, it is vital to use water efficiently and establish closed-loop systems in the textile industry. The increase in the price of energy resources and stricter environmental requirements is pushing businesses to invest in energy-efficient equipment. Green technologies also protect both nature and human health by limiting the use of harmful chemicals.

Through innovative approaches, the biodegradable nature of the materials used in production further increases environmental efficiency. Digitalization and the integration of artificial intelligence into industry open up new opportunities to prevent resource losses. The study of environmental efficiency requires the creation of a new methodological framework for increasing the competitiveness of enterprises. Modern consumer behavior is also characterized by an increased demand for environmentally friendly products. In this regard, a green image of enterprises is a key condition for accessing international markets (Muthu, 2020).

The main goal of the research work is to comprehensively analyze the environmental and economic consequences of the application of green technologies in the light industry. The tasks set in this direction include assessing the current ecological situation and identifying ways to optimize it. Studying international experience creates the basis for the adaptation of green standards in local enterprises. "Green Growth" strategies implemented by the state are an important support mechanism for the sustainable development of industry. Establishing environmental management systems (e.g., ISO 14001) within an enterprise increases management effectiveness (Gardetti & Larios-Francia, 2023).

Scientific research shows that it is impossible to prevent the ecological crisis without technological innovations. Nanofilters and biological treatment methods applied in the light industry minimize the degree of pollution. Conducting environmental monitoring during the production process helps to identify potential risks in

advance. Diversifying the raw material base and increasing the share of recycled materials also reduces the industry's foreign dependence. The methodology applied within the framework of the study covers quantitative and qualitative indicators of environmental efficiency.

From a social perspective, green technologies create a healthier and safer environment in the workplace. The social responsibility of businesses is measured by their attitude towards the environment. The transformation of industrial sectors is inevitable in order to leave a clean environment for future generations. The current study combines theoretical and practical recommendations for the implementation of environmental innovations in light industry. Thus, green technologies are a universal tool for both ecosystem restoration and industry adaptation to modern requirements. Consistent reforms in this area serve to achieve the country's sustainable development goals. In conclusion, it can be noted that environmental efficiency is the most important criterion determining the future development vector of the light industry.

2. Relevance of the Topic

In modern times, the deepening global ecological crisis makes it inevitable to carry out radical reforms in the light industry, as in all industrial sectors. The rapid depletion of our planet's natural resources requires the introduction of new, cost-effective approaches to production processes. The light industry sector, especially the textile and leather processing industries, is one of the largest water consumers and chemical polluters in the world. In this regard, the implementation of green technologies is at the heart of the environmental protection strategy. Reducing carbon emissions has become a priority for every business in the fight against global warming and climate change. The issue of industrial waste management remains a pressing scientific problem both locally and internationally.

The modern consumer market no longer attaches great importance not only to price and quality, but also to the ecological origin of the product. Producing environmentally friendly products is a key way for businesses to gain an advantage in international competition. The world's leading brands are already embracing green technologies, transitioning to the concept of "sustainable fashion." Refusing the use of harmful chemicals in production is necessary to protect both the ecosystem and human health. The limited availability of energy resources and rising prices make the issue of energy efficiency an economic priority. The integration of renewable energy sources into the light industry reduces enterprises' dependence on external energy.

The goal of "A country with a clean environment and green growth" is specifically mentioned in the socio-economic development priorities of the Republic of Azerbaijan until 2030. This strategic line requires the ecological modernization of all industrial facilities operating in the country. Reusing water in closed-loop systems in enterprises is an important step in preventing the threat of water shortages. Establishing waste-free production models minimizes dependence on natural raw materials. Applying circular economy principles extends the life cycle of materials and prevents waste. The introduction of digital tracking systems to increase transparency in the production chain is a relevant innovation. Scientific research into environmental efficiency allows for the development of optimal development models for enterprises.

Investors now consider companies' ESG (Environmental, Social, and Governance) performance as a key criterion when making investment decisions. The process of adapting to international standards (ISO 14001, ISO 50001) accelerates the integration of local businesses into foreign markets (ISO, 2006; Standard, 2006). The application of green technologies leads to the optimization of production costs in the long term. In modern times, the main object of industrial ecology science and research is precisely technological innovations. The use of biomaterials and biodegradable fibers is leading to revolutionary changes in the textile industry. Precise allocation of resources with the help of artificial intelligence and robotics radically reduces waste.

The relevance of the research topic is also related to the need for environmental education and personnel training. Creating green jobs is a guarantee of social well-being and environmental security. Correctly calculating environmental performance indicators allows you to see the real state of the enterprise. Reducing the amount of harmful gases emitted into the atmosphere is essential to achieving global "Net Zero" goals. The green transition strategy of enterprises determines their sustainability in the coming decades. The use of innovative treatment

facilities in raw material processing prevents pollution of rivers and groundwater. The principle of decoupling economic growth from environmental damage is the main line of modern economics.

New generation technologies not only shorten production time but also reduce the environmental burden. The creation of ecological clusters in industrial zones makes resource exchange more efficient. Efficient use of local resources and promotion of recycling are strategic factors that reduce import dependence. Identifying gaps in the application of green technologies is the basis of scientific research. Green tax breaks implemented by the state encourage businesses to innovate. The development of environmental auditing services increases transparency and accountability in the industry. Recycling packaging materials into an environmentally friendly form reduces the burden on landfills.

The research work serves as a theoretical basis for the ecological transformation of the light industry. Replacing outdated and environmentally harmful equipment with modern technologies is a priority. Increasing environmental efficiency also means improving the internal management culture of the enterprise. The integration of education and science with industry paves the way for the real application of green innovations (Gardetti & Larios-Francia, 2023). Tightening environmental requirements in global supply chains make this topic vital for every exporter.

Consequently, it can be noted that the study of the application of green technologies in the light industry is of exceptional importance for the future of both the national economy and the global ecosystem. Every scientific research conducted on this topic is a real contribution to ensuring sustainable development.

The main goal of the research is to investigate the possibilities of applying green technologies in light industrial enterprises, assess the impact of these innovations on the environment, and develop scientific and practical mechanisms to increase environmental efficiency in production.

The object of the study is the production processes of light industrial enterprises, the resource management mechanisms used in these processes, and the interaction of the applied technologies with the environment. The research used a systematic approach, comparative analysis, statistical data interpretation, ecological monitoring, and mathematical modeling of resource efficiency.

3. Materials

The material base of the study is statistical data obtained from light industrial enterprises, environmental reports, and international standards for the application of green technologies. The main focus is on the efficiency of water, energy, and raw material use in the textile and leather processing sector. A product life cycle assessment (LCA) methodology in accordance with ISO 14040 and ISO 14044 standards was used in this study. This method allows us to calculate the environmental burden at all stages, from the extraction of raw materials to the disposal of the final product (ISO, 2006; Standard, 2006). Carbon emissions and wastewater composition in production areas were analyzed using modern digital sensors. The study also considered the technical characteristics of new generation equipment that saves resources as a material. The results of energy audits of local enterprises served as important material for analyzing the current situation.

4. Discussion

The main topic of discussion is the quantitative indicators of the differences between traditional production methods and green technologies. Analyses show that the application of nanotechnologies reduces water consumption in the textile dyeing process by an average of 40-50%. This is a crucial factor for the sustainability of the industry, especially in regions experiencing water scarcity. Another important issue for discussion is the neutralization of chemical waste through biological treatment facilities. Modern filtration systems are capable of removing 98% of heavy metals from water. When it comes to energy efficiency, automated control systems increase electricity savings to 30%. Businesses that use renewable energy sources can reduce their carbon footprint by 2,500 tons of CO_2 equivalent per year. Increasing the share of recycled polyester and other synthetic fibers in production optimizes raw material costs (Muthu, 2020).

The discussion of the circular economy model has particular importance as a future development vector for light industry. The transition of materials from the "produce-use-dispose" chain to the "produce-use-recycle" model is analyzed. Research shows that recovering and reusing slaughter waste as raw materials reduces raw material waste by 15%. Circulating water within a facility through closed-loop systems is the most obvious indicator of environmental efficiency. The discussions encourage the industrial use of renewable biomaterials (e.g. organic cotton, hemp fiber). These materials are biodegradable and thus prevent soil pollution in a natural way. A waste management strategy has a positive impact on the overall profitability of the enterprise. Eco-design principles ensure that a product is recyclable even at the design stage.

The return on investment (ROI) of green technology investments forms the economic part of the discussion. Assessments show that energy-efficient systems fully pay for themselves within an average of 3-5 years. The system of environmental taxes and subsidies is one of the main incentives that increases the interest of businesses in this field. Businesses with green certificates (e.g., Oeko-Tex) can sell products at a 20% higher price in European markets. From a social perspective, cleaning the work environment of toxic substances reduces occupational diseases by 60%. Employees' acquisition of green skills strengthens the innovation potential of the enterprise. Environmental efficiency is also considered an integral part of corporate social responsibility (CSR). Research results prove that customer loyalty to environmentally responsible brands is 1.5 times higher than that of others.

The challenges encountered in the implementation of green technologies also feature prominently in the discussions. The main obstacles are high initial investment costs and a lack of specialists. However, public-private partnership models can help share these financial burdens. Modular transition strategies are proposed to avoid production interruptions during technological upgrades. It is important to create industrial symbiosis centers that enable resource exchange between enterprises. The construction of joint treatment facilities at the regional level reduces costs for small and medium-sized enterprises. Every discussed solution must be carried out in parallel with the tightening of environmental regulations. Through Digital Twin technology, it is possible to simulate the results of the green transition in advance.

The results show that green technologies in the light industry are no longer a luxury, but a term of survival. The discussions highlight the need to improve the legislative framework in this area. Processing local raw materials using environmentally friendly methods strengthens economic security by reducing the share of imported components. In future research, studying the role of artificial intelligence in waste sorting has been identified as a promising direction. It is suggested to create a single national platform for continuous monitoring of environmental efficiency. Modern laboratory tests show that innovative materials are not inferior to traditional materials in terms of durability. Promoting green manufacturing also has a positive impact on the country's international image (European Commission, 2022). In conclusion, it can be noted that the materials obtained and the discussions conducted create a sufficient scientific basis for the "green" transformation of the industry. This transition process requires a multifaceted approach and close cooperation between all stakeholders. Table 1, given below, shows the application of green technologies in specific areas of the light industry and the benefits they create:

Table. Comparative analysis of green technologies in light industry sectors.

Industrial Area	**Applied Green Technology**	**The Impact of the Traditional Method**	**Ecological and Economical Benefit**
Textile Industry	Waterless dyeing (CO_2 technology) and digital printing	Excessive water consumption and chemical pollution	90% reduction in water consumption; saving on dyes
Clothing Production	Laser cutting and recycled fibers	Fabric waste and synthetic waste	15-20% reduction in material loss; optimization of raw material costs
Leather Processing	Plant-based tanning (Chromium-free technology)	Pollution of water with Heavy metals (Chromium)	Zero toxic waste; eco-friendly product certification
Shoe Industry	3D printing technology and biodegradable pallets	Adhesive fumes and non-polymer waste	Shortening the production chain, reducing carbon footprint by 30%
Sericulture and Wool	Ecological conditioning and natural cleaning	High energy consumption and harmful detergents	40% increase in energy efficiency; naturally preserving fiber quality

Key results taken from Table 1:

1. Resource efficiency: Raw material losses are minimized in all areas of the light industry.

2. Environmental compatibility: Harmful chemicals (especially in leather and textiles) are replaced with safe alternatives.

3. Competitive advantage: The "Green Production" label increases the company's ranking in the global market (for example, in the EU and US markets).

5. Conclusion and Future Directions

A study of the environmental efficiency of the application of green technologies in the light industry shows that a radical technological transformation in this area of industry is inevitable for both ecological balance and economic sustainability. Analyses prove that traditional production methods lead to excessive waste of resources and irreversible environmental pollution. During the study, it was found that the integration of green technologies significantly reduces the carbon footprint of enterprises. Especially in the textile industry, the application of water recycling and closed-loop systems provides revolutionary results in saving water resources. Replacing chemical dyes with biological alternatives minimizes toxic pollution of water bodies. The application of chromium-free tanning methods in leather processing plants ensures both environmental safety and protects the health of employees. Modern, energy-efficient equipment reduces production costs and strengthens the financial stability of the enterprise. The use of renewable energy sources is a strategic factor that reduces the energy dependence of industrial enterprises.

The application of principles of circular economy to industry allows waste to be revalued as a resource. The use of recycled materials reduces pressure on natural raw material extraction and serves to preserve biodiversity. Research shows that green innovations are not only environmentally friendly but also have high economic profitability. The compliance of enterprises with international environmental standards (ISO 14001) increases their competitiveness in global markets. Modern consumers increasingly prefer ethical and environmentally friendly products, which makes the concept of "green branding" relevant. The application of digital technologies and artificial intelligence helps reduce resource losses in production to zero. Increasing environmental efficiency also increases the social responsibility indicators of the enterprise.

The research work found that the state's "green growth" strategy creates new incentives for industrial enterprises. Green subsidies and tax breaks accelerate the technological innovation process of enterprises. The introduction of innovative treatment facilities dramatically reduces atmospheric emissions. Switching to biodegradable packaging materials eliminates the environmental damage caused by a product at the end of its life cycle. Industrial symbiosis models streamline resource exchange between enterprises. Ekoloji audit və monitorinq sistemləri istehsalatın hər bir mərhələsində şəffaflığı təmin edir. The methodology proposed as a result of the research allows for the prediction of environmental risks.

Economic analyses show that initial investments in green technologies yield high returns in the medium and long term. Saving resources reduces the cost of the product and leads to an increase in market share. The green transition also encourages the creation of new "green jobs" and the training of qualified personnel. The study proves that ecological modernization is closely linked to the digital transformation of industry. The use of nanofilters in production increases the degree of water purity up to 98%. Recycled polyester and other fibers serve to diversify raw materials in the textile industry. The LCA (Life Cycle Assessment) method applied for assessing environmental efficiency has been identified as the most effective tool (ISO, 2006; Standard, 2006).

Future development prospects require the industry to transition to a completely waste-free and carbon-neutral model. The role of scientific research and innovation is crucial in this transition process. Efficient use of the local raw material base strengthens the country's economic security. The creation of ecological clusters in industrial zones increases resource efficiency at the regional level. The research work forms a theoretical and practical basis for the ecological transformation of the light industry. The application of environmental management in the

internal management systems of enterprises optimizes the decision-making process. Green technologies make a real contribution to ecosystem restoration and the protection of natural capital.

In conclusion, it can be noted that the application of green technologies in the light industry is not just a technological innovation, but also an ethical obligation to future generations. The research results confirm the importance of further improving legislation and incentive mechanisms in this area. An increase in the green rating of enterprises increases their international investment attractiveness. Each "green" step in the production chain leads to an increase in overall environmental efficiency. Thus, the sustainable development of the light industry directly depends on the large-scale implementation of green technologies. The research provides concrete solutions to reduce the industry's environmental footprint. This strategic approach will play an important role in the country's achievement of global environmental goals. Ultimately, green technologies are the main driving force determining the future of the industry. All the provisions of the study can be considered a scientifically based roadmap for increasing the environmental efficiency of the light industry.

The novelty of the study lies in the comprehensive substantiation of the dependence between the application of green technologies and environmental efficiency in light industrial enterprises through mathematical and statistical models and the development of specific "green transition" indicators for local production conditions. At the same time, an innovative waste-free production methodology for integrating circular economy principles into the textile and leather processing sector was proposed for the first time within the framework of this study.

The applied significance of the research lies in the development of practical recommendations that minimize resource loss in light industrial enterprises, the introduction of production models in accordance with environmental standards, and the creation of a methodological basis for enterprises to increase their export potential by obtaining international "green" certificates.

The application of green technologies in the light industry directly serves to strategically reduce production costs and increase the overall profitability of the enterprise. Innovations focused on water and energy efficiency ensure lower costs, reducing utility costs by an average of 30-40%. Thanks to circular economy models, the recycling of raw materials and a waste-free production chain minimize dependence on expensive foreign raw material imports. Environmentally friendly production methods exempt businesses from heavy environmental fines and environmental remediation costs. Obtaining international environmental certificates (such as OEKO-TEX or ISO 14001) allows local products to be sold at higher prices in foreign markets and gain a competitive advantage. Green investments accelerate the return on investment by optimizing resource management in the long term. Automated resource tracking systems prevent economic losses by eliminating waste caused by the human factor. İstehsalatın ekoloji modernizasiyası müəssisənin ESG reytinqini yüksəldərək əlverişli şərtlərlə "yaşıl kredit" və investisiya cəlb etmək imkanlarını genişləndirir. Selling waste as raw materials to other industries within the framework of industrial symbiosis creates an additional source of income for the enterprise. Nəticə etibarilə, yaşıl texnologiyalar yüngül sənayedə dayanıqlı iqtisadi artımı təmin edən ən effektiv alətdir.

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Refrences

Azərbaycan Respublikasının 2030-cu ilə qədər sosial-iqtisadi inkişafa dair Milli Prioritetləri. (2021, February 2). Presidential Order of the Republic of Azerbaijan. Baku.

European Commission. (2022). EU strategy for sustainable and circular textiles. *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM (2022) 141 final*.

Gardetti, M. Á., & Larios-Francia, R. P. (Eds.). (2023). *Sustainability challenges in the fashion industry: Civilization crisis, decolonization, cultural legacy, and transitions*. Springer. https://doi.org/10.1007/978-981-99-0349-8

International Organization for Standardization. (2006). *Environmental management: life cycle assessment; Principles and Framework*. ISO.

Məmmədov, Q. Ş. (2022). *Azərbaycanda yaşıl iqtisadiyyatın inkişaf perspektivləri* [Prospects for the development of a green economy in Azerbaijan]. Elm.

Muthu, S. S. (2020). *Assessing the environmental impact of textiles and the clothing supply chain*. Woodhead publishing.

Rüstəmov, F.A. (2023). *Sənaye müəssisələrində ekoloji menecment və audit*. Ali məktəblər üçün dərslik. Bakı: "İqtisad Universiteti" nəşriyyatı

Standard, I. (2006). Environmental management-Life cycle assessment-Requirements and guidelines. *London: ISO*. https://www.iso.org/standard/76126.html

Future Development Trends in the Application of Virtual Reality (VR) Technologies in Construction Project Management

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Abstract

In the modern world, virtual technologies have found their application in various fields of activity, including construction. Virtual construction is the use of modern virtual and augmented reality technologies to create virtual models of buildings and facilities, which allows you to simulate and analyze construction and facility management processes at various stages, from design to operation. This approach helps increase the accuracy, efficiency, and quality of projects and reduce costs and risks. This approach helps increase the accuracy, efficiency, and quality of projects and reduce costs and risks. Improving the quality of life is also an important goal. Virtual construction helps to take into account the needs and interests of all stakeholders, which contributes to the formation of a more equitable and sustainable environment.

Keywords: Virtual reality, Construction, Project, Augmented reality, Simulation

JEL Codes: Q01, Q56, R11, Z32

1. Introduction

Virtual construction involves the use of various technologies to create virtual models of facilities and simulate construction and management processes at various stages of the facility's life cycle. This process may start from the creation of 3D models of objects that are correct due to the usage of special software like CAD or BIM, which enables creating accurate models of objects.

The potential for developing virtual construction is quite high. Alongside the growth of technologies and an increase in the amount of data that can be used, there will appear new ways to create more accurate models of construction works will appear. Among the most crucial directions here, one can mention enhancing visualization, i.e., developing more realistic textures and lighting, and working within virtual reality. Besides, there will also be a need for integration of virtual construction and other types of technology, especially artificial intelligence.

Also, the development of cloud technologies and the ability to work with data in real time are of enormous importance. This will improve collaboration between different teams and increase the efficiency of the construction process (isicad.ru. (n.d.).

2. Current Applications and Impact of Virtual Construction

The created model can then be used for various purposes, such as:

- Visualization (a virtual model can be used to create a realistic representation of an object and its environment) (Ponomareva et al., 2016; Ponomareva et al., 2019; Romanov, 2022).
- Simulation (using a virtual model, various construction and operation scenarios can be simulated);
- Project management (the virtual model can be used for project management at various stages of the

object's life cycle).

The main components of virtual construction are as follows:

1. Virtual reality (VR) is a technology that allows you to create virtual 3D models of objects and environments that can be interacted with in real time.
2. Augmented reality (AR) is a technology that allows virtual objects and information to be added to the real world via a smartphone camera or other devices.
3. Object modeling is the process of creating three-dimensional models of objects to be used in virtual construction.
4. Facility management is the use of virtual models to manage construction and operation processes at various stages of a facility's life cycle.
5. Designing is the creation of virtual projects of objects using special programs and technologies such as CAD (computer-aided design) and BIM (building information modeling).
6. Training is the use of virtual models of objects to train specialists in design, engineering, project management, and other areas of construction (Romanov, 2022; Gureev & Nagovitsyn, 2025).

Virtual construction has several advantages that can help improve the construction process. Some of the main advantages are the following:

Reduction in construction costs and duration: Virtual construction allows for more accurate and detailed work during the design phase, which reduces the number of errors and shortens the time spent on eliminating them during the construction process. This can also lead to reduced waste and material losses, ultimately lowering construction costs.

Improved visualization: Virtual construction helps create a more accurate and realistic visual representation of the future facility, allowing engineers to better imagine how the facility will look in real conditions.

Improved coordination: It creates more effective collaboration and interaction between the various project participants, reducing the likelihood of errors and conflicts.

Increasing security: It helps identify potentially hazardous situations on a construction site and develop safer work methods.

Increasing accuracy: Increases the accuracy of design and cost estimation.

Increased productivity: It reduces the time required to complete tasks on a construction site and increases the efficiency of resource use. This, in turn, increases the overall productivity of the construction company (Ponomareva et al., 2019; Softprom. (n.d.).

However, virtual construction also has a number of disadvantages:

High costs for training: Using virtual construction requires specific training and preparation, which can lead to high costs for skills updating and training.

Limited accuracy: Although it allows for the creation of highly detailed models, virtual Construction cannot completely replace real construction in many cases because there are situations where such factors as weather conditions or material reaction to loading cannot be predicted properly in the virtual world.

Fewer possibilities for change management: If something changes in the course of project implementation, there might be some extra work to do when changing the virtual model of the building under construction.

Less customer involvement: Although the concept is good as regards demonstrating various ideas, it is not always easy to transmit the atmosphere of the building.

Limited availability: Virtual construction requires special equipment and software that can be too costly for some enterprises.

Lack of interdepartmental cooperation: In the course of implementing a construction project, specialists from such areas as architecture, engineering, designing, and building participate in it, and all of them usually work with their own programs (Primenenie, opyt i perspektivy (n.d.); Gamma AR. (n.d.)).

Virtual construction may also be implemented to create models for the reconstruction of historic places, including the Colosseum in Rome, the Parthenon Temple in Athens, and the tomb of Tutankhamun. With the help of virtual construction, one can get an idea of how the buildings looked in the old days and get information about their structure and characteristics (Mordor Intelligence. (n.d.)).

New era of client interaction and AR in construction. Modern technologies of augmented reality (AR) change approaches to client interaction, providing the opportunity to use virtual constructions in order to present a project and discuss all details with the customer. AR technology makes it possible to overlay virtual images on the real world around us and create interactive 3D models of construction facilities.

Using AR, one may see the project in its real environment and make sure that everything will be built properly and in time. Moreover, in complex construction cases, it is important to provide a detailed demonstration of each element of a building.

Advantages of AR in comparison with traditional methods include better visualization and interaction opportunities. It is difficult to show the whole size of the facility or its place in the surrounding area through sketches; AR is preferable.

AR Applications by Animar Media. Animar Media has created several AR applications that show real-world examples of using AR for various purposes in construction, including educational. One of such applications includes augmented reality quest games to let users experience interactive quests (Mordor Intelligence. (n.d.); isicad.ru. (n.d.); Forum-100. (n.d.)).

Another useful tool created by Animar Media involves the visualization of repair processes. In this way, it becomes possible to let customers see how renovation works at their place. It is possible to visualize changes to the interior of the house, such as installing new windows, doors, walls, or floors. It allows interacting more effectively with customers and showing the result based on their preferences.

Using AR technology to increase sales. The usage of AR in construction allows for increasing sales and making clients more satisfied with their purchases. It is easier for clients to make decisions with the help of AR technology. AR's interactive visualizations give buyers a clear idea of the project, helping them better understand the impact of their choices on the final result. As a result, customer trust and satisfaction levels increase, brand loyalty is strengthened, and the likelihood of repeat purchases increases.

3. The Future of AR in Construction

In the future, AR is expected to further develop in the construction industry and provide more advanced solutions. Increasing the accuracy and realism of visualizations, as well as integration with technologies such as artificial intelligence and machine learning, is likely to lead to the creation of more dynamic and adaptive models. New trends may also include the use of AR to improve planning and construction processes, as well as to train and educate field professionals.

Virtual construction can also help achieve sustainable development goals in the construction industry. For example, reducing waste and minimizing environmental impact. It is possible to reduce energy consumption and greenhouse gas emissions by optimizing in the early stages of design. Improving the quality of life is also an important goal. It allows considering the interests and requirements of all stakeholders, thus helping to create a more balanced environment.

4. Conclusion

Therefore, virtual construction is an invaluable tool that will contribute to meeting different sustainable development objectives and plays a crucial role in the field of construction. All in all, the perspectives of virtual construction look very promising, and this technology can revolutionize many aspects of construction in the coming years. Hence, virtual construction is an invaluable tool for construction design at present, while it also has the potential to evolve in the future.

Augmented reality (AR) technologies are making new opportunities available in many areas, and the construction business is one of them. AR helps designers and construction businesses imagine future facilities in a real environment, while customers receive an unparalleled chance to "see" and assess a project prior to its implementation. The increasing role of AR in the construction field not only improves the efficiency of specialists but also revolutionizes the ways of interacting with clients. Construction businesses can make their presentations more vivid and effective, which makes a great contribution to the sales process of projects. AR technologies create new possibilities for construction businesses to establish more successful communication with their clients.

Author Contributions

Both authors contributed equally to this work and approved the final manuscript.

Conflict of Interest

The authors declare no conflicts of interest.

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References

isicad.ru. (n.d.). *Dopolnennaya realnost i perspektivy eye primeneniya v stroitelnoy otrasli*. Accessed [March 25, 2024]. https://isicad.ru/ru/articles.php?article_num=16724

Ponomareva, S. V., Vedernikova, E. V., & Gorlova, V. M. (2016). *Razvitie stroitel'noy otrasli Rossiyskoy Federatsii v krizisnoe vremya* [Development of the construction industry of the Russian Federation in times of crisis]. Kontentus, (1), 91–99.

Ponomareva, S. V., Zhigit, A. A., & Lashkin, S. A. (2019). *Modelirovanie riskov vliyayushchikh na nesvovremennoe zavershenie grazhdanskogo i promyshlennogo stroitel'stva v Rossiyskoy Federatsii* [Modeling risks affecting the untimely completion of civil and industrial construction in the Russian Federation]. Vestnik Altayskoy akademii ekonomiki i prava, (7-2), 82–90.

Romanov, I. V. (2022). *Ispol'zovanie virtual'noy real'nosti v proektirovanii stroitel'nykh ob''ektov* [The use of virtual reality in the design of construction objects]. Moscow: Nauchnaya kniga, 45–67.

Gureev, K. A., & Nagovitsyn, A. A. (2025). Integratsiya tekhnologiy virtual'noy i dopolnennoy real'nosti dlya proektirovaniya stroitel'nykh ob''ektov [Integration of virtual and augmented reality technologies for the design of construction objects]. *Prikladnye ekonomicheskie issledovaniya*, (1), 123–129.

Softprom. (n.d.). *Dopolnennaya realnost v stroitelstve*. Accessed [March 25, 2024]. https://softprom.com/ru/dopolnennaya-realnost-v-stroitelstve

Primenenie, opyt i perspektivy ispolzovaniya AR v stroitelstve. (n.d.). *Se7en*. Accessed [March 25, 2024]. https://se7en.ws/primenenie-opyt-i-perspektivy-ispolzovaniya-ar-v-stroitelstve/

Gamma AR. (n.d.). *BIM with AR*. Accessed [March 25, 2024]. https://gamma-ar.com/

Mordor Intelligence. (n.d.). *Анализ размера и доли рынка дополненной реальности — тенденции роста и прогнозы (2024–2029 гг.)*. Accessed [March 25, 2024]. https://www.mordorintelligence.com/ru/industry-reports/augmented-reality-market

Forum-100. (n.d.). *Virtualnoye stroitelstvo kak novyy metod voploshcheniya proektov v realnost*. Accessed [May 13, 2024]. https://forum-100.ru/

Mountain Tourism: Sustainable Development, Economic Impacts, and Ecological Challenges

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Abstract

Globalization finds expression in each sphere of economic activity, including tourism, which unites the production, trade, and services sectors, and more generally in the sphere of services, particularly international tourism. Ecotourism can be seen as a form of responsible tourism conducted in natural areas with the aim of preserving ecosystems, biodiversity, and the quality of life of local populations. The key features of ecotourism include environmental sustainability, social responsibility, and economic efficiency. In addition to guaranteeing effective utilization of natural resources, this kind of tourism supports the preservation of the environment. In theory, both agritourism and ecotourism play a significant role in the formation of the post-industrial economy. The growth of the service sector, urbanization, and environmental consciousness are regarded as the main drivers of the development of agritourism and ecotourism. Modern studies indicate that agritourism and ecotourism not only generate economic profits but also promote the development of social capital and environmental sustainability. Mountain tourism is one of the most rapidly growing branches of the global tourism industry. The mountain area has become the attraction of 9-16 percent of the international tourist flow. In addition, the tourism sector plays a significant role in generating jobs, providing incomes, and developing infrastructure in mountain areas. Nevertheless, issues such as ecosystem degradation, climate change, and resource overutilization may lead to the unsustainability of mountain tourism development. This article studies the economic, social, and environmental consequences of mountain tourism, sustainable development concepts, and management approaches. The findings demonstrate that with proper strategies, approaches, and management, sustainable mountain tourism development is achievable.

Keywords: Mountain tourism, Sustainable development, Ecotourism, Regional economy, Climate change

JEL Codes: Q01, Q56, R11, Z32

1. Introduction

Nowadays, tourism is one of the spheres with significant development tendencies, which are connected with employment, financial turnover, and commodity circulation, as well as with other spheres of the economy. It should be noted that tourism is among the fastest developing sectors of the multifunctional world economy, where all three sectors of the economy (industry, services, and commerce) are involved, and mountain tourism can be regarded as a part (WTO, 2022). Globalization is expressed in all sectors of the economy, such as tourism, and, moreover, in the sphere of services, which includes production, trade, and services, particularly in international tourism.

2. The Conceptual Framework of Ecotourism

Ecotourism is a type of tourism that is conducted responsibly and in natural territories to conserve the environment, preserve biodiversity, and improve the quality of life of residents. Environmental sustainability, social responsibility, and economic effectiveness are the main tenets of ecotourism. Such a type of tourism not only provides for rational resource management but also contributes to environmental protection.

From the theoretical point of view, agritourism and ecotourism are directly associated with the emergence of a postindustrial economy. The expansion of the service sector, accelerated urbanization, and increased environmental awareness are considered to be the main factors stimulating the development of these forms of tourism. Modern research shows that agritourism and ecotourism not only create economic benefits but also serve to form social capital and ensure ecological sustainability (Qafarov, 2019).

Tourism is one of the most dynamic sectors of the modern global economy, and mountain tourism is considered an important component of this system. Mountain areas are attractive destinations for tourists due to their natural landscape, biodiversity, clean air, and cultural heritage. Globally, mountain tourism accounts for approximately 9-16% of international tourist flows and attracts hundreds of millions of tourists. In recent decades, scientific research on mountain tourism has increased rapidly, and tourism development, sustainable management, and mountain destination models have emerged as key directions in this field.

Mountain tourism is an important tool for regional development, rural revitalization, and socio-economic transformation. However, unsustainable tourism management can lead to problems such as land use change, pollution, and damage to ecosystems. The aim of this article is to systematically analyze the economic, social, and environmental impacts of mountain tourism and identify key models for sustainable development. One of the types of tourism that mountain tourism is closely related to is ecological tourism.

Ecotourism is one of the fastest-growing sectors of the tourism industry. Its annual growth is estimated at 10-20% to 30%, and its income from international tourism reaches 10-15%. Ecotourism is the tourism niche that attracts the most interest from tourists. Ecotourism is travel to explore and enjoy natural and cultural tourist attractions that help conserve nature. Additionally, ecotourism ensures the active socio-economic participation of the local population and the benefit of the environment from this activity.

The following principles of ecotourism exist:

1. Ecotourism provides purposeful trips to wildlife to get in touch with nature.
2. Ecotourism is sometimes called "soft tourism" because it has minimal, if any, negative impact on the natural environment.
3. Ecotourism activities encourage tour operators and tourists to protect the natural environment and promote the socio-economic development of areas.
4. The development of ecotourism should be beneficial to the local population and should not conflict with their interests and socio-economic development.
5. Ecotourism, as an integral part of the tourism industry, plays a key role in protecting the natural environment and improving the living standards of the local population as a tourist activity in nature that produces and sells tourism products and makes a profit from them.
6. The main goals of ecotourism are environmental education, improving human relations with nature and culture, developing ethical standards of behavior in the natural environment, cultivating a sense of personal responsibility for the fate of nature and individual elements, as well as restoring a person's spiritual and physical strength, creating a natural environment that provides proper rest, etc (Rüstəmova et al., 2020).

Ecological tourism is considered one of the most relevant areas today. Today, the expansion of global problems related to natural resources in the world, the failure to effectively use the resources in the world's land and water areas, and, on the contrary, the pollution of water bodies and the disruption of the ecological balance as a result of erosion and depreciation in recreational areas related to the development of tourism have created serious problems

in the world economy and ecology in general. Implementing measures to develop environmental efficiency in the tourism sector, taking into account depreciation costs in tourism zones, and especially expanding the scale of ecotourism, are of particular priority.

In the 21st century, the global tourism industry has entered a phase of structural transformation, and the transition from traditional mass tourism models to sustainable, ecological, and community-based forms of tourism has accelerated. In this transformation process, agrotourism and ecotourism have emerged as the most dynamically developing areas of tourism (ADTA, 2020). In modern scientific literature, these types of tourism are evaluated not only as recreational activities but also as a means of regional economic development, social inclusion, and preservation of ecological balance (Əlirzayev, 2010).

Azerbaijan is one of the very few countries in the world that has managed to preserve its natural resources to this day. One of the main tasks facing the country today is to understand and assess the value of these resources and to adopt a literate approach to their use, which will serve to restore, increase, improve, and pass them on to future generations (OECD, 2022). The experience of countries around the world that carry out tourism activities related to the use of natural resources in any form shows that improper organization of the exploitation of these resources for recreational purposes leads to their erosion and destruction. Restoring those reserves requires a large amount of financial resources (Əsgərov, 2011).

3. The Essence of Mountain Tourism

Mountain tourism is a set of tourism activities carried out in specific geographical locations, such as mountainous and hilly areas. This type of tourism encompasses leisure, sports, health, and adventure tourism and is considered a form of nature-based tourism. From a theoretical perspective, agritourism and ecotourism are closely linked to the formation of a post-industrial economy. The expansion of the service sector, accelerated urbanization, and increased environmental awareness are considered to be the main factors stimulating the development of these forms of tourism. Modern research shows that agritourism and ecotourism not only create economic benefits but also serve to form social capital and ensure ecological sustainability (Lane et al., 2018).

3.1. Key Characteristics of Mountain Tourism

Mountain tourism is distinguished by the following characteristics:

- High ecological sensitivity;
- Seasonality (especially winter tourism);
- Difficult geographical conditions;
- High role of local communities;
- Commitment to nature and cultural heritage.

These characteristics distinguish mountain tourism from other types of tourism and require a special approach in management.

Mountain tourism is one of the important factors of regional economic development. Tourism infrastructure, the service sector, and investments increase economic activity in mountain regions.

- According to research, mountain tourism:
- Increases local employment;
- Leads to the creation of new businesses;
- Increases tourism revenues;
- Stimulates regional development.

Mountain tourism helps economic diversification and contributes to poverty reduction, especially in rural and remote areas. At the same time, tourism services (hotels, transportation, guides, gastronomy, etc.) create an economic multiplier effect and increase the social well-being of regions.

3.2. Social and Cultural Influences

Mountain tourism acts as a tool for social transformation for local communities. It contributes to the preservation of local culture, creates more jobs for residents, and hastens the construction of social amenities. Nevertheless, the swift expansion of the tourism industry may cause difficulties, including cultural conformity, modification of lifestyle patterns, and social conflicts.

4. Environmental Impacts and Risks

Mountain ecosystems are very fragile, and unsustainable tourism development leads to the following problems:

- Soil erosion
- Deforestation
- Water and soil pollution
- Increased waste
- Decreased biodiversity

Climate change is also a major risk for mountain tourism. Declining snow cover, melting glaciers, and extreme weather events are negatively impacting tourism seasons and economic stability. The sustainable mountain tourism model refers to the increase in the population living in urban areas as a result of urbanization and, as a result, the need for recreational travel by the urban population, at least on weekends, especially due to the high enthusiasm of people who previously lived in rural areas for nostalgia and ethno-tourism, which leads to various picnics, mountain climbing, communication with people living in mountainous areas, organization of trips in these areas, the healing, sports, entertainment, and cognitive functions of mountainous areas, cultural-historical research, modern expansion of the scale and types of travel under the influence of ethno, nostalgia, and other factors, and the beneficial use of these areas for tourism by future generations.

Sustainable mountain tourism aims to create a balance between economic development, environmental protection, and social well-being. Modern research highlights sustainability as a major research direction in mountain tourism.

Sustainability Principles:

- Efficient use of resources
- Protection of ecosystems
- Ensuring the participation of local communities
- Management of tourist flows
- Environmental education

Sustainable management mechanisms include:

- Ecotourism strategies
- Protected areas management
- Green infrastructure
- Sustainable tourism policies include

Studies show that mountain tourism creates long-term economic benefits when ecological and social balance is maintained.

5. Prospects of Mountain Tourism in Azerbaijan

The foundations for the development prospects of tourism in Azerbaijan were laid with the signing of the 1994 international contract, the “Contract of the Century”. Thus, this international agreement laid the foundation for successful business cooperation in our country and became the main means of its recognition in the world. After that period, the number of travelers to our country for business investment purposes and later for recreational

purposes began to increase rapidly every year. Our country's geographical location, favorable natural conditions for the tourism sector, biodiversity, and its proximity to the Greater Caucasus and Lesser Caucasus mountain ranges can be considered its main tourism resources. As we know, every traveler is interested in three main factors: Time, finance, and safety. It is precisely in our country that political stability, multicultural values, traditions of hospitality formed since ancient times, internal stability, the resolute will of the President of Azerbaijan in 2020, the "Iron Fist" of our army, the power of our martyrs and veterans, the magnificent victory of the state-people-army unity, which glorifies the valor of our martyrs and veterans, and the liberation of our native Karabakh from the enemy's clutches accelerated the solution of the main security-related problems, and then the successful anti-terrorist operations against separatists-terrorists in our native Khankendi ensured the restoration of the sovereignty of our country. Thus, the availability of tourist destinations for different tourist segments in terms of financial resources, the geographical location at the crossroads of Europe and Asia, which is easily accessible by plane in terms of time, and the above-mentioned issues in terms of security increase the attractiveness of our country for foreign tourists.

During the pandemic, the development of the economy, especially the service sector, has come to a complete halt almost all over the world, and some sectors have gone into decline. During this period, in our country, which has a socially oriented market economic system, the state implemented financial regulations to support the service sector, including tourism, and supported entrepreneurial activity to prevent layoffs. All these processes have led to positive changes in indicators in the tourism sector in the post-pandemic period. Azerbaijan's normal neighborly relations with neighboring countries, traditions of hospitality, geographical location, rich history in line with statehood traditions, a society with cultural and multicultural values, political stability, and flexible modern and bureaucratic organization of state administration, especially the implementation of the ASAN service model, are among the factors that make both inbound and outbound tourism favorable.

Table 1. Tourism Sector Indicators in Azerbaijan (2020-2024).

Indicators	2020	2021	2022	2023	2024
Travel Agencies & Tour Operators	300	150	240	300	381
Number of Received & Dispatched Tourists (Persons)	8,205	16,324	31,801	50,345	100,777
Gross Number of Employees (Persons)	1,464	962	1,268	1,698	2,132
Gross Income of Travel Agencies & Total Tour Operators	16,147.3	22,614.8	53,350.3	78,772.7	166,392.3

As can be seen from Table 1, as a result of the successful economic policy pursued by the Azerbaijani state, positive progress has been observed with specific indicators towards the self-recovery and development of the tourism sector in the post-pandemic period (ASTA). Thus, since 2022, the amount of income earned by tour operator companies, their personnel, and companies has been expressed in positive figures. During this period, an increase in the number of tourists arriving has also been observed. It is practically obvious that these indicators have increased under the influence of both socio-economic and political factors. Thus, the establishment of administrative concessions and direct financial allocations by the state to prevent layoffs and eliminate bankruptcy in the private sector during the pandemic prevented the closure of businesses, especially in the service sector, including tourism, and led to their development over time in the post-pandemic period. The tourism sector is among the fastest-growing sectors in the world, as it also encompasses extensive networks such as transportation, catering companies, and the hospitality industry.

6. Regional Development and Mountain Tourism

Mountain tourism plays an important role in regional planning. The development of infrastructure, the creation of tourist routes, and the expansion of protected areas increase the tourism potential. For example, in some countries, the development of mountain tourism is supported by the rehabilitation of roads, the marking of hiking trails, and the management of national parks. Mountain tourism creates a broader economic impact by integrating with rural tourism, agrotourism, and ecotourism.

The main purpose of tourism is recreation. In this regard, our country has broad prospects for mountain tourism. Both the Greater Caucasus and the Lesser Caucasus Mountains, the Talysh Mountains in the south, and the numerous cultural and historical sites and caves located in the mountains indicate the potential resources of this type of tourism in Azerbaijan (Əsgərov et al., 2011).

The main purpose of tourism is recreation. In this regard, our country has broad prospects for mountain tourism. Both the Greater Caucasus and the Lesser Caucasus Mountains, the Talysh Mountains in the south, and the numerous cultural and historical sites and caves located in the mountains indicate the potential resources of this type of tourism in Azerbaijan (Xaspoladova, 2022).

7. Key Destinations and Regional Highlights

One of our areas that attracts the attention of both domestic and foreign tourists for recreation and ethnotourism is Khinalı, the highest rural settlement in Europe. There are many recreational places in Guba in terms of travel time and distance. One of the famous places in Guba is the village of Khinalig (Figures 1, a & b). Khinalig is an interesting settlement located at an altitude of 2,350 meters above sea level and is considered one of the most suitable for ethnotourism. This tourist destination has a 5,000-year history. Geographically, it is 57 km southwest of Guba, and 14 km from the village is the Shah Plateau. There are caves in the area that are a suitable resource for speleotourism. Khinalig attracts the attention of both local and foreign tourists, especially in the spring and summer months.

(a) **(b)**

Figure 1. Khinalig village.

Qachrash village (Figure 2) is located 12 km from the district center in Guba and is considered one of the large villages with extensive travel opportunities and rich in elements of nature tourism. Qachrash is an interesting tourist zone, attracting the attention of domestic and foreign tourists with its mysterious landscapes and recreation centers. It is an area mainly surrounded by mysterious forest areas and rich in natural springs. Here, in the forest area, there are walnut, hazelnut, cranberry, hawthorn, rosehip, apple, pear, and sycamore trees, and Gudyalchay, which adds special beauty to this area and gives special pleasure to local and foreign tourists. Waterfalls further expand recreational opportunities in this area. This village offers recreational areas serving tourists, offering natural food and the famous samovar tea, as well as places for picnics. This is especially attractive to young people,

young families, and middle-aged people who come for recreation or want to stop along the way and continue their journey later. In terms of segmentation, it can be said that most segments of tourism market participants (in terms of age, gender, and financial status) can be seen here, especially in the spring and summer months, and sometimes in the fall and winter as well.

Figure 2. Qachrash, Guba.

The village of Tengealti is one of the recreational areas of Guba and means "place between the mountains." Located 33 km from the district center, this village boasts mysterious and beautiful landscapes. The Velvelachai River flows between two mountains, through magnificent cliffs and greenery, creating a fascinating landscape on the northern slope of the Greater Caucasus Mountains.

One of the examples of mountaineering culture in these areas is Afurca Waterfall, 42 km from the district center, 60 meters high, located on the slope of the Afurca Waterfall (Figure 3), a canyon-like valley formed by the Yan ridge of the Velvale River, and registered as a geological natural monument.

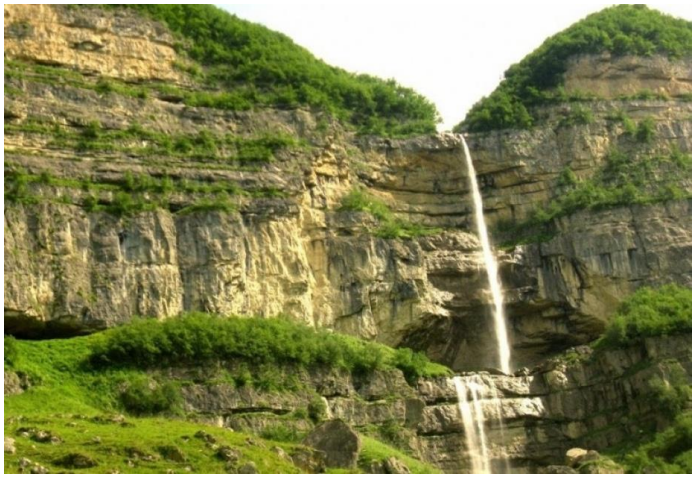

Figure 3. Afurca waterfall.

Lake Chanlibel, located approximately 14 km from the district center and reminiscent of the famous "Goygol" is an ideal area for recreation and photo and video shooting around the village of Nugedi, full of beautiful views. There are numerous tour flights for travelers who want to relax and enjoy the beauties of nature and travel away from the heavy traffic jams of the city on busy work weekends. There are public catering establishments around the lake, which allow visitors to combine gastronomic pleasure with the mysterious views of the lake. The Guba Khan Palace, also known as the "Shah Abbas Palace," is a historical and cultural architectural monument of the city and one of the city's most beautiful tourist attractions. The palace, which has attracted the interest of both local

and foreign tourists and has gained wide popularity with its three-century history since the 18th century, has become an indispensable tourist destination.

Azerbaijan, a multicultural and modern country, has been famous throughout the world for its traditions of hospitality since ancient times. The regions of our country, which have vast opportunities for gastronomic tourism, are rich in various customs and traditions, elements of hospitality, and delicious regional foods and drinks. The richness of Azerbaijani cuisine provides ample opportunities for tourists traveling to both the capital, Baku, and the regions to effectively utilize the potential opportunities of the gastronomic type of tourism. Thus, the Guba and Sheki regions are very famous for their sweets; the Zagatala-Balakan region for its dishes called "surhullu"; the western region for its pastry dishes, especially in the fall and winter months, with its delicious pilaf made from khangali, dovgasi, and rice; and our southern regions for their indispensable levangi and our Nakhchivan region for its govorma.

8. Conclusion

Studies show that interest in mountain tourism is growing day by day. Travel in this direction in Europe and America has become even more relevant since the beginning of the 20th century. In our country, the Caucasus and Lesser Caucasus Mountains are "encircled" by mountains in the south. The demographic situation is that there are more large cities in the entire market. This, combined with the bustling city life typical of all megacities, encourages the population to engage in recreational travel and nature tourism, especially to mountainous areas. On weekends and especially during holidays, the city population begins to flow into the regions. A large part of the mountainous areas located in Azerbaijan is rich in historical and cultural sites, ancient settlements, and caves that attract the attention of tourists. Speleotourism, i.e., cave tours, which are very popular in the European region today, can also be implemented in our country. There is a need to expand marketing research in this direction so that both domestic and foreign tourists can get to know these areas.

Thus, from the economic perspective of tourism, the potential opportunities are broad, with natural resources being the three main resource groups. In terms of the second main capital resource, although tourism companies spend money in this direction and earn income, attracting foreign investors or creating joint ventures can motivate further growth in income in this direction. To transform third-generation human resources into human capital in this direction, tourism specialties are taught in Azerbaijan at both bachelor's and master's degrees, and young doctoral students are also conducting scientific research at the doctoral level. Thus, taking into account the demands of the labor market, the Azerbaijani state supports students, both in state higher education institutions and in private higher education institutions (with high scores), where students are provided with education based on state orders.

We believe that, taking into account the reality that the modern urban lifestyle, where innovative technologies are being applied day by day, will increase the scale of urban residents' trips to rural areas, especially mountainous areas, and the expansion of our country's relations with countries around the world, especially friendly and allied countries of Azerbaijan, the mountainous areas, which are geographically located on the border of the Western and Eastern territories, rich in biodiversity and with 9 climate types, and which are eye-catching with their mysterious beauty, can be considered promising opportunities for the development of mountain tourism in mountainous areas where historical, ethnographic, and cultural tourism intersect, as well as nature tourism.

The Karabakh economic region is considered one of the promising development areas of Azerbaijan with its rich natural resources, favorable geographical location, and diverse landscape structure. The economic structure of the region allows for the formation of diversified types of activities. Tourism, which includes health, mountain, and recreational tourism, agriculture, industry, and the construction sector, as well as the mining industry, should be noted among the priority areas in this context. This will allow diversifying and ensuring the sustainable development of the regional economy (MERA).

The region of Karabakh is located in the southwestern part of the Lesser Caucasus mountainous zone and is characterized by great natural diversity. The forest resources of this territory are quite numerous, and their general

size is estimated at about 247 thousand hectares. Part of them belong to economically valuable tree and plant species that provide good potential for the development of the forestry sector, woodworking, and ecotourism.

Among the protected territories, one needs to highlight those created for the protection of natural diversity and ecosystems before the occupation. Of interest in this aspect is the Basitchay State Nature Reserve (Figure 4). The nature reserve is located on both banks of the river of the same name, in the region of Zangilan, with the aim of protecting rare plane trees (Platanus orientalis). Moreover, some of these trees are hundreds and even thousands of years old.

Figure 4. The Basitchay state nature reserve.

The reserve is situated on both banks of the Basitchay River in the territory of the Zangilan region with the objective of protecting rare Oriental plane trees (Platanus orientalis). Some of them are aged several hundreds or thousands of years and are regarded as an important part of the biodiversity of the country. The fertile soil, together with its flora and fauna elements, has been heavily damaged due to intentional fires and illegal deforestation. The damage to centuries-old Eastern plane trees is considered one of the greatest losses from the perspective of ecology and culture.

It is important to note that the economic revival of Karabakh should not be confined merely to the reconstruction of the country's infrastructure. The contemporary development paradigm should be compatible with ecological recovery and the implementation of the principles of the "green economy." The peculiar mountain landscape and presence of mineral springs facilitate the development of health and mountain tourism. On the other hand, the availability of rich soil resources makes it possible to develop agricultural, including horticultural, winemaking, and cattle raising sectors. Furthermore, the presence of mineral deposits may help to establish a strong industrial sector. Thus, the main principle of the development of Karabakh is the use of natural resources in a rational way, preservation of ecological balance, and socio-economic integration.

Several institutional actions are taken to create management procedures and perform a preliminary inventory of resources in the territories that were released from occupation. The monitoring involved such regions as Zangilan, Jabrayil, Gubadli, Khojavand, and Fuzuli. The primary aim of the mentioned activity is to estimate the present situation with regard to the available natural resources, identify the extent of environmental damage, and create relevant protection mechanisms and effective exploitation plans. It has been proven that the damage to not only natural ecosystems but also tangible and intangible cultural heritage elements, such as cemeteries, historical buildings, and other landmarks, has been made.

Author Contributions

The author was responsible for all aspects of the study, including conceptualization, methodology, data collection and analysis, and manuscript preparation.

Conflict of Interest

The author declares no conflicts of interest.

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References

Azerbaijan State Tourism Agency. (n.d.). Azərbaycanın turizm imkanları Qazaxıstanda sərgi çərçivəsində nümayiş olunur. https://tourism.gov.az/news/azerbaycanin-turizm-imkanlari-qazaxistanda-sergi-cherchivesinde-numayish-olunur

Azərbaycan Dövlət Turizm Agentliyi. (2020). *Aqroturizm fəaliyyətlərinin təşkili üzrə bələdçi kitabı*. Bakı, Azərbaycan.

Əlirzayev, Ə. Q. (2010). Turizmin iqtisadiyyatı və idarə edilməsi. *Bakı-2010. İqtisad*.

Əsgərov, Ə. T. (2011). *Ekoloji turizm: Dərs vəsaiti*. Bakı: Adiloğlu.

Əsgərov, Ə. T., Bilalov, B. Ə., & Gülalıyev, Ç. G. (2011). Ekoloji turizm. *Dərs vəsaiti, Bakı*.

Lane, B., & Kastenholz, E. (Eds.). (2018). *Rural tourism: new concepts, new research, new practice*. Routledge. https://doi.org/10.4324/9781315111865

Ministry of Economy of the Republic of Azerbaijan. (n.d.). İnvestisiya mühiti. https://economy.gov.az/az/page/iqtisadiyyat/investisiya/investisiya-muhiti

Organisation for Economic Co-operation and Development (2022). *OECD Tourism Trends and Policies 2022*.

Qafarov, N. C. (2019). Turizmin iqtisadiyyatı. Bakı: Kooperasiya nəşriyyatı.

Rüstəmova, S., Zeynalova, R., Azadəliyeva, G., & Nuriyeva, N. (2020). *Turizmin marketinqi və menecmenti*. Bakı: Elm və təhsil.

World Tourism Organization (2022). *International Tourism Highlights*

Xaspoladova, Ü. (2022, November 26). Kənd turizmi. *Azərbaycan* https://azerbaijan-news.az/az/posts/detail/kend-turizmi-1669423919

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