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Prospects and Directions for the Development of Ecotourism in the Context of Conservation of Biological Diversity

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Abstract

This article presents a comprehensive study of the economic aspects of ecotourism development within the context of biodiversity conservation. The significance of this study lies in the increasing global human pressure on ecosystems and the need to find sustainable management models capable of achieving economic benefits without compromising the environmental integrity of regions. The study aims to propose a system of economic mechanisms and management strategies that promote harmony between ecotourism development and biodiversity conservation. The methodological framework includes a literature review, a comparative geographical approach, cognitive modeling of socio-economic processes, and a scenario-based approach. The study analyzed various types of regions, ranging from mountainous and border areas to protected natural areas. The results showed that the effective development of ecotourism requires a shift from a comprehensive model to a more intensive one, based on service quality and visitor flow management. Key economic tools include differential pricing, the establishment of eco-clusters, the introduction of a public-private partnership mechanism for infrastructure financing, and a system of compensation payments and investments for ecosystem rehabilitation. Particular attention was given to the role of ecotourism in raising environmental awareness, which contributes to changing consumer demand and forms the basis for the sector's long-term sustainability. Based on the analysis, practical recommendations were made to improve the regulatory framework, promote responsible business practices, and develop effective regional strategies that balance economic and environmental priorities.

Keywords: Ecotourism, Biodiversity conservation, Economic mechanisms, Sustainable development, Recreational pressure, Environmental awareness, Tourism management

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1. Introduction

The current stage of socioeconomic development is characterized by an intensifying conflict between humanity's growing demand for recreational resources and the fragility of the natural systems that sustain them. At the same time, biological diversity, the foundation of biosphere stability and a source of enormous economic value in the form of ecosystem services, is under unprecedented threat. Therefore, the search for economic models that not only minimize damage but also promote the preservation and restoration of natural capital is becoming imperative. At the same time, ecotourism, conceptually focused on responsible travel to natural areas, appears to be one of the most promising forms of such symbiosis.

According to the definition approved by the International Ecotourism Association (TIES), ecotourism is defined as "responsible travel to natural areas that conserves the environment, supports the well-being of local people, and includes educational and outreach activities" involving all stakeholders, including personnel (The International Ecotourism Society, 2015). Thus, the key features of ecotourism should be the following:

- Developing tourist routes through natural landscapes in their pristine state, with maximum respect for natural and cultural sites and minimal anthropogenic interference;
- Protecting ecosystems and preserving local cultural traditions, customs, sites, etc.;
- Pursuing educational and awareness-raising goals;
- Promoting improved well-being of the local population;
- Fostering environmental awareness and responsibility.

2. Research Methods

In modern times, environmental protection, rational use of natural resources, and ensuring the socio-economic well-being of local communities are considered one of the main directions of sustainable development. In this regard, ecotourism is of strategic importance as a form of tourism based on nature, carried out without harming the ecological balance and aimed at strengthening the economic opportunities of the local population.

The main feature that distinguishes ecotourism from other types of tourism is that it promotes the interaction of people with nature and, in this process, is based on the principle of minimal impact on the cultural and ecological environment. This form of tourism is aimed at ensuring that tourists and tourism operators contribute to environmental protection, as well as to the socio-economic well-being of local communities. As a result, ecotourism is not only a means of environmental protection, but also an important element of the sustainable development of natural areas.

The strategic goal of ecotourism is to achieve sustainable development or to form practical mechanisms to achieve this goal. This approach includes, for example, issues such as reducing ecological footprints, directing the obtained economic resources to nature conservation, and raising environmental awareness among the population. In this context, Lindberg and colleagues present ecotourism in a more general form as “a type of sustainable tourism and recreation based on nature”. In their approach, the sustainability of tourism is associated with the creation of positive and lasting effects in the experience of tourists, along with balancing ecological, socio-cultural, and economic impacts.

The existence of numerous definitions of ecotourism shows that this field is still not fully systematized from a theoretical and practical point of view and is in a developmental stage. Therefore, in order for each definition to be considered comprehensive and complete, it is important that it reflects the fundamental principles that constitute the essence of ecotourism. These principles show that ecotourism is not only an activity focused on nature, but is also based on the integration of social, economic, and ecological aspects.

- Protection of the biological diversity of natural recreation areas;
- Increasing the level of economic sustainability of regions involved in the field of ecotourism;
- Improving the ecological culture of participants in ecotourism activities;
- Maintaining the ethnographic status of recreational areas.

As a result, one of the main features of ecotourism is that this form of tourism, while satisfying the need for people to interact with nature, aims to minimize negative impacts on the environment and cultural heritage. At the same time, tourists and tourism organizers participating in ecotourism activities are encouraged to actively contribute to environmental protection, as well as to the socio-economic development of local communities.

Ecotourism is today considered one of the main mechanisms contributing not only to the protection of nature, but also to the socio-economic development of surrounding areas at the global level. In most of the definitions of ecotourism presented in various sources, it is clearly seen that it is directly linked to sustainable development. The concept of sustainability in this context is understood, first of all, in the sense of ensuring an optimal and long-term balance between the ecological, socio-cultural, and economic impacts of tourism activities. In addition, the positive interaction and behavioral patterns of ecotourists among themselves also play an important role in maintaining this balance.

Thus, ecotourism is not only a type of recreational activity, but also an important tool that promotes the efficient and responsible use of natural resources, supports ecological balance, and regional sustainable

development. This approach shows that environmentally sustainable, economically efficient, and socio-culturally inclusive forms of tourism can be evaluated in the context of more sustainable tourism models.

For a better understanding of this type of tourism, the 10 rules of ecotourism formulated by TIES are as follows (The International Ecotourism Society, 2015):

- Remember that the Earth is fragile;
- Leave no trace behind, only take pictures;
- Learn about the environment you are in: the culture of the people, the geography;
- Respect the local population;
- Do not buy products from manufacturers who pose a threat to the environment;
- Travel only on well-trodden paths;
- Join environmental protection programs;
- Use environmental protection methods wherever possible;
- Maintain relationships with organizations that help protect the environment;
- Travel with the help of companies that support the principles of ecotourism.

Over the past 20 years, the demand for ecotourism has been growing at an average annual growth rate of 10–15%. The main reasons for this growth are shown in Figure 1.

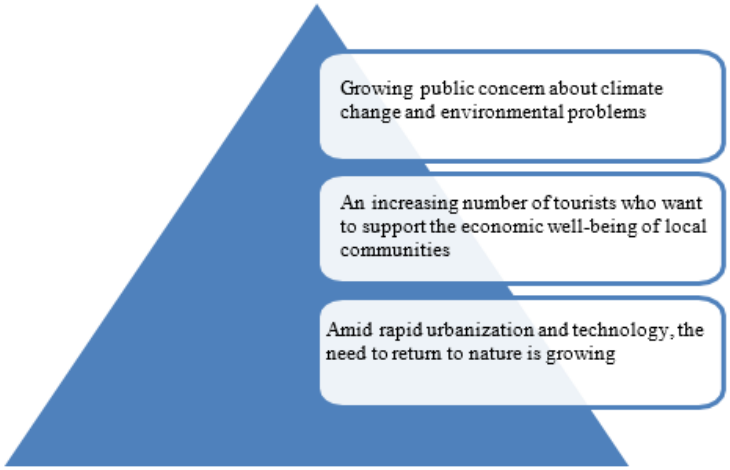

Figure 1. Factors leading to the development of ecotourism.

As can be seen from the figure, the development of ecotourism is influenced by the increasing public concern about climate change and environmental problems, the increasing number of tourists who want to support the economic well-being of local communities, and the increasing need to return to nature against the backdrop of rapid urbanization and technology.

As public interest in environmental problems has increased in recent years, ecotourism has become one of the most important directions of sustainable tourism. This form of tourism has become a relevant field on a global scale, based on the principle of protecting natural resources, improving the well-being of local communities, and minimizing environmental impact. In this study, the dynamics of the development of ecotourism on a global scale from 2015 to 2025 are reflected in the statistical indicators in Table 1.

Table 1. Dynamics of the development of ecotourism in 2015–2025.

Year	Tourist trips	The share of ecotourism	Note
2015	1.21 billion	90 million (7–8%)	The beginning of rapid development
2018	1.41 billion	150 million	Growth continues
2019	1.51 billion	170 million (>10%)	Highest levels
2020 (Pandemic)	400 million	40 million	74% reduction (UNWTO, 2022)
2021	500 million	60 million	Partial recovery
2023	1.31 billion	180 million	Post-pandemic growth
2024	1.41 billion	200 million	Development of new trends
2025	1.51 billion	230 million	Development of new trends

Source: Compiled by the authors based on the State Statistical Committee (2025).

As can be seen from the table, data for 2015–2025 show that ecotourism has increased in dynamics in the global tourism sector and is now forming not only as an alternative, but also as a direction of strategic importance (UN Tourism). Although a serious decline was observed during the pandemic, the recovery process accelerated in subsequent years, and forecasts for 2025 indicate that ecotourism will fully recover and exceed previous levels. These trends confirm that ecotourism will develop as a sustainable and priority area in future tourism models. In addition, the table below reflects the countries in which ecotourism is developing most regionally.

Table 2. Regional development dynamics of ecotourism.

Continent	Main countries	2015–2019	2020–2021	2022–2025
Asia	Nepal, India, Malaysia	Increase in Himalayan trekking routes	Closures due to the pandemic	Restoration digitalization
Europe	Switzerland, Norway, Germany	Green infrastructure development	Sharp decline in visitor numbers	Development with a green deal
Afrika	Kenya, Tanzania, Rwanda	Safari tourism is booming	Safari activity has stopped	Community-based recovery initiatives
North America	Canada, USA	Growth in the national park system	Access to parks is restricted	Carbon-neutral tours and service
South America	Costa Rica, Peru, Brazil	Rise in the Amazon and Andes	Visits to reserves have decreased	Eco-certified tourism growth
Australia & Oceania	Australia, New Zealand	Tourism growth around the Great Barrier Reef	Hard closure	The "Nature Positive Tourism" program is being implemented

Source: Compiled by the authors based on UN Tourism.

The indicators reflected in the table demonstrate that the ecotourism sector has gone through different stages of development on all continents during the period 2015–2025. During this period, the sector initially developed with stable growth dynamics, but in 2020–2021, it experienced a serious decline at the global level due to the impact of the COVID-19 pandemic. However, since 2022, it has been observed that the sector has begun a gradual recovery process and that the previous upward trends have gradually re-formed.

The following are the main basic principles of ecotourism (Tussyadiah et al., 2020):

- Protection of the biological richness and diversity of recreational natural areas;
- Increasing the economic sustainability of the regions where ecotourism is carried out;
- Implementing necessary measures to improve the cultures of participants engaged in ecotourism activities;
- Preservation of the ethnographic characteristics and status of recreational areas.

The above-mentioned basic principles of ecotourism can be illustrated in more detail through the following diagram.

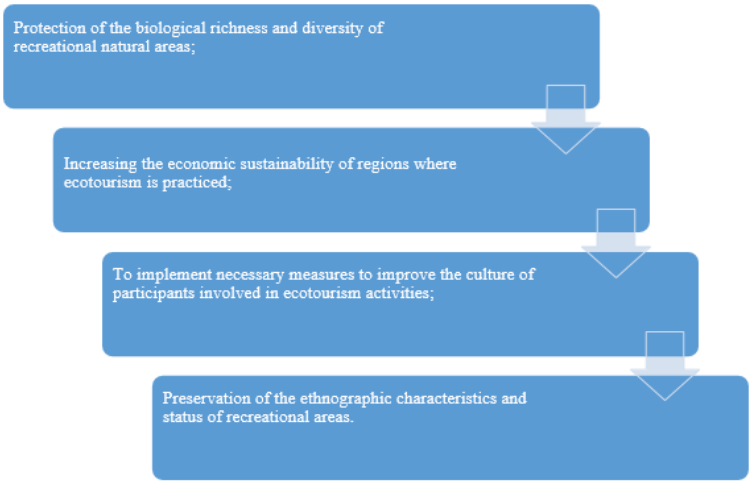

Figure 2. Basic principles of ecotourism.
Source: Compiled by the authors based on The International Ecotourism Society (2015).

At this stage, various regions have entered the recovery process with initiatives aimed at sustainability, for example, green infrastructure (Europe), community-based initiatives (Africa), carbon-neutral tours (North America), and digital innovations (Asia). These data show that ecotourism is no longer just an alternative form of tourism but has also become one of the main drivers of the strategic and sustainable development of global tourism.

In the Republic of Azerbaijan, several state programs, legislative initiatives, and local and international projects have been implemented over the last 15 years to develop ecotourism (ecotourism). The "Strategic Roadmap for the Development of the Specialized Tourism Industry in the Republic of Azerbaijan" was adopted by the decree dated December 6, 2016 (President of the Republic of Azerbaijan, 2016). The main provisions of this strategic roadmap are shown in Figure 3 below.

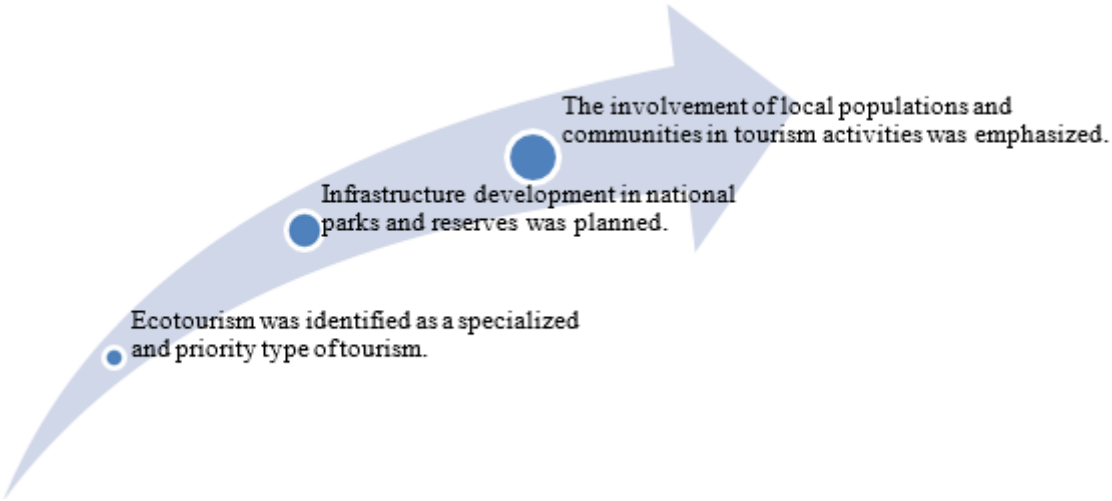

Figure 3. Strategic roadmap for the development of the specialized tourism industry in the Republic of Azerbaijan: main provisions of ecotourism.
Source: Compiled by the authors based on the President of the Republic of Azerbaijan (2016).

The points reflected in the visual material show that ecotourism is considered both an object of thematic specialization and a priority area for development at the national level. In this context, the improvement of the material and technical base of national parks and reserves, as well as the active involvement of local communities in tourism processes, are among the main target areas. Also, since 2003, 10 national parks have been established in Azerbaijan by the Ministry of Ecology and Natural Resources to develop ecotourism. National Parks are reflected in Table 3 below (Ministry of Ecology and Natural Resources).

Table 3. National Parks of the Republic of Azerbaijan.

Name	Location	Year of establishment	Total area, hectares
Absheron National Park	Baku, Khazar district	2005	783
White Lake National Park	Agjabedi, Beylagan district	2003	17.924
Goygol National Park	Dashkesan, Goranboy, and Goygol districts	2008	12.755
Shahdag National Park	Ismayilli, Gabala, Guba, Gusar, Oghuz, and Shamakhi districts	2006	130.508
Altiagach National Park	Khizi district	2004	11.035
Hirkan National Park	Lankaran and Astara districts	2004	40.358
Zangezur National Park is named after Academician Hasan Aliyev	Ordubad district	2003	42.797
Shirvan National Park	Gardagh, Salyan, and Neftchala districts	2003	54.374
Samur-Yalama National Park	Khachmaz district	2012	11.772
Gizilaghaj National Park	Lankaran, Masalli, and Neftchala districts	2018	99.060

Source: Compiled by the authors based on the State Statistical Committee (2025).

As can be seen from the table, the system of national parks, established to protect Azerbaijan's ecosystems and develop ecotourism, covers various natural and geographical regions of the country and has been formed consistently since 2003; currently, 10 main national parks operate in the country (Ministry of Ecology).

The Tourism Agency has developed new programs covering the years "State Program for the Development of Tourism (2022–2026)". The main measures are as follows (State Tourism Agency).

- Assessment of the ecotourism potential in Karabakh and East Zangezur;
- Digitization of ecological nature routes;
- Creation of community-based tourism support funds;
- State support mechanisms for green infrastructure.

The development of ecotourism in Azerbaijan has been carried out gradually and in stages. A model based on state policy, non-governmental initiatives, and the participation of local communities is being formed. This area is expected to expand further with the opening of the Karabakh region to tourism.

Environmental sustainability is reducing the impact of tourism activities on natural resources and ecosystems. It governs the principles of:

Resource conservation: The use and conservation of natural resources such as water, energy, and land. This can be achieved by reusing water in tourism facilities, increasing energy reserves, and using renewable energy sources.

Pollution reduction: The treatment of air, water, and land pollution, waste management, and recycling programs. For example, the principle of "reduce, reuse, recycle" is applied to reduce solid waste.

Biodiversity conservation: The maintenance of rare and endangered species and the protection of their habitats. This seeks to protect the biodiversity of these areas from being threatened by the creation of areas and the development of ecotourism activities in these areas.

Landscape conservation: The preservation of the aesthetic ecological value of natural and cultural landscapes. This requires the design of construction and infrastructure projects in an environmentally friendly manner.

3. Conclusion

Ecotourism possesses distinctive characteristics that should be clearly understood. After all, simply going to nature for the purpose of recreation is not ecotourism. The main criterion of ecotourism is the fact that it contributes to the preservation of wild nature and does not harm it. Organized streams of tourists are controlled and distributed in such a way as not to harm natural ecosystems. In addition, ecotourism contributes to education: it gives people information about natural objects, the animal and plant life of this area, shows the beauty of nature, and emphasizes the importance of its preservation, not because of imposed restrictions, but because of conscious motivational activity. Another important condition of ecotourism is the economic component; it increases the well-being of the local population, gives new jobs, and allows you to open a business based on sustainable nature management.

The most popular ecotourism is in specially protected natural territories (OOPT); an important reason for this is that the corresponding infrastructure is created on these lands, and ecological paths are laid.

Among the advantages of ecotourism, in our opinion, the following circumstances should be considered:

1. Ecotourism makes it possible to receive non-monetary income by means of increasing legal culture and legal awareness, ecological education and upbringing, understanding the need to preserve natural objects for future generations;
2. Ecotourism is carried out within the borders of specially protected natural territories, which allows concentrating efforts to preserve natural landscapes and natural resources;
3. Ecotourism provides the local population with the opportunity to get work and income from the sale of natural products produced by them, from the sale of handicrafts;

4. Organized ecotourism attracts a large number of tourists, which implies the development of tourist infrastructure and the attraction of financial investments.

The advantages of ecotourism stimulate the subjects of entrepreneurial activity to further develop and improve tourist services, to implement together with the local population projects to create new workplaces.

Ecotourism is an effective measure of ensuring the sustainable use of natural resources. The study of theoretical and practical problems of ecotourism allowed the formulation of proposals concerning the ways of their resolution through the functioning of specially protected natural territories, which realize the goals of the concept of sustainable development and provide a balance of ecological, economic, and social interests.

Ecotourism is a type of active recreation that helps visitors restore their physical and mental well-being. Thus, ecotourism has a clearly expressed recreational character.

Ecotrails and routes are the most visited objects of environmental and educational activities and educational tourism in state nature reserves and national parks.

Author Contributions

All authors approved the final manuscript.

Conflict of Interest

The authors declare no conflicts of interest.

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Azerbaijan's Food-Grade Wheat Sector: SWOT Analysis and Institutional Development Prospects

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Abstract

Food-grade wheat production is one of the strategic indicators characterizing Azerbaijan's food security. Milling wheat production reflects the quality of agrarian land relations and the effectiveness of state support in agriculture. The self-sufficiency level has remained at around 55% for a long time, suggesting that the limitations are not only associated with the size of arable land and natural resources. Land fragmentation, small farm sizes, water losses, inequality in access to quality seeds and agronomic services, limited coverage of agricultural insurance, and weak integration between production, processing, and logistics limit the expansion of domestic production. The aim of this study is to assess the sector using SWOT analysis, reconsider the results of the 1990s reforms in terms of modern development requirements, and propose an institutional model for the new stage. Voluntary land use consolidation, the Agricultural Land Bank, regional agricultural combines, a result-based subsidy model, risk-based agricultural insurance, the National Food-grade Wheat Council, double statistical accounting of wheat, the Agricultural Science Transfer Agency, and the application of the farmer income indicator are justified. The study proposes a sustainable self-sufficiency target of 70–75%, without making import substitution a goal in itself as a strategic direction.

Keywords: Milling wheat, Food security, Land consolidation, SWOT analysis, Agricultural Land Bank, Agricultural insurance, Result-based subsidy, Farmer income indicator

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1. Introduction

The issue of food-grade wheat should not be regarded merely as a sector-specific problem related to crop production. In countries where bread and flour products constitute staple foods, the stability of wheat supply directly affects food prices, foreign exchange expenditures, rural incomes, and national security. The volume of production, product quality, supply geography, strategic reserves, risk insurance, and the entire value-added chain should all be included within the scope of state policy.

According to the information presented at the meeting held on May 25, 2026, wheat production in the country was 1.573 million tons, imports were 1.267 million tons, and the self-sufficiency level was approximately 55% (Aliyev, 2026). The long-term stagnation observed despite subsidies, concessional financing, agroparks, leasing, agricultural insurance, and infrastructure investments suggests that the causes lie in the structure of the agricultural system, including land use, irrigation, seed production, risk management, agricultural science, procurement mechanisms, and public administration.

The reforms of the 1990s abolished the administrative model based on collective and state farms, strengthened the institution of private property, and created the legal framework for market relations. While the first phase of reforms addressed who owns the land, the modern phase must address what productivity, income, and social benefits the land generates. The new economic impetus to be given to the agricultural sector should be expressed not in the redistribution of property, but in the voluntary consolidation of land use, long-

term leasing, cooperation, contract production, and the integration of smallholders into large value-added chains.

As the author emphasized in his interview on the relationship between grain wheat and land, the modern problem is not so much about the physical volume of production, but about the efficiency of land use, technology, productivity, and competitiveness (Guliyev, 2026). In a previous interview on the topic of drought and water supply, it was noted that food security cannot be explained solely by climatic events, and that planning, land reclamation, and a lack of specialists also have a serious impact on the results (Guliyev, 2021a).

The State Program for 2026–2030 involves the transmission to an intensive production model, the development of irrigation, land consolidation, digitalization, and the modernization of agricultural science, including goals such as increasing productivity in specialized regions to approximately 50 quintals/hectare, expanding the areas covered by modern irrigation systems to 300,000 hectares, and implementing a pilot consolidation model on 20,000 hectares (State Program, 2026). Based on the research hypothesis, the main obstacle is not restricted to a complete shortage of resources, but also their organizational fragmentation and the incomplete transition from promoting general production to a thorough agrarian policy.

2. Literature Review and Theoretical-Methodological Approach

The relationship between farm size and productivity is not unambiguous. While small farms can more efficiently use family labor and local knowledge, large farms benefit from economies of scale in mechanization, financing, laboratory control, storage, insurance, and marketing. In grain production, the separate organization of combines, sowing equipment, irrigation equipment, insurance valuation, and elevator services for each farm increases average costs. Existing econometric estimates suggest a direct relationship between consolidation, access to technology, and productivity (Aliyev, 2025).

Protecting property rights and stimulating efficient land use are not contradictory goals. Institutional management should take into account the quality, fertility, intended purpose, and effectiveness of land use (Valiyev, 2020). The water problem is also determined not only by physical shortages, but also by accounting, tariffs, the condition of intra-farm networks, and the quality of management of water user associations (Fikratzade & Aliyev, 2022a; Rzayev, 2020).

The cluster approach shows that the integration of production, processing, service, and sales increases added value and reduces transaction costs (Guliyeva, 2022). An agro-industrial complex can be considered as a territorial-production model that combines seed production, technical support, laboratories, elevators, processing, credit, insurance, and sales into a single system. In an interview on the development of agroparks, the impact of modern irrigation, technological equipment, and diversified production on the sustainable development of regions was particularly emphasized (Guliyev, 2021b).

Agricultural insurance is one of the main institutions that allows separating the producer's individual risk from the state's budget risk and the bank's credit risk. In the face of climate change, drought, hail, floods, frost, disease, and price volatility, the uninsured subsidy system does not fully protect the producer from risk; on the contrary, it may reinforce the expectation that losses will always be compensated from the budget. Although the availability of agricultural insurance is considered a factor of stability for farmers, its coverage, risk mapping by product and region, digital confirmation of damage, and speed of insurance payment are of crucial importance (Guliyev, 2024b).

In addition to production volume, financial accessibility should also be considered while analyzing food security policies. The interview on the price of social breadth and its role in mass consumption suggests that the food grain policy is not only a question of farmers and producers, but also a social policy issue regarding real population income and their ability to access basic food commodities (Guliyev, 2024a). In this regard, it is important to measure farmer income and consumer accessibility in terms of the same policy framework.

The study introduces the SWOT methodology not as a simple list of factors, but as an analytical means which strategically connects strengths and weaknesses with opportunities and threats. Regulatory documents, scientific articles, reports of international organizations, official speeches, and interviews given by the author in various years are included in the research base of the article. The bibliography is developed only based on resources cited in the text.

3. The Real Economic Picture of the Sector

The total pool of resources, measured as the sum of domestic production and imports, accounts for approximately 2.84 million tons, indicating the share of domestic production is 55.4%, while imports are 44.6%. Because of the opportunity cost of land and water, 100% self-sufficiency may not be cost-effective in all situations. Nevertheless, the long-term stagnation of the share of domestic production exacerbates the country's risks to logistical, price, and geopolitical shocks. A self-sufficiency target of 70–75% would achieve a balance between domestic resilience and efficient resource use.

To reach the 70% level, assuming the total resource volume remains unchanged, domestic production would need to increase to approximately 1.988 million tons, 415,000 tons more than the current figure. At a productivity of 5 tons/hectare, the increase is equivalent to 83,000 hectares of highly productive area. A more rational way is to increase productivity on existing lands. Increasing productivity from 3.2 tons to 5 tons/hectare creates an additional 180,000 tons of product for every 100,000 hectares. The yield of approximately 5.8 tons/hectare on farms covered by the modern irrigation and food-grade wheat program is 8 tons higher than the national average (Mammadov, 2026).

Increasing the volume of wheat does not guarantee a reduction in import dependence if the product does not meet the requirements of the baking industry in terms of protein, vitreousness, moisture, and nature. State statistics should distinguish the total wheat harvest from the volume of certified grain wheat. The double-entry accounting system will allow us to assess not only production measured in tons, but also the real import substitution ability of domestic products in terms of quality.

Financial constraints hamper small and medium farmers' timely access to seeds, fertilizer, irrigation, and machinery. In the interview on simplifying access to agricultural finance, transparency of financial markets, risk reduction, digital technologies, and alignment with international standards were also assessed as conditions for agricultural competitiveness (Guliyev, 2025). When credit and insurance mechanisms are set up separately, the bank does not finance the risky farmer, and the farmer perceives the insurance premium as an additional cost. Combining credit, insurance, subsidy, and sales contract into a single project package can increase financial accessibility.

4. SWOT Analysis of the Sector and Strategic Interpretation of SWOT Results

SWOT analysis of the milling wheat sector in Azerbaijan is described in Table 1.

Table 1. SWOT analysis of the milling wheat sector in Azerbaijan.

Direction	Main elements
Strengths (S)	Grain-growing traditions; diversity of natural zones; state support; agroparks; storage capacity of approximately 1.9 million tons; digital platforms; subsidy and agrarian insurance infrastructure; potential of Karabakh and East Zangezur
Weaknesses (W)	Land fragmentation; dominance of small farms; water losses; unequal access to seeds, machinery, insurance and advisory services; weak linkages between production and processing; support mainly provided on a per-hectare basis; mixing of common and bread wheat in statistics
Opportunities (O)	State Program for 2026–2030; voluntary consolidation; Agricultural Land Bank; modern irrigation; regional agro-combinations; subsidies based on results and quality; index-based insurance; digital monitoring; new production zones
Threats (T)	Climate change; water scarcity; external price and logistics shocks; land degradation; rural-urban migration; monopolization; mispricing of insurance risks; violation of smallholder rights (FAO, 2021)

Source: Compiled by the authors.

Existing strengths create a solid foundation for scaling up successful technologies. Agroparks should become open service platforms for surrounding farmers, elevators should become independent quality classification centers, and the insurance system should become an institution for preventive risk management. The integration of land, crop, water, subsidy, insurance, and productivity data enables a shift to government support based on measurable results.

The sector's main weakness is the fragmentation of land. The fragmentation of fields makes the use of machinery, irrigation, laboratory analysis, insurance, and sales sharply more expensive. The lack of sufficient differentiation of purchase prices based on quality reduces interest in high-protein wheat production. The

disconnect between science, breeding, and production prevents a new variety from going all the way from zoning and reproduction to advisory support to the farmer.

Key opportunities relate to consolidation pilots, modern irrigation, outcome-based subsidies, and risk-based insurance. The value of pilot projects should be measured not only by the area covered, but also by testing contracts, revenue sharing formulas, insurance claim approvals, and dispute resolution mechanisms. Institutional safeguards require the establishment of protective institutions such as antitrust limits, transparent contracts, independent laboratories, fertility control, an insurance ombudsman, and the owner's right to withdraw from the contract.

5. Concept of Institutional Reforms

5.1. Single Coordination Center of Agrarian Policy

The functional transformation of the Ministry of Agriculture into the Ministry of Agrarian Policy and Food Security, or in a more concise form, the Ministry of Agrarian Policy, may be discussed. The reform aims not only to change the name, but also to consolidate responsibility for land, water, food balances, rural areas, processing, science, insurance, and farmer incomes into a unified policy center. The ministry's main success indicators should cover value added per hectare, yield per cubic meter of water, farmers' net income, share of insured acreage, share of quality wheat in total production, consolidated land use area, and additional output per manat of financial assistance

5.2. Agricultural Land Bank

The Agricultural Land Bank should be founded not as a classic credit institution, but as an intermediary, registrar, and guarantee institution for land use planning. Long-term leasehold should be registered by the bank; it should also ensure the voluntary transfer and consolidation of lands, formation of production groups, and provide for owners’ option of either fixed rents, rents in kind, or participating in the capital of the undertaking. The process of consolidation should expand use rights rather than ownership rights.

The Land Bank's digital platform can integrate land boundaries, fertility indicators, water supply, lease term, insurance history, financial assistance, and production outcomes. Initial and last soil fertility analysis, including an accelerated mediation mechanism for land-related conflicts, are important factors for reform. If bank operations fail to comply with transparency and self-determination, consolidation can become a cause of new concentration and social dissatisfaction.

5.3. Regional Agricultural Combines

The establishment of regional agro-combinations built on public-private-farmer partnerships can combine fragmented supply chains into a single value chain. Infrastructure and legal security are secured by the state, while the investor provides capital and management, and the farmers supply land, labor, and contractual obligations. The agro-industrial complex should contain a seed center, laboratories, a common equipment park, data-driven monitoring, an elevator, flour production, waste treatment, logistics, lending, and insurance.

Farmer’s property rights should be protected by legislation; it should also ensure transparent pricing, independent quality evaluation, revenue distribution mechanisms, and the right to withdraw from the contract. The agricultural cooperative should not be responsible for product purchase, quality assessment, and insurance compensation. To prevent conflicts of interest, independent accredited institutions should conduct laboratory and damage assessment processes.

5.4. Results-Based Subsidy Model

The current subsidy system should gradually transition to a results-based model. In the pilot phase, distribution should be conducted as follows: 30% of the support can be determined as a base portion, 50% as payment for productivity and quality indicators, while 20% is a bonus for water conservation, soil fertility protection, insurance, and digital accounting. Following pilot evaluation, the process of distribution ratios should be finalized (Fikratzade & Aliyev, 2022b).

Performance should not be measured solely in tons harvested per hectare. Quality class, use of certified seeds, access to official sales channels, yield per cubic meter of water, soil organic matter balance, availability

of insurance contracts, and increase in the farmer's net income should be evaluated together. Given the low initial capabilities of small farmers, they should be provided with non-monetary support, including access to machinery, discounted seeds, agronomic guidance, and training.

The budget burden in vulnerable territories can be eased by establishing a direct connection between subsidies and insurance. A minimum insurance requirement may be demanded to access a base subsidy, and protective measures, certified seeds, commitment to agrotechnical rules, irrigation schedules, and digital field logs can be taken into account for a further bonus. Insurance should not be seen as a pressure, but as a means to strengthen the link between state support and risk responsibility.

5.5. The New Role of Agricultural Insurance

Agricultural insurance should become an integral part of production decision-making, not an independent support mechanism in wheat policy. Division of croplands, uneven distribution of weather stations, and delays in damage assessment can threaten confidence in insurance. The reforms mainly involve the preparation of risk maps according to region and product, the application of satellite and drone data, electronic damage confirmation, standardization of payment terms, including the establishment of an independent complaint mechanism.

Furthermore, traditional non-life insurance, index-based products related to weather conditions, such as drought, temperature, or precipitation indicators, could be assessed. Even though the index model decreases administrative expenses, it poses the risk of an inconsistency between the farmer's real loss and the index result. The model will only be effective if there is a dense meteorological data network, a clear calculation methodology, and payment rules are explained to the farmer in advance. The relevant authorities should separately regulate reinsurance and public guarantee of catastrophe risks.

5.6. National Milling Wheat Council

The National Milling Wheat Council should unify government agencies, farmer associations, seed companies, mills, bread producers, the insurance sector, banks, and scientific organizations on a single platform. The Council must annually issue information on the wheat balance, need by quality class, regional production plan, import and reserve scenarios, price mechanism for public procurement, and insurance risks.

Double-entry statistical evaluation should contain data envisaging total harvested wheat and certified grain wheat separately. The first indicator will represent the physical output of agriculture, and the second indicator will represent the real food resource that meets the requirements of the flour and bakery industry. The statistical system must also record the product's quality class, moisture content, protein content, storage location, insurance status, and sales channel. Such a database will increase the objectivity of subsidy, procurement, reserve, and import decisions.

5.7. Agricultural Science Transfer Agency

The Agricultural Science Transfer Agency should coordinate production trials of varieties and technologies, demonstration farms, certification of advisory services, and projects in the “university-research institute-agro-industrial complex-farmer” model. The effectiveness of scientific activity should be assessed not by the number of publications, but by direct application, productivity, quality, water conservation, risk reduction, and revenue growth.

The agency's regional offices should provide farmers with a package of advice on soil analysis, seeding rates, plant protection, irrigation, insurance, and sales contracts. The results of state-funded research should be posted in an open electronic database, and the licensing of new varieties and technologies should be simplified. The transfer agency should accept the farmer's production results as the main final indicator, not the report of the scientific organization.

5.8. Farm Income Indicator

To measure the social impact of agricultural policy, a “farmer income indicator” should be calculated based on the ratio of the average net income of a farm to the average wage in the economy. The indicator should take into account the labor time, depreciation, loan interest, insurance premiums, and subsidy income

of family members working on the farm, not just one person. Calculating sales revenue alone can overstate a farmer's real well-being (FAO, 2023).

Publishing the farmer income indicator by region, farm size, and product will allow us to assess the economic causes of rural migration, the social impact of the subsidy model, and the fairness of income distribution among agro-combined enterprises. If farmer income does not grow against the backdrop of productivity increase, it is evident that added value is focused on other links in the chain. The steady income of rural families should also be seen as the success of agricultural policy along with tons of production.

6. Implementation Stages and Risk Management

The reforms are recommended to be conducted in stages. In 2026–2027, a regulatory and legal framework, a pilot model of the Agricultural Land Bank, an experiment on double-entry accounting of wheat, a result-based subsidy, and index-based insurance should be created. Risk maps should be developed for three major climatic zones during the same period, and the methodology of the farmer income indicator should be tested.

In 2028–2029, it is envisaged to launch at least three regional agro-combinations, expand consolidation areas, establish a regional network of the Agricultural Science Transfer Agency, and introduce KPIs for water productivity. After 2030, the country may establish a nationwide network of agro-combinations, economic passporting of lands, a shift to a superior position of result-based subsidies, and the annual balance sheets of the National Milling Wheat Council gaining legal status.

The risk of excessive land concentration should be limited by regional antitrust thresholds, disclosure of beneficiaries, and the farmer's right to withdraw from the contract. An insurance company, an agricultural enterprise, and a credit institution operating under the same beneficial control can cause conflicting interests. On the contrary, independent laboratories, insurance adjusters, and ombudsmen, as well as open contract standards, are preconditions for institutional trust.

Climate- and water-related risks should play a central role in crop allocation decisions, while strategic reserves should be managed and evaluated through digital systems that monitor stock quality, rotation, and the number of months of domestic demand they can cover. Agricultural insurance should not be viewed as a comprehensive solution for all potential losses. Instead, effective risk management should begin with preventive measures such as efficient water use, sound agronomic practices, high-quality seeds, production diversification, and contract-based marketing arrangements. Insurance should serve primarily as a mechanism for distributing the remaining risk that cannot be mitigated through these measures.

7. Conclusion

Wheat self-sufficiency has remained at approximately 55% over a long period, indicating that the problem is not only resource-driven, but more institutional in nature. Private property, resulting from the reforms during the 1990s, must acquire a new qualitative character, becoming the basis for highly productive, coverable, and profitable land use. Voluntary integration, long-term leases, cooperation, and agro-combinations facilitate economies of scale without the risk of land expropriation.

According to the SWOT analysis, essential state support, infrastructure, digital systems, and an agrarian insurance system co-occur with land fragmentation, water shortage, insufficient quality incentives, limited insurance coverage, and fragmented management. The 2026–2030 State Program offers new possibilities for the sector, but climate change, water shortage, land degradation, migration, and market concentration require social, environmental, insurance, and antitrust safeguards.

The proposed institutional model integrates the Ministry of Agrarian Policy and Food Security, the Agricultural Land Bank, regional agro-combinations, the results-based subsidy system, risk-based agricultural insurance, the National Milling Wheat Council, double-entry statistical accounting, the Agricultural Science Transfer Agency, and the farmer income indicator into a unified policy framework. All institutions should be aligned with their databases, performance indicators, and lines of responsibility.

It is possible to create an optimal balance between complete import substitution and uncontrolled foreign dependence. Extending cultivated areas while simultaneously increasing productivity, quality, water efficiency, insurance coverage, and farmers' income can help achieve the intended goal. The new phase of

agrarian reform should focus on restructuring land-use relations to ensure more efficient utilization of agricultural land while balancing private property rights, higher farmer incomes, and national food security, rather than merely redistributing land.

Author Contributions

All authors approved the final manuscript.

Conflict of Interest

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Government Control Mechanisms in Oil Revenue Management and International Experience

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Abstract

Oil revenues are the main source of revenue for many resource-rich countries and play a key role in economic development. However, effective management of oil revenues remains a major challenge due to risks associated with corruption, economic instability, and poor governance. This article examines government oversight of oil revenues and analyzes international experiences of selected oil-producing countries. The study highlights the importance of transparency, accountability, sovereign wealth funds, financial regulation, and independent oversight institutions to ensure a stable and effective management of oil revenues. The results show that strong governance structures and effective government oversight mechanisms contribute significantly to economic stability and long-term development. Effective government oversight of oil revenues is considered an essential part of financial management in resource-rich countries. International experience shows that a lack of transparency and accountability leads to financial instability, corruption, poor governance, and long-term economic instability. Countries that manage their oil revenues effectively, such as Norway, Chile, and Azerbaijan, rely on strong legal frameworks, independent oversight institutions, sovereign wealth funds, and strict fiscal rules. These tools ensure the use of resources in a planned, sustainable, and citizen-oriented manner. Global research by the IMF, the World Bank, and other international organizations shows that various governance mechanisms, including public accountability, parliamentary oversight, external audit, and rules-based investment policies, significantly reduce the risks associated with poor governance. Integrating these mechanisms into national systems strengthens fiscal discipline, improves transparency, builds public trust, and promotes long-term economic stability. Overall, international examples show that an effective oil revenue management system is essential not only for current financial stability but also for the well-being of future generations.

Keywords: Oil revenues, Government control, Sovereign wealth funds, Transparency, Accountability, Fiscal policy, Natural resource management

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1. Introduction

As a result of the reforms carried out in Azerbaijan, macroeconomic and financial stability have recently been achieved in the country, structural changes in the economy have increased, and suitable conditions have been created for the development of entrepreneurship (OECD, 2019). Consistent reforms have significantly contributed to the country's socio-economic development and improved public welfare. In the context of such rapid growth of our country's economy, the increase in the rate of use of fiscal capacities and the redirection of part of oil revenues to state infrastructure projects have had a positive impact on economic growth, employment growth, and the increase in incomes of the country's population. In particular, we should emphasize that the recent decline in oil prices over time and the fact that the peak of production has already passed have justified important analyses in fiscal policy. The current global economic environment and persistent fluctuations in oil prices require stronger fiscal discipline and more effective management of oil revenues. From this point of view, along with measures taken to provide a framework for fiscal policy and

save revenues from natural resources, determining the most appropriate level of oil revenue transfer to the state budget based on the current economic situation is an important issue. One of the most outstanding natural resources of our state is oil, and currently, important strategic plans are being implemented, and strategies and programs are being developed for the beneficial use of this resource (Aslanli & Ahmadov, 2026). That is, a large share of oil revenues is directed to the economic development of regions, the improvement of small and medium-sized enterprises, the increase in incentives, the prevention of poverty, and the resolution of other social issues. The economic, scientific and technical, financial, social, and personnel opportunities and infrastructure created in the early years of our economic independence have enabled our state to aim at achieving economic growth as a primary task, using the resources of economic growth as a resource, through the progress of the non-oil sector and human capital. All of this will create new qualitative differences in the driving forces and conditions of economic growth in our country (Table 1).

Table 1. Comparative analysis of government control mechanisms in oil revenue management.

Country	Sovereign Wealth Fund	Fiscal Rule Framework	Transparency Level (1–10)	Government Control Effectiveness (1–10)	Main Objective
Norway	Government Pension Fund Global	Structural budget rule	10	10	Long-term wealth preservation
Saudi Arabia	Public Investment Fund	Medium-term fiscal planning	7	8	Economic diversification
Azerbaijan	State Oil Fund (SOFAZ)	Oil revenue transfer limits	8	8	Macroeconomic stability
Kazakhstan	National Fund of Kazakhstan	Fiscal stabilization rule	7	7	Budget stabilization
United Arab Emirates	Abu Dhabi Investment Authority	Revenue allocation framework	8	9	Intergenerational savings

Source: Compiled by the authors.

Although special work has been carried out in the country to create a progressive and functional budget and financial control system, some problems remain in this direction. Currently, the existence of problems in the suitability, efficiency, and effectiveness of the financial control system within the country makes it necessary to rebuild and develop the system. The reasons that weaken the suitability of financial control over oil revenues include the lack of scientific foundations for the formation of this system, the lack of a database important for the organization of control, as well as the lack of sufficient attention to the issues of organizing financial control. From this point of view, it is very urgent to take legal, methodological, and organizational measures in a short time to resolve important problems of financial control.

The impact of oil revenues on the well-being of the population and living standards has always been a subject of interest in countries with oil revenues. The most well-known methods for the effective use of oil revenues are the “Permanent Income Hypothesis” (PIH) and “Bird in Hand” (BIH) (Friedman, 1957). The Permanent Income Hypothesis (PIH) is calculated in the following form (Ossowski et al., 2008):

$$Y(t) = A = r * NPV \text{ (oil revenues)}$$

where r is the profitability level of the Oil Fund. NPV (Net Present Value) is the country's net profit from oil production.

A is the tax collected by the state from the oil sector in the current year.

Control is considered a key part of the management system. Deviations from accepted standards, cases of non-compliance with legislation, holding responsible parties accountable, compensation for damage, and the implementation of effective measures to prevent such a situation from recurring. An important place in management is financial control, forecasting, and management. In order to implement financial control, different methods and forms of reviewing the financial bases of economic structures can be applied. This is considered one of the main functions of the state (Campagne et al., 2020). Financial control aims to prevent the misuse, embezzlement, and inefficient allocation of public financial resources. The main goal is to comply with the principle of legislation (Table 2).

Table 2. Assessment of government control instruments in oil revenue management.

Control Instrument	Implementation Rate (%)	Impact on Fiscal Stability (%)	Impact on Transparency (%)	Overall Effectiveness Score
Sovereign Wealth Funds	95.2	90.3	85.2	8.92
Fiscal Rules	82.0	88.3	70.1	8.02
Independent Auditing	76.0	65.3	92.5	7.82
Parliamentary Oversight	71.2	60.3	88.6	7.32
Digital Revenue Monitoring Systems	68.0	72.3	84.7	7.52
Public Disclosure Mechanisms	74.0	58.3	95.5	7.62

Source: Compiled by the authors.

Financial control over oil revenues is an important component of financial management. At a time when the economy is progressing, economic and social processes cannot regulate themselves and are constantly exposed to external influences. As a result, the state faces some difficulties in regulating economic processes. In order to solve such difficulties, it is necessary to apply a state control system. The most important of these types of control systems is considered to be financial control. Today, financial control over oil revenues is one of the main functions of budget management. Control is administrative, economic, or legal in nature. The main purpose of financial supervision of oil revenues is to ensure compliance with the principles of legality, expediency, and efficiency of executive management measures in the stages of development, distribution, and use of financial resources, their security, and expansion of implementation. According to foreign experience, the following rules are used in controlling the management of oil revenues and balancing the budget:

Budget balance rule: Current expenditure must equal income "in a cyclical manner"; the primary non-oil balance. This rule is applied in India, Ecuador, Mexico, Pakistan, Nigeria, Peru and Switzerland

Expenditure rule: There must be an absolute limit on total and current expenditure. Either from the expenditure growth approach or as a percentage of GDP. These rules are applied in Brazil, Botswana, Argentina, Israel, Costa Rica and Japan.

Debt rule: There is a limit on public debt as a percentage of GDP. These rules are applied in Australia, Argentina, Ecuador, Peru, New Zealand and Sri Lanka

Income rule: There are minimum and maximum limits on income entering the budget. These rules are applied in Mexico, Nigeria, Ghana and Timor-Leste.

Withdrawal/appropriation rule: There is a limit on the amount of money that may be withdrawn from the Fund's accumulated capital. These rules are highly valued and applied in countries rich in natural resources.

The importance of the oil and gas sector in the macroeconomic environment is determined by its share in GDP, state budget revenues, and foreign trade flows. The beneficial correlation of this share distribution in the economy is considered important for development.

2. Theoretical Framework of Oil Revenue Management

Oil revenue management refers to the processes through which governments collect, allocate, monitor, and invest income generated from petroleum resources (Ossowski et al., 2008). Effective management aims to maximize public benefits while minimizing economic distortions and governance risks (Cameron & Stanley, 2017).

The concept of the resource curse suggests that countries rich in natural resources often experience slower economic growth, weaker institutions, and higher levels of corruption than resource-poor countries (Gelb, 1988; Humphreys et al., 2007; Ross, 2012). To mitigate these risks, governments implement various control mechanisms designed to enhance fiscal discipline and ensure responsible resource governance (Table 3).

Table 3. Theoretical framework of oil revenue management.

Theoretical Approach	Key Concept	Main Assumptions	Implications for Oil Revenue Management
Resource Curse Theory	Abundant natural resources may hinder long-term economic development	Resource-dependent economies often experience weak institutions, corruption, and low diversification	Requires strong governance, transparency, and economic diversification policies
Permanent Income Hypothesis	Resource revenues should be distributed across generations	Natural resource wealth is finite and should support long-term welfare	Encourages the establishment of sovereign wealth funds and savings mechanisms
Dutch Disease Theory	Resource booms can negatively affect non-resource sectors	Increased resource exports lead to currency appreciation and reduced competitiveness	Supports policies aimed at economic diversification and stabilization
Fiscal Sustainability Theory	Public expenditures should be aligned with long-term revenue capacity	Excessive dependence on volatile oil revenues increases fiscal risks	Promotes fiscal rules, expenditure controls, and stabilization funds
Institutional Economics Theory	Strong institutions improve resource management outcomes	Governance quality determines the effectiveness of resource revenue allocation	Emphasizes accountability, transparency, and regulatory frameworks
Sustainable Development Theory	Resource wealth should contribute to long-term economic, social, and environmental goals	Economic growth must be balanced with social welfare and environmental protection	Supports investment in human capital, infrastructure, and sustainable development projects
Intergenerational Equity Theory	Future generations have equal rights to resource wealth	Resource extraction depletes non-renewable assets	Encourages long-term savings and strategic investment of oil revenues

Source: Compiled by the authors.

According to public finance theory, resource revenues should be managed in a manner that promotes intergenerational equity, macroeconomic stability, and sustainable development (Nakhle, 2017). This objective requires transparent budgeting processes, independent auditing systems, and long-term investment strategies.

The theoretical framework for oil revenue management combines economic, fiscal, and institutional dimensions. The “resource curse” highlights the risks associated with resource dependence, while the fixed income theory and the intergenerational equity theory emphasize the importance of long-term wealth management (Ossowski et al., 2008. Fiscal security and institutional economics emphasize the importance of governance mechanisms, whereas “Dutch disease” theory and sustainable development theory focus on economic diversification and balanced development (Corden, 1984). Together, these concepts provide a comprehensive framework for designing effective fuel cost-saving policies.

3. Government Control Mechanisms in Oil Revenue Management

As a result of the implementation of the policy of efficient use of hydrocarbon resources, the country's economy needs to achieve balanced economic and regional development by properly injecting oil and gas revenues, which are on an increasing trend, into the non-oil sector, and to optimally manage revenues. Currently, many oil countries use the model proposed by Friedman (1957) for the management of oil revenues (Permanent Income Hypothesis). According to this model, the limit of oil revenues that can be spent each year is determined. The remaining revenues are directed to the reserve fund. The said model is based on net financial assets and current oil revenues. There is another rule for the use of oil revenues - the Bird-in-hand rule. According to this rule, oil revenues are converted into financial and other assets and stored, and only the revenues obtained from the management of these assets are used. The said rule is generally accepted as the most conservative rule and tends to limit the use of oil revenues in particular. L. Ghalayini, in his study on the analysis of the relationship between oil prices and economic growth, correctly notes that the volatility of oil prices has a serious impact on the economic activity of both crude oil exporting (oil countries) and importing countries. This is also characterized by changes in real demand and supply (Table 4).

Table 4. Government control mechanisms in oil revenue management.

Control Mechanism	Primary Objective	Expected Outcome
Sovereign Wealth Funds	Accumulation and preservation of oil revenues	Long-term fiscal sustainability
Fiscal Rules	Regulation of public spending and revenue allocation	Reduced budget volatility
Independent Auditing	Monitoring the use of oil revenues	Increased transparency and accountability
Parliamentary Oversight	Democratic control of resource management	Improved governance quality
Digital Monitoring Systems	Real-time tracking of financial flows	Enhanced efficiency and reduced corruption risks

Source: Compiled by the authors.

The success of oil revenue management depends largely on the integration of fiscal policies, transparency mechanisms, and institutional oversight (Nakhle, 2017). Countries that combine sovereign wealth funds with strong accountability mechanisms tend to be more successful in mitigating the negative impacts of oil price volatility and resource dependence.

At the same time, A. Khayati, based on his empirical analysis, proves in his study that economic diversification, capital efficiency, labor productivity, and a competitive economy are of great importance for oil countries. The creation of a fiscal model of the use of oil revenues (The World Bank: Petroleum fiscal modelling) is necessary for the efficient use and management of these revenues (Campagne et al., 2020). This model has three main objectives:

1. Modeling the results obtained during the analysis of fiscal policy;
2. Regular monitoring of the movement of funds;
3. Correct forecasting of revenues and optimal implementation of fiscal planning.

In terms of optimal and efficient use of oil revenues, the model known as the Norwegian model in the international arena is currently of interest to many countries rich in natural resources. In general, the mentioned model is known for several positive aspects (OECD, 2019):

1. According to the legislation of the current Norwegian state, the exploited natural resources belong unconditionally to the people, and the legitimate interests and rights of the people related to the resources are protected by law and regulated within the framework of the law.
2. The state has always taken a conservative approach to the problem of using oil money, and a small part of the current financial needs has been compensated by oil revenues. Oil revenues are mostly accumulated in funds and sterilized.
3. A special monitoring system has been created for oil and gas production, transportation, and use of revenues, and the policy of using natural resources is mainly focused on the optimal and fair distribution of income between generations.

As can be seen from the prepared graph, there is a direct correlation between GDP and the oil sector. Thus, GDP growth over the years has increased in parallel with the oil sector. This means that the dependence of the Azerbaijani economy on oil revenues has not yet been completely eliminated (Aslanli & Ahmadov, 2026). However, in recent years, considerable work has been done in this direction (replacing the oil sector with the non-oil sector)

Government governance mechanisms for oil revenue management refer to the institutional, legal, fiscal, and administrative arrangements used by countries to manage the collection, distribution, investment, and management of oil sector revenues (Cameron & Stanley, 2017). These mechanisms typically include national economic finance, monetary policies, state-owned oil companies, monitoring agencies, transparency policies, and public spending controls. Their main goal is to make oil revenues more sustainable for the economy while at the same time minimizing the negative effects of resource dependence (Table 5).

Table 5. SWOT analysis of government control mechanisms in oil revenue management.

Strengths	Weaknesses
Macroeconomic Stabilization: Government-controlled stabilization funds and fiscal rules help smooth revenue fluctuations caused by volatile oil prices, reducing economic instability.	Bureaucratic Inefficiency: Extensive government involvement may result in administrative delays, excessive regulation, and reduced operational flexibility.
Protection of National Interests: State oversight ensures that strategic natural resources are managed in accordance with national development priorities and public welfare objectives.	Political Interference: Oil revenue allocation may be influenced by short-term political considerations rather than long-term economic efficiency.
Long-Term Development Planning: Oil revenues can be directed toward infrastructure development, education, healthcare, and economic diversification initiatives.	Limited Transparency: In countries with weak governance structures, control mechanisms may lack accountability and public oversight.
Intergenerational Wealth Preservation: Sovereign wealth funds enable governments to save and invest resource revenues for future generations.	Dependence on Institutional Quality: The effectiveness of control mechanisms largely depends on the strength of public institutions and governance frameworks (Mehlum et al., 2006).
Enhanced Fiscal Discipline: Clearly defined revenue management rules can prevent excessive public spending and fiscal imbalances.	High Administrative Costs: Establishing and maintaining monitoring, auditing, and regulatory systems requires substantial financial and human resources.
Opportunities	Threats
Economic Diversification: Oil revenues can be strategically invested in non-oil sectors, reducing dependence on hydrocarbon exports.	Oil Price Volatility: Sudden declines in global oil prices can undermine government revenues and fiscal sustainability (Ross, 2012).
Digital Transformation: The adoption of digital governance tools, blockchain technologies, and automated auditing systems can improve transparency and efficiency.	Corruption and Rent-Seeking Behavior: Large resource rents may encourage misuse of public funds and weaken governance institutions.

Source: Compiled by the authors.

The SWOT analysis shows that government-led approaches to oil revenue management have great potential to promote macroeconomic stability, fiscal sustainability, and long-term development. However, their success depends largely on the quality of institutions, transparency, and accountability (Nakhle, 2017). While these policies present opportunities for economic diversification and the preservation of intergenerational wealth, they also face significant threats from volatile energy markets, corruption, political instability, and the global shift to renewable energy. Therefore, the success of oil revenue management depends not only on national governance but also on the strength and effectiveness of the institutions responsible for its management.

Confidently continuing the policy it has set in the field of using oil revenues in recent years, Azerbaijan has taken a serious approach to the issues of efficient management of revenues in the oil sector and ensuring transparency. The creation of the State Oil Fund in our country mainly aims to solve the following issues:

- Preventing an inappropriate increase in the real exchange rate of the country's currency;
- Achieving fiscal (financial) discipline and sustainability;
- Fiscal stabilization;
- Ensuring savings for many economic and social purposes, etc.

In our opinion, countries that provide high specialization in the world arena, increase and apply production technologies, innovation potential, and develop areas that can create sustainable added value will be able to be competitive at the regional and global levels. In order to ensure macroeconomic and fiscal sustainability for Azerbaijan, effective budget management and its coordination with the organization of a result-oriented budget, ensuring the optimality of state expenditures, rational use of oil revenues, and reducing the dependence of budget revenues on oil price fluctuations remain relevant. A simplified econometric specification can be expressed as:

$$FS = \beta_0 + \beta_1 IQ + \beta_2 SWF - \beta_3 ORV - \beta_4 CP + \varepsilon$$

Where:

FS = Fiscal Stability
B_0 = constant term
ε = error term

Expected coefficient signs:

$B_1>0$ (institutions improve stability)
$B_2>0$ (sovereign funds improve stability)
$B_3>0$ (volatility reduces stability)

The correlation analysis shows that the effectiveness of government regulatory mechanisms in managing oil revenues is closely related to the quality of institutions and the level of corruption. State-owned assets and strong institutions significantly improve fiscal stability and economic diversification, while volatility and corruption create negative relationships that exacerbate the risks associated with resource-dependent economies.

The experience of oil countries proves that positive results can be achieved if oil revenues are spent by the state mainly for three purposes:

- Development of human capital;
- Major infrastructure projects of national importance;
- Ensuring a favorable micro and macroeconomic environment in the country.

Diversification of the economy in Azerbaijan, especially the redirection of oil revenues mainly to the non-oil sector, will serve to achieve the following economic goals:

- Reducing the dependence of the state budget on oil revenues in the long term;
- Achieving sustainable and sustainable economic development in the economic sphere, initially through the intensive expansion of the non-oil sector, including the non-oil industry;
- Supporting socio-economic development in the regions, ensuring employment;
- Creating a basis for diversification of the economy;
- Increasing the weight of the non-oil factor in the country's GDP and increasing the share of non-oil revenues in the state budget revenues;
- Ensuring the application of innovative production methods in the non-oil sector and achieving fundamental structural changes in the economy;
- Increasing export potential, taking a worthy place for competitive Azerbaijani products in the international arena.

Ensuring long-term sustainable economic development, forming a knowledge economy, and accelerating the production of competitive products through the expansion of science-intensive technology and innovative activities are of great importance. It is advisable to ensure the application of innovative production methods in the non-oil sector and achieve fundamental structural changes in the economy, as well as to ensure the stimulation of the technological and intellectual base of the economy through state budget expenditures.

Developing human capital by training qualified and professional personnel and improving scientific infrastructure, and modernizing the material and technical base of science are the main conditions for a modern competitive economy. We believe that the transformation of oil capital into human capital should always be kept in the spotlight, and the allocation of funds from the state budget or SOFAZ for this direction should be ensured regularly (NRGI, 2013).

When preparing the state budget for each year, it is advisable to increase the expenditure only by the increasing part of tax revenues and at the expense of revenues from the management of the assets of the State Oil Fund. It should be noted that this system is currently used in many advanced oil countries. The Republic of Azerbaijan should also switch to this system after the country has established a solid infrastructure for the economy and several existing social problems have been resolved, especially after the return of liberated lands has been ensured, as well as after the development of the non-oil sector and the reduction of the weight of oil revenues in budget revenues. It is also considered advisable to use transfers to the state budget only for financing targeted state programs. One of the important aspects of reforms in the budget process should be strengthening public participation and transparency. In advanced countries of the world, special importance is attached to such reforms. The requirement and provision of budget transparency in the management of public finances is considered one of the most important achievements of budget policy in the world.

It remains necessary to improve and increase the efficiency of public financial control, and in this regard, the following are recommended:

- improving the information exchange system between participants in the budget process during the preparation of the state budget;
- defining the boundaries of the budget powers of government bodies, financial bodies and budget organizations throughout the budget process, and monitoring the implementation of budget powers;
- improving budget classification, aligning revenues and expenditures with a result-based budget.

Achieving fiscal sustainability will create the basis for macroeconomic stability. To achieve the set goal, the state sometimes pursues an expansionary fiscal policy by increasing the amount of budget expenditures or reducing tax rates, and sometimes a contractionary fiscal policy by doing the opposite. According to empirical studies, the effectiveness of budget expenditures varies depending on the selected research object. Empirical studies conducted for Azerbaijan reveal that budget expenditures have a stimulating effect on the non-oil sector. In this regard, it is necessary to increase the share of non-oil revenues in GDP and the state budget and determine the optimal limit of state debt relative to GDP.

The dynamics of investments in the oil sector (field) and the changes occurring in that structure, as well as the application of strict mechanisms in the selection of investment projects, and the acceptance of the purposefulness and efficiency (usefulness) of these projects as the main principles, remain the main conditions. Realization of the existing potential in connection with the formation of a "green economy" and the expansion of the "green financing" initiative are among the main challenges for sustainable socio-economic development. In this regard, it is necessary to expand initiatives in this direction.

4. Conclusion

Effective management of oil revenues remains one of the most important policy challenges facing resource-rich countries. International experience demonstrates that successful oil revenue management depends on strong government control mechanisms, transparent institutions, and prudent fiscal policies. Countries such as Norway, the United Arab Emirates, Saudi Arabia, and Azerbaijan provide valuable lessons on how oil wealth can be transformed into long-term economic prosperity.

The study concludes that transparency, accountability, sovereign wealth funds, and independent oversight institutions are essential components of effective oil revenue governance. By adopting international best practices and strengthening institutional frameworks, resource-rich countries can maximize the benefits of their natural wealth while ensuring sustainable development for future generations.

Author Contributions

Both authors contributed to the conceptualization, methodology, investigation, data analysis, and preparation of the manuscript. Both authors reviewed and approved the final version of the manuscript.

Conflict of Interest

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The Main Threats and Indicators of Food Security of the Country Under Risk Conditions

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Abstract

The global food problem has always been a pressing concern for humans and has existed throughout human history, the extreme manifestation of which was famine. Since the emergence of human civilization, it has evolved in both nature and scale, becoming a global problem in the second half of the 20th century. Throughout history, humans have learned to harness atomic energy and biotechnology, and finally, have achieved significant technological advances, including space exploration. Today, powerful productive forces exist not only in industrial but also in agricultural production, yet the food security challenge remains unsolved. Moreover, with the growth of the planet's population, its scale is increasing. The practical significance of this study is determined by the fact that its theoretical and methodological results are translated into practical conclusions and recommendations for practical use. Research methods include analysis, observation, study, generalization, systematization, comparison, and measurement. The theoretical and empirical basis for this study was provided by data from educational literature, scientific articles, periodicals, and online resources.

Keywords: Security, Risks, Threats, Directions, Monitoring, Policy, Availability, Mechanisms of provision

JEL Codes: Q01, Q56, R11, Z32

1. Introduction

Food security is recognized as one of the fundamental pillars of national security because it ensures the continuous availability, accessibility, and utilization of safe and nutritious food for the population (Peng & Berry, 2018).

Security is a state of an entity (organism, community, enterprise, industry, state, or global economy) that allows for minor changes in the parameters and qualitative indicators of this entity under the influence of external or internal factors while maintaining its integrity and normal functioning (Peng & Berry, 2018; Voronina, 2022).

Security can be classified into several categories: personal, social, technical, industrial, national, military (defense); food, information, and environmental. Food security is an important element of a country's national security, a necessary condition for maintaining its sovereignty and statehood, a crucial component of demographic policy, and a prerequisite for improving the quality of life of the population (Peng & Berry, 2018).

2. Literature Review

It can be noted that the role of food security in relation to other types of economic security (production, foreign trade, information, etc.) is fundamental, since the very life of the population depends on it (Peng & Berry, 2018). The list of the main goals of food security begins with ensuring a stable supply of food to the population at affordable prices (Kurbanov, 2015). Every citizen of the country should be able to obtain a sufficient food basket for life (this applies to both the availability of distribution sites and affordability). One of the areas is food support for individuals with low incomes (Voronina, 2022).

The presence, exacerbation, and increase of various types of risks, threats, challenges, and especially force majeure circumstances can have a significant negative impact on national food security and significantly slow down the solution to the problem of ensuring global food security. Such risks and threats can be classified as follows:

- Economic risks caused by the possibility of deterioration in the domestic and external economic situation and a decrease in the growth rate of the global and national economies; high inflation and a crisis in the banking system; a decrease in the investment attractiveness of domestic agriculture and fisheries; A decrease in the competitiveness of domestic products. The main economic risks to food security include unbalanced price increases, such as higher rates of resource price increases compared to increases in agricultural prices, which leads to a decrease in agricultural producer income and the competitiveness of agricultural products (Lyasnikov et al., 2023).
- Technological risks associated with the implementation of adaptive landscape farming principles, the increasing role of ICT in scientific and technological support for the agro-industrial complex, a slowdown in the pace of technical and technological modernization, and the rise of bioterrorism (Lyasnikov et al., 2023).
- Climatic and agro-ecological risks associated with adverse climate change and extreme natural disasters; an increase in the share of degraded land; a decrease in the fertility of agricultural land due to its irrational use in agriculture; and the consequences of natural and man-made emergencies (Davis et al., 2016).

Agriculture is vulnerable to natural and man-made emergencies. Natural disasters caused by droughts, earthquakes, fires, floods, and adverse weather conditions can have significant, widespread, and long-lasting impacts on the agricultural sector, causing severe damage to agricultural production, infrastructure, and farmland, as well as crop losses and livestock deaths, negatively impacting food security (Davis et al., 2016). At the international level, food security is a significant and stabilizing factor in the stability of the global system, influencing the development and adoption of policy decisions. It often correlates with the economic and political systems and development levels of countries, with significantly higher levels of food security (Peng & Berry, 2018).

Thus, food security is a crucial element of a country's national security, a necessary condition for maintaining its sovereignty and statehood, a crucial component of demographic policy, and a prerequisite for improving the population's quality of life.

At the current stage of economic development, several threats to food security can be identified:

The first threat is the saturation of the domestic food market with imported products. The introduction of food sanctions clearly demonstrated the depth of this problem: after the ban on food imports from several countries, prices for relevant food groups (meat, dairy products, cheese, and chocolate) rose sharply, while the quality of the products offered declined. Despite some improvement in the situation and the construction of large livestock farms (focused on pigs, cattle, and poultry), the problem has still not been fully resolved (Lyasnikov et al., 2023).

The second threat is low consumer demand. The income level of a significant portion of the population remains below the subsistence level (Voronina, 2022).

Food security is an indispensable component of economic security, and their dual relationship is quite obvious. Food security occupies a special place in the economic stability of regional development (Oborin et al., 2017). Compared to other types of security included within economic security (information, foreign trade, production, etc.), food security is the fundamental principle. This idea is most accurately expressed by a proverb that was used during the Civil War and Revolution: “The less grain there is, the more politics there is.”

Food policy should be viewed as a set of measures to effectively address the challenges of intensive development of agricultural production, storage and processing of products, foreign trade, food market regulation, and social development in rural areas. It determines the priorities and growth points for individual activities in the agro-industrial complex and the national economy (Kurbanov, 2015). The competitiveness of businesses, regions, and the country as a whole depends on it. Without food security, a state cannot be economically sustainable or have prospects for progressive development (Voronina, 2022).

The next goal is related to supporting agricultural production (Moronova, 2023). This goal is comprehensive and includes subgoals such as increasing the effectiveness of price support for agricultural production, supporting lending to agricultural producers, supporting scientific research in food production (this may include not only agriculture itself but also food processing, for example, not only grain growing methods but also methods of storing it, making flour, and eventually bread), and ensuring resource conservation (their careful use, adhering to the intended purpose of land). The food security framework is presented in Table 1.

Table 1. Food security framework.

Level	Problem Solver	Function of the subject
1	2	3
Global	UN, specialized bodies (FAO, WTO, Committee on Food Security, World Bank, etc.)	Promoting stable economic development of states, long-term food security programs, and creating food reserves
Subregional	Interregional entities with relevant bodies, forums	Promoting sustainable economic development. Improving food quality.
Interethnic (interstate)	Loosely organized entities (excluding the EU). Solidarity through agreements on trade, prices, and food standards.	Promoting sustainable economic development and the formation of state and local food reserves. Improving food quality.
National (state)	Governments, legislative bodies	Stability of economic development, formation of state food funds, and balance of supply and demand
Local	Territorial governing bodies (municipality, district, region) (Oborin et al., 2017)	Creating conditions for household income generation. Food supply and quality control (Oborin et al., 2017).
Population groups	Households by income groups	Achieving an income that ensures consumption according to scientific standards
Family	Households	Purchase and use of food products, etc.

Source: Prepared by the author based on Peng and Berry (2018), Voronina (2022), and FAO concepts.

Furthermore, the development of agricultural market infrastructure remains underdeveloped, and producers are experiencing a shortage of qualified personnel (due to labor market imbalances and distorted societal perceptions of prestigious professions) (Moronova, 2023).

- A region's economic security is characterized by the state of various spheres of activity, based on which studies identify the following components:
- Production, characterized by the availability of a resource base, conditions that support integration processes, and the development of a reproduction system in the region's objectively established specialization (Moronova, 2023);
- Raw materials, reflecting the efficient use of natural resources;
- Financial, characterized by the sustainability of the regional budget system and its ability to ensure socio-economic stability and development of the territory;
- Scientific and technical, characterized by the dynamics of the implementation of innovations and scientific and technological progress in the socio-economic sphere, the degree of production modernization, and the qualifications and number of personnel engaged in research and development;
- Socio-demographic, characterized by the level of social differentiation in society, the level of poverty, access to education, culture, healthcare, housing, communication services, etc.;
- Labor market security, characterized by industry-specific regional specialization, changing demand for appropriately qualified specialists, unemployment rates, and the system of tasks and functions performed by specialists;
- Social security, expressed in the absence of criminalization of society, the shadow economy, corruption, etc.;
- Food security, characterized by the level of regional food supply and the quality of food products (Oborin et al., 2017);
- Environmental security, violations of which manifest themselves in exceeding maximum permissible pollution standards and in high costs for eliminating the consequences of man-made disasters;
- Information security, ensuring data integrity and confidentiality, combined with its accessibility to all users.

Ensuring food security is associated with risks that can significantly undermine it. The most significant risks fall into the following categories (Figure 1):

Figure 1. The most significant food security risks.
Source: Prepared by the author based on Lyasnikov et al. (2023).

The presence of these risks creates threats to food security, which may lead to non-compliance with food security criteria. Broadly defined, global food challenge encompasses the production, distribution, exchange, and consumption of food, both globally and within individual countries.

This study proposes an interpretation of "food security" (of the state) and defines it as the state of the national economic system and agro-industrial complex that ensures the state's food independence, that is, its ability to meet the population's needs for high-quality products with high nutrient and energy value, the economic and physical availability of food, and the compliance of products with domestic quality standards defined at or above the corresponding international level.

The following factors influence the food security challenge (Figure 2):

Figure 2. Factors affecting the food security problem.
Source: Prepared by the author based on Kaputsina (2023).

Assessing the performance indicators of the agro-industrial complex within the economic security system becomes the core content of the monitoring process (Moronova, 2023). The results of this process can be used to assess the potential, prospects, challenges, and risks of providing the population with food in the required quantities and qualitative aspects of their needs.

Thus, to summarize the above, the problem of food security integrates a combination of factors: the socio-economic development of the state, its agricultural and production resource potential, and its domestic and international policies.

3. Food Security Indicators of the Country

The following system of indicators is used to assess the state of food security:

a) in the consumption sphere:

– available household resources by population group;
– availability of retail and catering space per 1,000 people;
– food consumption per capita;
– volume of targeted assistance to the population;
– daily caloric intake of a person;
– amount of proteins, fats, carbohydrates, vitamins, macro- and microelements consumed by a person per day;
– consumer price index for food products.

b) in the sphere of production and national competitiveness (Moronova, 2023):

– production volumes of agricultural and fishery products, raw materials, and food;
– imports of agricultural and fishery products, raw materials, and food;
– budgetary support for producers of agricultural and fishery products, raw materials, and food per ruble of sold output;
– productivity of land resources used in agriculture;
– volumes of food sales by retail and catering organizations.

c) in the area of management organization:

– volumes of food in the state material reserve, formed in accordance with the regulatory legal acts of the Russian Federation;
– reserves of agricultural and fishery products, raw materials, and food.

To assess the state of food security, the criterion is the share of domestic agricultural, fishery, and food products in the total volume of commodity resources (including carryover stocks) of the domestic market for the relevant products, with threshold values for:

- grain – at least 95%;
- sugar – at least 80%;
- vegetable oil – at least 80%;
- meat and meat products (in terms of meat) – at least 85%;
- milk and dairy products (in milk equivalent) – at least 90%;
- fish products – at least 80%;
- potatoes – at least 95%;
- edible salt – at least 85%.

Discussions about how to solve the global food challenge have been ongoing for a long time. Leaving aside some differences, two main approaches can be identified: extensive and intensive. The extensive approach involves producing food by expanding agricultural land, although there is virtually no arable land left (Peng & Berry, 2018).

International organizations, primarily UN specialized agencies, play a major role in solving the global food challenge. The constitution of the Food and Agriculture Organization (FAO) states that its main goal is to improve nutrition and raise living standards (Peng & Berry, 2018). Thus, the food security challenge is the

production, distribution, exchange, and consumption of food, both globally and within individual countries.

4. Conclusion

Food security is a crucial element of a country's national security, a necessary condition for maintaining its sovereignty and statehood, a crucial component of demographic policy, and a prerequisite for improving the population's quality of life. The global food challenge encompasses the production, distribution, exchange, and consumption of food, both globally and within individual countries.

International organizations, primarily specialized UN agencies, play a major role in addressing the food security challenge. According to the Doctrine, the most important indicator of food security is the level of achievement of rational per capita food consumption standards. It is necessary to maintain and strengthen the balance and resilience of the entire supply chain network, including food production, transport, and logistics infrastructure, wholesale distribution centers, and wholesale and retail trade (Kaputsina, 2023).

Author Contributions

The author solely contributed to the conceptualization, methodology, investigation, data collection, data analysis, writing, review, and editing of the manuscript.

Conflict of Interest

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The Role of Green Technologies in Clothing Design

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Abstract

Globalization of the clothing industry and mass manufacturing have led to an increase in the negative influence on the environment and have necessitated changes in design and manufacturing processes. Nowadays, the implementation of green technologies in the process of designing clothes is not only an issue of reducing the environmental impacts, but also a new approach to the visual, structural, and functional principles of clothing design. This research project presents an overview of green technologies used in the clothing industry, the issues related to sustainable fashion, ecological textile materials, and particularly the use of recycled fibers in the design. The article considers the techniques of reducing the consumption of water and energy in the process of production and reducing the carbon footprint, and also highlights the significance of digital technologies and virtual modeling in the process of creating a waste-free production model. The research compared circular economy approaches and consumer behavior transformations in the fashion industry in relation to environmental responsibility. It can be seen from the results that green technologies are a primary driver of innovation that determines the future direction of the fashion industry due to the combination of visual beauty with the principles of environmental sustainability. The findings suggest that green technologies play an increasingly important role in innovation within the clothing industry.

Keywords: Green technologies, Clothing design, Sustainable fashion, Ecological textiles, Circular economy, 3D virtual prototyping, Carbon footprint, Eco-design innovation

JEL Codes: Q01, Q56, R11, Z32

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1. Introduction

The global context of modern light industry development, in particular the clothing and fashion industry, is accompanied by certain environmental problems. A “take, make, dispose” economic approach and the fast fashion concept that has emerged as a result of decades have caused over-exploitation of natural resources, significant greenhouse gas emissions, and a great deal of textile waste (Aliyeva, 2021; Sidorov, 2021). Under such conditions, the use of green technologies for clothing design and manufacturing has become a necessary global strategy to secure the sustainable functioning of the clothing industry in the future (Kuznetsova, 2020). Green technologies represent a variety of innovative approaches aimed at reducing any environmental impact in such processes as resource extraction, design, manufacturing, transportation, and disposal of products.

The application of green technologies in the creation of clothing involves several components and includes materials science, digital technologies, and socio-philosophical components (Hasanov, 2020). The usage of such an approach, which is realized on the basis of the concept of sustainable fashion, fundamentally transforms the designer’s creative approach (Aliyeva, 2021). While the aesthetics, price, and fit were the central components of traditional design, modern eco-design highlights the ecological character of the clothing, its biodegradability, energy-efficient manufacturing process, and circular nature of the product (Kuznetsova, 2020).

The primary objective of the current research work is a thorough analysis of the application of green technologies in the field of clothing design, the contribution of the innovative technologies to the methodology

of design, and their impact on the transformation of the industry on the ecological level. From a scientific point of view, the research examines various types of ecological textile materials, the structure of the recycling process, the methods of decreasing the amount of waste using digital 3D prototyping, and the integration of the concept of the circular economy in the clothing sector (Hasanova, 2020; Sidorov, 2021). The analyses conducted in this study indicate that green technologies transform the field of clothing design not only aesthetically but also ethically.

2. The Essence of Green Technologies and the Concept of Sustainable Fashion

The essence of green technologies is based on the application of scientific and technical methods and digital management systems that ensure that industrial production minimizes environmental impacts while supporting ecological sustainability. In the context of the clothing industry, green technologies ensure resource conservation, elimination of toxic substances, and biodegradability at every link in the production chain (Kuznetsova, 2020). Sustainable fashion ideology and aesthetics are based on the same technological framework. In order to produce and use clothing, it is essential to combine social justice, environmental sustainability, and economic efficiency.

A comparative study of traditional clothing manufacturing techniques and green technology proves that sustainable fashion involves a multidisciplinary approach to clothes creation (Aliyeva, 2021). Table 1 below systematically reflects the fundamental differences and innovative advantages between traditional clothing production and the application of green technologies.

Table 1. Comparison of traditional and green technologies.

Indicator	Traditional method	Green technology	Advantage
Source of raw materials	Petroleum-based synthetic fibers and intensively chemically cultivated cotton	Bio-based polymers, organic fibers, recycled raw materials	Reducing ecological dependence, turning waste into a resource
Production chain	High chemical waste and linear (Cradle-to-Grave) model	Closed-loop, zero-waste (Cradle-to-Cradle) model	Prevention of environmental pollution, resource conservation
Water and chemical consumption	Waste of tons of water, application of toxic synthetic dyes	Waterless dyeing (CO_2 methods), natural and enzymatic processing	Protection of water resources, reduction of wastewater to zero
Energy and Carbon Footprint	High carbon emissions, non-renewable energy use	Renewable energy, energy-saving digital equipment	Reducing the effects of global warming, climate neutrality
Design approach	Short-lived aesthetic structure based on fast trends	Principles of durability, modularity, and eco-aesthetics	Sustainable product architecture, functional design value

Source: Compiled by the authors based on Hasanov (2020) and Sidorov (2021).

The concepts of eco-design form a key component of the idea of sustainable fashion (Kuznetsova, 2020). Instead of designing the garments as pieces of material, the designer starts creating them as organisms, which have their life cycles. In the design process, the options for taking apart the dress, separating its components, and recycling them back into either nature or technical cycles are already provided.

In such a way, the core of green technologies does not impose any limitations on the creativity of the designer; on the contrary, it grants designers a new artistic language (Hasanov, 2020).

3. Use of Ecological Textile Materials and Recycled Fibers

Fabrics, the primary material expression of clothing design, have undergone a radical transformation with the introduction of green technologies. Ecological textile materials include organic plant fibers grown without the use of harmful pesticides, protein-based materials obtained without harming animals, and new-generation biotechnological elements (Ivanov, 2018). These materials both conserve natural resources and do not pose a toxic hazard when in contact with human skin. In recent years, thanks to advances in materials science, fibers derived from mycelium (fungal mycelium), cactus, cotton, and kenaf waste, as well as seaweed, have begun to be actively used in clothing design (Petrova, 2017). Each of these materials has unique tactile and visual

properties, which create the basis for the creation of original textures and natural color shades in modern clothing collections.

The use of recycled fibers is one of the most effective methods of waste management in the clothing industry (Sidorov, 2021). PET fibers, obtained from plastic bottles through mechanical and chemical recycling technologies, significantly reduce the dependence on traditional polyester in clothing production (Ivanov, 2018). When these materials are integrated into design, a new visual language is formed, which we call "eco-aesthetics" (Kuznetsova, 2020). The subtle irregularities within the fabric and the variations in natural color shades give the product an original, story-driven, and ethically valuable visual identity.

Table 2. Characteristics of ecological materials.

Material	Origin	Advantages	Field of application
Organic Linen	Flaxseed grown without chemicals	High breathability, antibacterial, fully biodegradable	Summer clothes, premium eco-collections, everyday clothes
Mycelium leather (Mycelium)	Underground root structures of fungi (laboratory environment)	Plastic-free structure, rapid growth, high elasticity and durability	Outerwear, shoes, bags and accessories
Econyl (Recycled polyamide)	Ocean debris, discarded fishing nets and nylon carpets	Infinite recycling potential, high mechanical durability	Sportswear, beachwear, functional outerwear
rPET (Recycled polyester)	Post-consumer plastic bottles and PET containers	Carbon emission reduction, resource saving, easy coloring	Casual wear, jackets, linings and auxiliary materials
Pinatex (Pineapple skin)	Agricultural waste fibers of pineapple leaves	Lightness, unique texture, replacement of animal skin	Shoe design, jackets, modern creative clothing elements

Source: Compiled by the authors based on Ivanov (2018), Petrova (2017), and Sidorov (2021).

4. Reducing Water and Energy Consumption, Minimizing the Carbon Footprint

Conventional fabric manufacturing processes such as dyeing and finishing operations are considered major pollutants of freshwater resources in the world (Sidorov, 2021). It requires thousands of gallons of water to make a pair of jeans, thus aggravating the environmental issue even more. The emergence of green technologies has brought about a water-free dyeing process and enzymatic treatment system in this industry.

For instance, a waterless dyeing process, which uses supercritical carbon dioxide (CO_2), is designed to ensure that dyes are applied to the fibers without any water and without any formation of chemical wastewater (Ivanov, 2018). The process not only saves 100% of water resources, but also helps to save energy thanks to a shorter dyeing process. On the other hand, laser technologies and ozone technologies have become an alternative to sandblasting and bleaching in the process of aging and decoration of clothes (Petrova, 2017). They not only help to preserve the health of workers, but also make it possible to apply any complicated designs on the fabric surface without using any water resources.

The minimization of the carbon footprint goes beyond the production process. The principles of green logistics, local production, and energy-efficient production lines minimize the carbon footprint of the product (Aliyeva, 2021). The designers ensure that clothes are designed in a way that minimizes fabric loss in the cutting process, and thus energy is conserved indirectly. The reduction of the carbon footprint is the most significant indicator of technological excellence (Sidorov, 2021).

5. The Role of Digital Design Technologies: 3D Design and Virtual Prototyping

The direction that offers the fastest and most efficient integration of green technologies in clothing design is digital transformation. With traditional clothing design, designers used to manufacture prototypes for every model of their clothing. This resulted in the waste of huge amounts of material, time, and energy. Modern computer-aided design and manufacturing (CAD/CAM) systems, which operate in the virtual environment, in particular software like CLO 3D, Marvelous Designer, and Browzwear, exclude any such waste (Hasanov, 2020).

With 3D designing and virtual prototyping, designers have an opportunity to digitally simulate mechanical characteristics of fabric (its weight, elasticity, drape characteristics, coefficient of friction). The fit of the garment, creases' placement, and tension of seam lines are examined on the virtual mannequin (avatar). This

technology allows for achieving a lot of advantages in the process of design, including zero physical prototyping, cut optimization, and algorithmic pattern layout optimization, as well as virtual marketing and digital fashion. This kind of shift results in a complete transformation of the industry from mass production to a personalized one (Kuznetsova, 2020).

6. Green Production Models and Circular Economy in the Apparel Industry

The highest stage of green production models is the establishment of a circular economy in the clothing industry (Sidorov, 2021). The only way to avoid the environmental disasters caused by the traditional industrial model is to keep materials in a closed-loop cycle. The "Cradle to Cradle" approach, a key principle of the circular economy, assumes that clothing circulates in two different cycles during the design phase: a biological cycle and a technical cycle (Kuznetsova, 2020).

Materials used in the biological cycle (e.g., organic cotton, linen, mycelium) completely decompose in nature after their life cycle ends, turning into fertilizer and nourishing the ecosystem (Ivanov, 2018). In the technical cycle, artificial materials such as polyester, nylon, etc. are turned back into fibers chemically or mechanically without degrading their quality and reused in textile production. In order to effectively do this task, designers need monomaterial design, design for disassembly, and modular clothing architecture (Hasanov, 2020).

7. Consumer Behavior and Environmental Responsibility

The true efficiency of green technologies and sustainability practices in industry depends on the behavioral change of the consumer (Aliyeva, 2021). Regardless of how successful eco-materials and digital manufacturing processes are, it is impossible to stop the flow of waste in the fast fashion business without changing the environmental consciousness of consumers and their ethical awareness. As the current sociological and marketing studies show, the tendency of "conscious consumerism" is growing very quickly worldwide (Sidorov, 2021).

Modern consumers, especially the young generation, consider not only the brand name and the price of clothes, but also the process of their production and the conditions under which they were produced. The sense of ecological responsibility contributes to better care for clothes and prolongs their life cycle, or even leads to second-hand shopping and clothing rental (Aliyeva, 2021).

8. Empirical and Statistical Indicators of the Research (Data Analysis)

Data from various global industry reports and scientific sources were synthesized to quantitatively assess the level of integration of green technologies into the apparel industry and resource-saving indicators. The figures and percentages are detailed in Tables 3 and 4 below.

Table 3. Global adoption of selected sustainable textile technologies.

Technology direction	Application level (%)	Main focus area
3D Virtual Prototyping	45%	Design and sketching phase, reducing sample waste
rPET and Recycled Fibers	35%	Sports and casual clothing production, raw material substitution
Waterless and Ozone Dyeing	20%	Fabric processing and finishing of denim garments
Biotechnological and Cellular Materials	8%	Experimental premium collections, luxury segment
Monomaterial and Removable Construction	12%	Circular design models, recycling preparation stage

Source: Compiled by the authors based on Hasanov (2020), Sidorov (2021), and Aliyeva (2021).

Table 4. Estimated water savings achieved through selected green textile technologies.

Clothing Type	Traditional method (Liter)	Green technology (Liter)	Reduction percentage (%)
Jeans (Denim Jeans)	3785 L	250 L	93.4%
Cotton Shirt (T-shirt)	2700 L	400 L	85.2%
Polyester Jacket	1200 L	150 L	87.5%
Sportswear	1800 L	300 L	83.3%

Source: Compiled by the authors based on Ivanov (2018) and Sidorov (2021).

9. Conclusion

A scientific-theoretical and practical analysis of the role of green technologies in clothing design shows that modern light industry is in a stage of radical structural and aesthetic change. The fundamental scientific results obtained can be summarized as follows:

Integrated Eco-Aesthetics: Green technologies and ecological materials have transformed the visual appearance in clothing design from being a mere decorative element to a new artistic language of eco-aesthetics based on the intrinsic properties, texture, and ethical origin of the material.

Digital Efficiency: 3D virtual prototyping and computer-aided design systems optimize the designer's creative process with the principles of digital sustainability by minimizing physical fabric waste, energy, and time losses during sample production.

Circular Economy Integration: The application of monomaterials and the demountable design methodology helps transition the clothing industry from a linear model, putting the formation of a closed-loop circular economy model in line with the "Cradle to Cradle" philosophy into practical implementation.

Practical significance: The materials of this study can be used as a conceptual guide and methodological basis for modern fashion houses, clothing factories, and industrial designers in the development of eco-collections, the establishment of waste-free cutting lines, and the integration of digital 3D design programs into production.

Future research directions: Future scientific research could be focused on empirical analysis of the long-term mechanical endurance properties of living materials grown in laboratory conditions using biotechnological methods (e.g., bacterial cellulose and seaweed fibers) in mass production, the creation of smart green textile products, and the study of consumers' psychological adaptation processes to digital fashion products.

Author Contributions

The author has read and approved the final version of the manuscript.

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Impact of Inclusive Tourism on the Economy and Society

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Abstract

Inclusive tourism is a concept that promotes social justice and equality, creating opportunities for everyone, including people with physical and mental disabilities, to participate in and benefit from tourism activities. This form of tourism covers not only people with physical disabilities, but also all groups with differences such as age, gender, ethnicity, and social status. Inclusive tourism encompasses economic growth by serving a wider range of tourists, taking into account the needs of different parts of society. In terms of economic impacts, the inclusive tourism sector stimulates the development of infrastructure projects related to the creation of new jobs and the reconstruction or adaptation of tourism facilities. By creating favorable conditions, services that make it possible for people with disabilities to travel, in particular, increase the participation of this group in tourism activities. This leads to an increase in tourism spending and more economic activity in the relevant areas. The impact of inclusive tourism extends beyond economic benefits and contributes significantly to social development. Inclusive tourism enhances the development of Social Inclusion. It also allows for greater equal opportunity for all groups in public life and allows for greater equal opportunity for citizens to travel and experience different cultures, educate themselves, and form social bonds. Ultimately, an increase in travel opportunities creates greater understanding and empathy between different cultures and provides the ability for individuals to take a giant leap toward social equality and peace. Additionally, the promotion of inclusive tourism requires that the public and private sectors work together, utilize new technologies, and gain support from the local community. By providing this framework, provides a foundation for developing a sustainable, equitable tourism industry that is economically and socially viable.

Keywords: Inclusive tourism, Sustainable tourism, Social inclusion, SDGs, People with disabilities, Economic development, Tourism accessibility

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1. Introduction

Inclusive tourism has become an increasingly significant research area within tourism studies. As an area of study, inclusive tourism includes concepts such as equity, social justice, and ensuring that every person can participate in tourism regardless of any barriers. In addition to supporting the development of accessible environments for those with physical, sensory, cognitive, and/or psychological disabilities, inclusive tourism also represents broader socially equitable and inclusive practices to address the needs of individuals regardless of age, gender, ethnicity, economic status, and numerous other personal characteristics. Essentially, inclusive tourism is aimed at ensuring equitable access to opportunities for all while enhancing all members of the community's quality of life.

Inclusive tourism has garnered strong international interest as it can contribute to both the economic development of local economies and improve individuals' quality of life. In general, inclusive tourism can assist with the expansion of the economy by increasing and diversifying the number of visitors that a destination can accommodate services to, thereby increasing both the demand for and revenue generated by tourism in general. In addition to the economic development benefit, increasing numbers of visitors to destinations who use accessible tourism products and services provide opportunities for increased job creation,

increased investments in local infrastructure, and increased diversification of the type of tourism services provided in various communities.

Furthermore, through increasing cultural exchange and increasing opportunities for social interaction between groups of different social and economic backgrounds, inclusive tourism helps to develop stronger social cohesion and greater community development among people from diverse social backgrounds.

Governments, tourism-related organizations, and private commercial entities across the globe have increasingly recognized the importance of developing inclusive tourism systems. Many governments, private tourism enterprises, and tourism-related organizations have focused on enhancing accessibility standards and updating their tourism infrastructure, and implementing new technologies that help to achieve the above-mentioned goals. Developing inclusive tourism systems requires more than just removing physical barriers and improving access to tourism services regardless of cultural or social background. As a result, inclusive tourism has become an integral aspect of sustainable tourism development by creating greater economic growth and increasing social inclusion. Therefore, this study seeks to explore the effects of inclusive tourism on the economy and society and its role in promoting sustainable economic development, increasing social equality, and improving participation by more people in tourism activities.

2. Economic and Social Impacts of Inclusive Tourism

Inclusive tourism is a way of providing opportunities for everybody, including people with disabilities, to participate in society. Inclusive tourism contributes to the development of the tourism sector and also supports social justice and equal opportunities for participation. Research shows that inclusive tourism has the potential to produce a wide range of benefits to individuals and society and to be an important component of the sustainable development of tourism (Bhatt, 2024).

From an economic perspective, inclusive tourism expands the potential customer base (beyond just those who have a disability) and creates new markets for tourism destinations and services (Korbiel et al., 2025). The provision of accessible and adaptable tourism products and services creates job opportunities, stimulates investment in tourism infrastructure, and supports regional economic development. The increased accessibility of destinations creates opportunities for the growth of a more diverse visitor base, a higher level of tourism spending, and increased revenues for tourism businesses. For people with disabilities, the ability to use tourism products and services and participate in tourism activities promotes independence and social participation. The increasing demand for accessible services will result in more innovation and diversification of the tourism industry, resulting in the development of specialized products and services to meet the diverse needs of visitors (Ghotbi & Dyliaeva, 2025).

From a social perspective, inclusive tourism ensures that all people have an equal opportunity to participate in tourism activities, which promotes social equality. By providing access to tourism experiences, people with disabilities will be able to engage more fully in the social life of their communities and participate more in community interactions. In addition, inclusive tourism promotes mutual understanding, empathy, and respect between different social groups. Developing inclusive tourism will foster intercultural exchange and increase social interaction while contributing to the development of an equitable and inclusive society (Hamarneh et al., 2024).

Moreover, inclusive tourism will reduce barriers to different social groups while improving the quality of life of society as a whole. By fostering greater participation, accessibility, and opportunity for all social groups, inclusive tourism strengthens social cohesion and supports communities that are diverse in nature. The benefits of implementing inclusive tourism practices extend not only to travellers as individuals but to all members of society through increased social integration and improved collective well-being (Mubaiwa, 2022).

Inclusive tourism also has the potential for significant economic and social impact. The development of inclusive tourism will create a more inclusive, accessible, and socially responsible tourism industry. An increase in the level of inclusive tourism will positively impact the welfare of society as it relates to both social inclusion and economic development (Acheampong et al., 2025). A critical factor in maximizing the long-term benefits of inclusive tourism is effective cooperation and collaboration among all stakeholders (public and private); continuing improvement of tourism infrastructure; and the increased availability of accessible and affordable services.

A further factor contributing to the competitiveness of tourism destinations in the modern economy and for future development is the contribution to sustainable development made by inclusive tourism. Tourism policy increasingly emphasizes the need to develop an environment that is accessible and welcoming for all people, regardless of their level of physical ability, age, or social status. Inclusive tourism, by allowing for the shared benefits of tourism activity to be spread throughout the broader community, contributes to sustainable development. Inclusiveness encourages social cohesion, provides opportunities for all individuals, and supports the long-term viability of tourist locations.

One important component of successful inclusive tourism is having adequate accessible tourism supporting infrastructure in place. Accessibility does not just refer to physically modifying hotels, restaurants, and tourist attractions to accommodate those with disabilities; it also includes transportation systems, information services, communication technologies, and publicly accessible facilities. Destinations that have made these types of accessibility improvements are now able to offer their products and services to a much broader audience, including individuals with disabilities, seniors, and families with small children. Therefore, investing in accessibility enhancements not only provides visitors with improved experiences but also creates increased demand for tourism and increased economic activity.

Technological innovations are playing an increasingly important role in promoting inclusive tourism. Digital solutions, online booking systems, and assistive technologies remove barriers that have historically prevented individuals from participating in tourism, enabling guests to plan and fully experience their journeys independently and confidently, thereby enhancing visitor experience and quality of services while promoting increased levels of social inclusion throughout the tourism community.

Also, benefits equal to increased employment opportunities and economic sustainability are provided to local communities due to increased successful adoption of inclusiveness amongst businesses and institutions. Increasing interaction between people from various sociocultural backgrounds promotes respect for one another, encourages communication, and understanding of the cultures of others. Therefore, inclusive tourism should be treated as not only an economic activity but an important means of achieving community development, civic engagement, and sustainable growth.

Inclusive tourism, while contributing to the economy and social development, each of the inclusive tourism activities, also plays an important role in promoting sustainable development goals at both a global level and a national level.

Examining the significance of inclusive tourism can be framed within an international framework using the United Nations Sustainable Development Goals (SDGs). Governments and the United Nations are placing greater priority on sustainability. Inclusive tourism can be viewed as an effective instrument to achieve several of the global objectives identified by the UN.

Primarily, inclusive tourism supports the achievement of SDG8. Through the development of inclusive tourism destinations, inclusive tourism creates employment opportunities by stimulating entrepreneurship and promoting sustainable economic activity in the tourism sector. Increasing the accessibility of tourism services will ultimately create growth opportunities for the tourism industry while increasing participation in the labour force.

Additionally, inclusive tourism is closely linked with SDG10. By reducing the barriers that may prevent an individual from accessing tourism opportunities, a destination creates equal opportunities for everyone, including people with disabilities, older persons, women, low-income individuals, and persons from varied socio-economic backgrounds. Creating equal access to tourism opportunities removes the stigma associated with social isolation and provides individuals the opportunity to participate fully in economic and social activities. Therefore, tourism becomes an avenue through which equitable and engaging communities can be created.

In addition, inclusive tourism supports the achievement of SDG11. Sustainable cities and communities through the development of accessible infrastructure, public spaces that are inclusive to all, and through community involvement. By providing barrier-free transportation systems, affordable accommodation, and public amenities that are easy to use and enjoyable, we provide a better quality of life for both tourists and local residents. In addition to improving the quality of life for thousands of people who visit the destination,

these improvements will increase urban sustainability, create environments that are inviting to all citizens, and ultimately strengthen our communities (Mubaiwa, 2022).

The growing integration of the principles of inclusive tourism into sustainable development strategies reflects a view that tourism cannot be assessed solely by the economic contribution(s) generated by tourism. Inclusive tourism is also an important contributor to community engagement, social inclusion, and the promotion of access to tourism for all individuals, regardless of their socio-economic or geographical status. Therefore, an effective approach to achieving economic growth, social equity, and the objectives of sustainable development is through inclusive tourism.

Table 1. The impact of inclusive tourism on the economy and society.

Area	Impacts	Outcomes
Economic Impacts	1. Creation of a new customer base 2. Expansion of accommodation and tourism services. Creation of new employment opportunities	1. Increased tourism revenues 2. Development of local economies 3. Emergence of new services and innovations
Infrastructure Development	1. Adaptation of tourism infrastructure to accessibility requirements 2. Development of specialized services for people with disabilities	1. Improved accessibility of the physical environment 2. Expansion of services for individuals with special needs
Social Impacts	1. Promotion of social inclusion 2. Increased empathy and understanding among different social groups. Strengthening of social interactions	1. Greater social equality and harmony. Equal participation opportunities for all members of society
Cultural Impacts	1. Growth of cultural exchange 2. Enhanced mutual understanding among different cultures and ethnic groups	1. Greater openness toward cultural diversity. More effective intercultural dialogue
Social and Economic Benefits	1. Promotion of social equality and justice. Increased participation of different social groups in economic activities	1. Strengthened social inclusion. Improved social welfare and community development

Source: Compiled by the author based on Gorbatova (2024).

Table 1 summarizes the major economic and social impacts of inclusive tourism identified in previous studies (UNWTO, 2021).

In Economic Impact, rather than simply generating tourism revenue, inclusive tourism enables the expansion of the tourism market through developing new clients, creating new service providers, and increasing employment opportunities for individuals with disabilities and other underrepresented groups. As a result, by enhancing the accessibility of destinations and promoting the participation of all visitors regardless of their disability status or other characteristics, inclusive tourism will create increased demand for travel and tourism, thereby generating increased revenue for both businesses and government (Darcy & Buhalis, 2010). Additionally, inclusive tourism promotes additional economic activity for the region by creating additional jobs and increasing the capacity of local economies, contributing to long-term sustainable development of local economies (Table 1).

In terms of infrastructure development, inclusive tourism supports the development of the built environment, including creating and adapting built environments, such as tourism facilities, transportation systems, accommodation facilities, public spaces, and accessibility to those facilities. These improvements promote greater usability of the built and natural environment, encouraging equal participation by all visitors in tourism, while improving the physical accessibility of tourist destinations (Tilovmurodov, 2024). Specifically, by providing additional services for individuals with disabilities, these facilities enhance the number of accessible facilities at the tourism destination level and enhance the overall accessibility of the destination by aligning with the principles of universal design in the tourism development and service delivery process (Table 1).

In terms of Social Impact, inclusive tourism supports the development of equitable social systems and increased social cohesion. By providing opportunities for individuals to participate in tourism regardless of their disability status or other characteristics, inclusive tourism facilitates the interaction of diverse groups and promotes the understanding and acceptance of others. As a result, inclusive tourism promotes healthy social relationships and reduces discrimination against individuals who are underrepresented in tourism.

Cultural impact highlights the importance of greater cultural awareness and understanding. Interaction between persons from diverse cultural, ethnic, and social backgrounds contributes to greater understanding and promotes the use of constructive dialogue in building intercultural relationships. Additionally, the increased interaction and exposure between diverse cultural groups will enhance the quality of social experiences and ultimately foster greater tolerance and openness in our societies.

Lastly, in summation, the benefits of inclusive tourism have both social and economic implications. Providing a broad range of tourism services and increasing the participation of the different social groups in the tourism economy reinforces social justice while creating additional economic opportunities for those groups. Thus, inclusive tourism contributes to the well-being of the community, quality of life, and an equitable model for the future of tourism development. The contributions of inclusive tourism are multidimensional and will create long-term economic, social, and cultural benefits for all participants (Maxmudova et al., 2025).

3. Conclusion

Inclusive tourism will assist in providing social equity and economic growth. By developing and advancing tourism opportunities for people with disabilities, as well as the diverse social groups within our society, the tourism industry will promote interaction among individuals from different parts of the world, thereby providing for a more cohesive society and a better understanding of one another through the appreciation of the cultures of others.

Additionally, inclusive tourism contributes to economic growth in the form of new job creation for individuals who may not have had access to tourism prior to the introduction of inclusive tourism. It also provides a means to promote sustainable tourism through the expansion of accessible tourism facilities and services in these areas. Furthermore, inclusive tourism will further increase the competitive advantage of tourist destinations because of these improvements to sustainability.

The benefits of inclusive tourism also extend to the cultural domain, as it enhances intercultural communication and cooperation between individuals from diverse social and cultural backgrounds, and by doing so, fosters a greater level of understanding and mutual respect; therefore, helping to create a greater sense of community and a greater sense of tolerance and an open attitude towards others.

Thus, inclusive tourism is not only a viable strategy for the growth of tourism, but it can be a significant contributor to the enhancement of social equity and social justice; and so, it should be pursued in a manner that creates the greatest incentive to produce a more equitable society through sustainable development. To accomplish this, there must be a partnership between the private and public sectors, and continual improvement of tourism infrastructure and access to tourism services for all individuals, especially those living with disabilities.

Author Contributions

The author approved the final manuscript.

Conflict of Interest

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