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Factors Ensuring Sustainable Development in Agriculture

Abstract

Sustainable agricultural development is essential for ensuring food security, conserving natural resources and mitigating the impacts of climate change. This article highlights the key drivers of sustainable agricultural development. It highlights the importance of adopting agroecological practices that promote soil restoration, biodiversity conservation and water use efficiency. These practices enhance the resilience of ecosystems and reduce dependence on harmful chemicals, thereby ensuring the long-term productivity of agricultural systems. At the same time, sustainable agricultural development requires empowering smallholder farmers through access to resources, markets and knowledge. The article notes that investing in rural infrastructure and promoting the development of farmer cooperatives can increase productivity, livelihoods and food security.

Keywords: *agriculture, sustainable development, investment, food security, biodiversity, economic growth*

Introduction

The ever-increasing demand of the world's population can result in the depletion of natural resources, economic crises, environmental stress, political and social problems. To prevent this, each country must determine its own development strategy and explore ways to preserve resources for future generations. Experts see the way out of the current situation in ensuring sustainable development.

The sustainable development model is a balanced, continuous and dynamic development model. This model is considered development that does not pose a threat to the full satisfaction of the needs of future generations. The development of the agricultural sector is of decisive importance in meeting the needs of the population in the country with food and consumer goods, as well as in meeting the needs of a number of industrial sectors of the country for raw materials. Taking into account the above, while solving the problems in the Republic of Azerbaijan with the aim of developing the national economy, reforms were envisaged in the agricultural sphere, and the reforms were primarily implemented on the basis of targeted state programs (Azerbaijan State Statistical Committee, n.d.).

Research

Assessing the sustainability of the agricultural sector is a difficult and complex issue, as it involves complex interactions between technology, environment and society. Also, the assessment of this activity covers various components, characteristics and priorities at different scales (global, national, regional, local).

The Pressure–State–Response (PSR) framework developed by the OECD has for the first time addressed the issue of systematic identification of indicators for environmental sustainability. This framework is based on the Coase concept, that is, various human activities create certain pressures on the environment and change the state of the environment. Society, in turn, responds to these

changes through environmental, economic and other programs. Environmental sustainability does not yet mean the sustainability of the agricultural sector as a whole. For this, there is also a need to assess social and economic sustainability indicators (Bernasovskaya & Viktorov, 2010).

Social sustainability is about people, and two main categories can be distinguished under this criterion. First, social sustainability at the local community level. This is related to the well-being of farmers and their family members. The indicators available in the literature are divided into three main categories: education, working conditions (working hours, workload and workforce), and quality of life (isolation and sociability). Second, social sustainability at the societal level. Indicators related to this dimension are also divided into three groups: multifunctionality (rural development, employment generation and ecosystem services), acceptable agricultural practices (environmental impacts and animal welfare) and product quality (food safety and quality processes). Unlike the other two criteria, social indicators are qualitative indicators. They are difficult to assess because they are often subjective. According to another approach, social indicators cover only two main topics: sustainability related to the local farming community and sustainability related to society as a whole ("Socio-economic Problems of Sustainable Development" Collective monograph ANAS, 2020).

Our legislation on agrarian reforms reflects the development of agrarian infrastructure enterprises, a number of tax breaks and financial assistance, regulation of the agrarian market, social protection of the rural population, training of specialists in the agrarian sector, scientific support of the agrarian sector, etc. (Khalilov, 2006). The reforms implemented in the agrarian sector set certain goals, and we can show the directions of those goals and the situation before and after the reform in the following table:

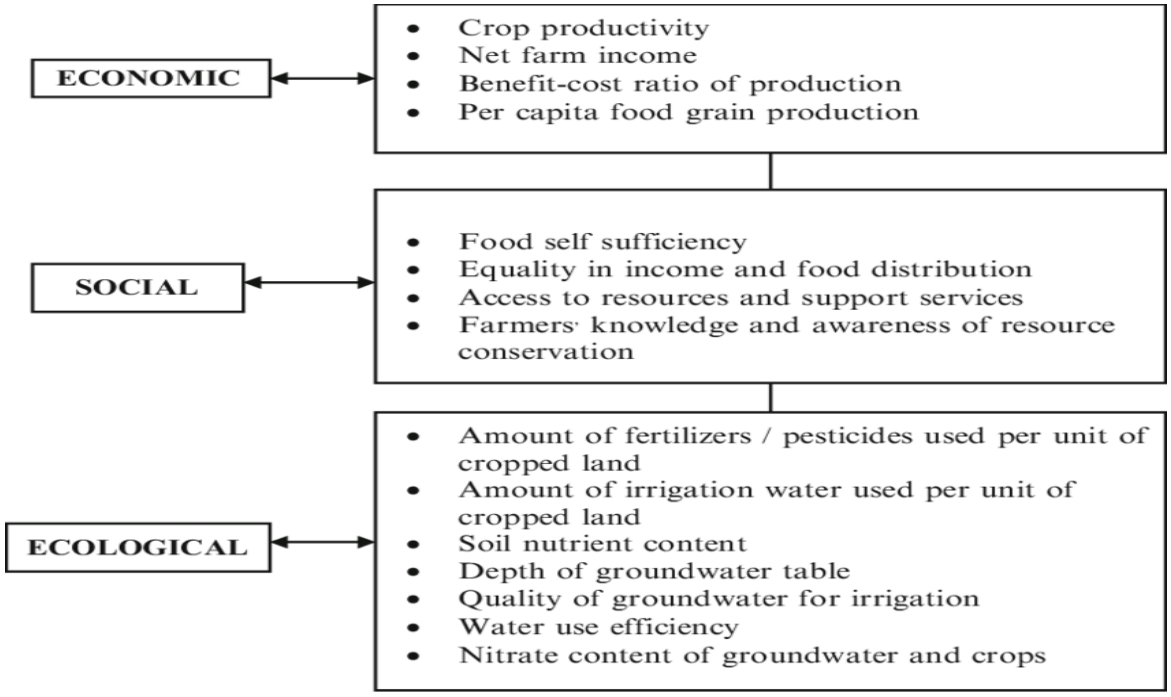
Table 1. Reforms implemented in the agrarian sector.

Directions	**Before the reform**	**After the reform**
Production	The purpose of production is determined centrally	Production decisions are freely made by farms
Prices	Centrally assigned	Liberalized
Finance	There are constant state subsidies and debts are often written off	Strict budget constraints Prevail
Factors of production, sales, processing	State-owned enterprises Monopoly	privatized, de-monopolized inhisarsızlaşdırılmışdır
Form of ownership of resources	State, collective	Privatized
Structure of farms	Large-scale collective organization	Small-scale personalized

Source: compiled by the authors

In the international literature, a system of indicators corresponding to the three components of sustainability is proposed for assessing the sustainable development of agriculture (Ismayilov, Abdullayev, Gurbanova, Huseynova, Zeynalova, Naghiyev, Seyidzade & Hasanov, 2018). It should be noted that, in addition to the presented indicators, numerous other indicators can also be used. These indicators are summarized as follows.

Figure 1. Proposed indicators for measuring the sustainability of agriculture.



Source: Zhen, Lin & Routray, Jayant. (2003). "Operational Indicators for Measuring Agricultural Sustainability in Developing Countries." *Environmental Management*, 32, 34–46. https://doi.org/10.1007/s00267-003-2881-1

Depending on the purpose of the assessment, the availability of data for the assessment, the amount of funding allocated for the assessment and other factors, a different set of sustainability indicators can be used in a specific case.

Country-specific sustainability issues are also considered within the framework of the Sustainable Development Goals (SDGs). For this purpose, the SDGs were established by the UN General Assembly in 2015. The SDGs consist of 17 interrelated goals designed to achieve a better and more sustainable future for all. These goals are included in the UN resolution *2030 Agenda* (Vasilyeva, 2012). Since the goals have a wide scope, specific sub-goals have been identified within each goal, and appropriate indicators are used to assess the achievement of each sub-goal. The SDGs cover many areas of activity (agriculture, industry, ecology, health, education, sociology, gender issues, employment, etc.). It should be noted that issues related to the assessment of sustainability in the agricultural sector are mostly considered under Goal 2. This goal is called End Hunger – "End hunger, achieve food security and improved nutrition, and promote sustainable agriculture" (Cai & Liu, 2025).

Some scholars have conducted in-depth research in recent years by establishing various models to assess the sustainable development of the agricultural sector in various countries and regions. Among them, the sustainable development goals related to the agricultural sector have been an important reference point in establishing sound evaluation systems. Thus, it can be said that sustainable agriculture is socio-economically favorable (Maharram, Salahov, Bagirova, Mammadova & Ismayilova, 2022).

Aspects such as healthy structure, stable function, safe service and sustainable development of the rural ecological system have been applied in the scale of the rural ecological health model. In addition, a reliable policy has been developed in South Africa as an indicator of sustainable development related to the agricultural sector, such as the elimination of unemployment and hunger. In addition, in terms of sustainable development of agriculture, the system included in the agro-ecological resources, the economic-social system and various agricultural systems have also been

taken into account (Fu, 2025).

In addition, regional sustainability was assessed by combining four separate subsystems: regional population, resources, environment and socio-economics. The sustainable agricultural development index can be divided into two parts. All the existing studies mentioned above show the importance and difficulties of assessing the sustainable development capacity of agriculture (Measurement of Sustainable Development, 2012). In addition, many scholars have conducted in-depth discussions on ways to achieve sustainable agricultural development; for example, precision agriculture, the development of microorganisms as bio-fertilizers, reducing the use of organic fertilizers and pesticides, multifunctional agriculture. Assessing the sustainable development capacity of agriculture is a significant and complex system and touches on all aspects of the economy (Ignatyev, 2014).

Sustainability of irrigation water use. Seventy to seventy-two percent of Azerbaijan's fresh water resources are formed outside the country's borders. The Kura and Araz rivers, the country's main water arteries, are subject to pollution with various chemical elements and compounds, as well as organic substances, before entering the country's territory. The permissible concentrations of oil products, phenols, copper, bismuth, titanium, manganese and other elements in the waters of these rivers at the border lines are exceeded. The degree of pollution in the Araz River, which enters Azerbaijan from the territory of Armenia, is higher than in other rivers. River waters are also subject to pollution of various origins within the country (He, 2024).

In general, for 2020, 31% (1,476.7 thousand hectares) of the agricultural land areas (4,780.1 thousand hectares) in Azerbaijan are irrigated lands. Sixty-one percent of the total crops in the country and 66% of perennial crops fall on irrigated lands. One of the most important issues in terms of sustainable water use in agriculture is the irrigation methods used. Information on the irrigation methods used in Azerbaijan is presented in Chart 1.

Chart 1. Types of irrigation used in the country in 2022.

Source: Ministry of Agriculture, EKTIS database

As can be seen from the graph, the most widespread irrigation types in Azerbaijan are flooding and furrow irrigation (ditch irrigation). The combined share of these two irrigation types is more than 89%. However, along with these traditional irrigation methods, modern irrigation methods are also used. The share of the use of modern irrigation methods is approximately 11%. Traditional irrigation methods are used for most plants and plant groups in the country. The plants where modern irrigation

methods are most commonly applied are soybeans, berries and sugar beets. The share of tea, fruits and grapes in the use of modern irrigation methods is also high. It should be noted that the most widely used method among modern irrigation methods in the country is drip irrigation. The share of this irrigation type in the total use of modern irrigation types is 65% (Mendoncha, 2025).

Another important aspect of sustainable use of irrigation water is the management and regulation of irrigation systems. Currently, issues related to the regulation of irrigation systems in the country are entrusted to the Water User Associations (WUAs). The main tasks of WUAs include the preparation of an operational plan for land reclamation and irrigation systems in the service areas, planning their restoration and reconstruction, installation and operation of metering devices, drawing up water distribution schedules, resolving disputes arising during water distribution, ensuring the payment of the association's expenses, including water fees, concluding contracts for water withdrawal, preparing annual budgets and reports, etc. (Baghirova, Mammadova, Hasanova & Aliyeva, 2025).

Azerbaijan is a member of the international Convention on Biological Diversity and has joined the Convention on Biological Diversity (CBD) in order to expand international cooperation in the field of conservation of genetic resources of biodiversity. In accordance with the requirements of the Convention, the *National Strategy and Action Plan for the Conservation of Biodiversity in Azerbaijan (2006–2010)* and the *National Strategy for the Conservation and Sustainable Use of Biological Diversity in the Republic of Azerbaijan for 2017–2020* (2015) were adopted (https://e-qanun.az/framework/11513). The Institute of Genetic Resources also operates in the country. A.Genbank was established under the Institute in 2004 for the medium- and long-term conservation of genetic resources. The Genbank mainly stores national genetic resources of plant samples (Huseynov, Salahov, Bagirova, Mammadova & Ismayilova, 2022).

The sustainable economic development model applied in the republic today is a strategic development path based on market principles, free entrepreneurship, consideration of national interests, deepening international and regional cooperation and the realization of social and humanitarian directions based on sustainable economic progress (Ministry of Agriculture, n.d.).

Conclusion

The sustainable economic development model applied in the republic today is a strategic development path based on market principles, free entrepreneurship, consideration of national interests, deepening international and regional cooperation and the realization of social and humanitarian directions based on sustainable economic progress.

As can be seen from the conducted research, the agricultural sector, while being the main provider of food security on a global scale, acts as one of the areas of activity that has a destructive impact on individual elements of the environment. From this point of view, in order to achieve sustainable development in the agricultural sector, it is necessary to approach the issue from two aspects: on the one hand, reducing the negative impacts of agricultural activity on the environment, as well as eliminating these impacts, and on the other hand, mitigating the impact of climate change occurring at the global level on the agricultural sector, as well as considering the possibilities of the sector's adaptation to these impacts. In general, from the point of view of achieving sustainable development of agriculture, all three aspects of sustainability (ecological, economic and social) should be kept under control. Among these, the ecological environment, more precisely, the sustainable use of air, soil and water resources, as well as the protection of biodiversity, are of greater importance.

The activities currently carried out by the state to protect soil and water resources should be further expanded and improved. These include measures such as controlling the use of fertilizers and pesticides, expanding the use of modern irrigation systems, stimulating compliance with agrotechnical rules, etc. In short, state regulation in the field of using natural resources for the production of agricultural products should be strengthened and awareness-raising measures should be expanded.

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A Circular Economy Sustainable Development Model for Georgia

Abstract

Background: The unsustainability of the traditional linear production model (production–consumption–disposal) has clearly indicated the need for a new model – circular economy. This article examines both the existing environment and infrastructure of Georgia and international experience, the exchange of which is important for the ecological and economic development of the country.

Research objectives: The main objective of the article is to analyze the concept of circular economy, to identify its global and local significance, and to assess the opportunities and challenges that Georgia faces.

Research design and methods: This article uses case study and analysis methods.

Results: The article presents recommendations for policy makers, business and society that can serve as a basis for the country's transition to a strategic path of circular economy. The study shows that despite the current low level of circular economy (1.3 percent), Georgia has significant potential, including natural resources, youth motivation and international support.

Conclusions: The circular model is not only an environmental necessity for Georgia, but also an economic opportunity – to promote innovation, new jobs and sustainable development.

Keywords: *circular economy, sustainable development, renewable energy, recycling, linear economy*

Introduction

In the 21st century, the world economy faces complex challenges such as climate change, resource depletion and environmental pollution. These processes have clearly shown us that the traditional linear economic model ("production–consumption–disposal") is no longer sustainable. It is in this reality that the circular economy emerges as an alternative, ecologically balanced and economically favorable way of development.

The circular economy involves the sustainable use of resources, minimizing waste and recovering, recycling and reusing products. This model is based on the principle that all resources should remain in economic circulation for as long as possible. It is an economic model that seeks to maximize the efficient use of resources, reduce waste and keep materials in a continuous cycle.

The circular economy is one of the most innovative and promising trends in the context of sustainable development. This approach is already receiving a lot of attention in developed countries and is becoming part of one of the main strategic policies in the face of environmental, social and economic crises.

Currently, a linear economic model is still functioning in Georgia, which is manifested in inefficient use of resources, a low level of waste recycling and increased pressure on the ecosystem. Accordingly, the adoption and implementation of circular economy principles is an opportunity not only for environmental, but also for economic and social progress. The relevance of the topic is also increased by the fact that the transformations taking place at the global level will inevitably affect Georgia, and the country's competitiveness will be directly related to its environmental policy and innovative approaches.

The article "Development of circular economy in agriculture" by Lomishvili M. and Lachkepiani T. defines the essence of circular economy and the principles of its implementation in the agricultural sector. Successful experience of the introduction of the closed production cycle in the agricultural

sector abroad is shown. It is established that the circular economy is recognized as a tool for reducing waste and food losses (Lomishvili & Lachkepiani, 2022).

Relevant literature in Georgia is rather scarce, which further aggravates the need for research.

According to the Ellen MacArthur Foundation, the circular economy is "an industrial system designed with a recovery-oriented principle. It replaces the concept of 'end of life' with recovery, shifts to renewable energy, eliminates the use of toxic chemicals that inhibit resource reuse, and aims to eliminate waste through better design of materials, products, systems and business models."

According to the World Business Alliance for Sustainable Development, "the circular economy can stimulate innovation, create new business opportunities and jobs, and improve the competitiveness of companies and regions. It also improves resource efficiency, reduces costs and increases resilience." By creating new jobs and business opportunities, the circular economy contributes to the goals of decent work and economic growth. It also promotes innovation and technological progress, especially in the areas of industry, infrastructure and innovation. For example, the circular economy supports the development of small and medium-sized enterprises, which contributes to more inclusive and diverse economies.

The circular economy can make a significant contribution to the United Nations Sustainable Development Goals, which aim to eradicate poverty, protect the planet and ensure peace and prosperity for all.

Various factors contribute to the transition to a circular economy. One central aspect is product design, which includes the creation of products that serve closed-loop systems and environmental sustainability. Artificial intelligence also contributes to more efficient resource management. Business models that utilize circular economy principles such as the 3R (Reduce, Reuse, Recycle) or 6R (Refurbish, Rethink, Restore) foster innovation and business development. Stakeholder engagement plays an important role in promoting the circular economy.

Global action on the circular economy over the past decade has shown that the concept has now become a key element of many countries' policies to address environmental challenges.

Globally, the amount of waste increases every year. According to the World Bank, in 2020, an average of 0.79 kg of waste was generated per capita per day, equivalent to 2.24 billion metric tons per year. Of this amount, only 17% was recycled, while the remaining 83% (1.86 billion tons) was dumped, incinerated or otherwise disposed of. With increasing urbanization, the annual amount of waste is expected to increase by 73% compared to 2020 and reach 3.88 billion tons by 2050, which means an average of 1.09 kg of waste per capita per day. Against this backdrop, many countries are trying to reduce waste generation and create conditions for its reuse and recycling. In 2015, the European Commission approved an action plan to accelerate the transition to a circular economy.

Research

The study is based on secondary data analysis and a comparative approach. The following methods are used:

- Document analysis – reports from international organizations (EU, UNEP, Ellen MacArthur Foundation) and local agencies;
- Synthesis and interpretation – processing of received information and development of country-specific recommendations.

Results and discussion

International strategy and policy. The European Union's Closed Loop Economy Action Plan 2020 is one of the most advanced policy frameworks for implementing the circular economy. It focuses on the development of environmentally friendly products, sustainable consumption and waste minimization.

- The Netherlands is one of the most ambitious countries in this regard. They have a plan called "Closed Loop Economy in the Netherlands by 2050," which aims to reduce resource use by 50 percent by 2030 and fully transition to a zero-waste closed loop economy by 2050.
- France approved the Closed Loop Economy Roadmap in 2018, which includes 50 actions for a 100% closed-loop economy. A law was passed in 2020 to eliminate waste and phase out single-use plastic packaging by 2040.

- Germany passed a law on the circular economy and waste management back in 1996. The Resource Efficiency Program (ProgRess) was approved in 2012 and covers six main areas: raw materials, production, consumption, construction, information technology and legal framework.
- Italy's 2020 budget law includes investments to support green projects. The country is also one of the leaders in the EU's environmental management and labeling system.
- Japan was one of the first countries to enact a law to establish a circular society in 2000. Its plans are for five years and are regularly updated. The government updates the plan every five years. The plan emphasizes that financial institutions and investors should allocate resources to companies, non-governmental organizations and projects that work to create a "healthy material cycle society." To further develop the circular economy, Japan announced the "Circular Economy Vision 2020" in 2020, which aims to develop digital technologies, introduce new business models and improve resource efficiency. In addition, the Resource Circulation Strategy for Plastic was established to address the problem of single-use plastic waste.
- China. In 2021, China's National Development and Reform Commission approved the Circular Economy Development Plan for the 14th Five-Year Plan (2021–2025). One of the main goals of the plan is to increase resource productivity by 20 percent by 2025 compared to 2020.

It is interesting to look at the dynamics in Georgia. It is worth noting that the first steps in this direction have been made in Georgia as well, although, ultimately, the principle of recycling is still far from being properly implemented and achieving effective results.

- In recent years, the level of waste recycling in Georgia has been low. The country's recycling rate is 1.3%, which is significantly lower than both world (7.2%) and European (11.5%) averages. This means that 98.7 percent of resources are used linearly (consumption waste).
- In 2020, 760,942 tons of waste were generated in urban areas of Georgia and 300,065 tons in rural areas, for a total of 1,061,007 tons.
- In 2021, this increased to 1,104,952 tons, of which 768,257 tons were generated in urban areas and 336,695 tons in rural areas. Ninety percent of the waste is not recycled and is thrown directly into landfills.
- Plastic consumption is increasing in the country due to the low price and availability of plastic bags, weak regulation and lack of monitoring mechanisms.
- Between 2010 and 2020, plastic production and imports in Georgia increased by about 71 percent, leading to an increase in illegal dumping, especially in rural areas.
- According to the World Bank, more than 95 percent of waste on the Black Sea coast consists of plastic, which has a negative impact on environmental pollution.

Georgia has embarked on an accelerated path towards a circular economy, and its main challenge is to replace the concept of "recycling" with an economic system in which material cycles are closed. Through the concerted efforts of the government, civil society organizations, the academic sector and international partners, Georgia has started to develop a strategy and roadmap for a circular economy. They aim to apply an integrated approach in many areas, including production, consumption, waste management, secondary raw materials, innovation and investment, as well as ongoing projects in different areas, implemented by different players in different sectors and belonging to different parts of the value chain or at different stages of development.

Georgia has a rather large potential for the development of a closed-cycle economy:

- Abundance of natural resources – Georgia has rich biodiversity, water resources and renewable energy, which favors the development of cleaner production;
- Strategic location – Georgia can become a green logistics hub and develop clean transport and efficient resource management;
- Active young generation – eco-social awareness is growing, especially among young people, which creates a fertile ground for green innovations;
- International support – the country is actively involved in a number of international environmental projects, which increases opportunities to attract financial and technical assistance;
- Agricultural potential – cyclical approaches in agriculture (organic fertilizers, waste reuse) can become one of the pillars of the regional economy.

The transition to the circular economy in our country is accompanied by certain challenges, among which are:

- Low awareness – both in society and in the business sector there is often a lack of information or skepticism about the principles of the circular economy;
- Underdeveloped infrastructure – the country lacks a full-fledged system of separate collection and recycling of valuable waste;
- Insufficient regulatory framework – the direction of the circular economy is not yet fully defined in legislation;
- Passivity of business – many companies consider investing in green technologies a risky and unprofitable business;
- Lack of incentives – there are insufficient tax and financial incentives to support green startups and initiatives.

At the same time, the country has reasons for optimism:

The Georgian private sector is keen to enter European markets, which is based on the free trade agreement and the country's status as a candidate country for EU membership. These important prospects can be realized by improving quality, which is linked to compliance with European production and packaging standards, the development of environmentally friendly production and the introduction of closed-loop economy practices.

Georgia's civil society is another asset and hope on the road to building a circular economy. Environmental sustainability and rights are at the center of attention of NGOs, activists and media, especially in recent years (UNDP: Environmental Justice for All). Ninety percent of the Georgian population, especially young people, are fairly well informed about climate change (UNDP: What Georgians Think About Climate Change?, 2021).

At the same time, Georgia's relatively small economy and impressive track record of rapid and effective reforms create a unique opportunity to make the systemic changes needed to transition to a circular economy.

UNDP is actively assisting our country through this challenging journey of transition to a circular economy. Its support is based on cooperation with the public, private and civil society sectors, as well as sharing international best practices and experiences, including those of the European Union, Norway and Sweden. In 2019, with the support of the Government of Sweden, the civil society organization Georgian Society of Nature Researchers “Orchis” is implementing an awareness-raising program to promote circular economy in Georgia. This program provides guidance to stakeholders on how to accelerate the implementation of circular model principles at different levels of economic activity.

Legal framework and enabling conditions

The most important existing legislative framework that can be used to develop the circular economy in Georgia is related to waste management. In this field, Georgia has already approved the Code and corresponding technical regulations (see 2.2. Status quo of local waste management system, including EPR in Georgia). Georgia has not yet adopted a national legal framework devoted specifically to the circular economy, and municipalities have not formulated corresponding political documents. However, with the European Union’s assistance, Georgia is working on a National Waste Prevention Program (2022–2024). The waste prevention program is based on the waste management hierarchy of the EU’s waste management framework directive. The hierarchy includes waste prevention, preparing for reuse, recycling, recovery and disposal. The program includes short-, medium- and long-term objectives that aim to turn Georgia into a country committed to waste prevention and recycling. The project will involve the preparation of a Waste Prevention Plan, which will bring Georgia’s waste management sector closer to the EU standards.

In 2022, the Government of Georgia commissioned an important document on Georgia’s circular economy mapping: an assessment of the circularity level of the Georgian economy. According to the assessment, the share of circularity in the Georgian economy is 1.3%, translating into a circularity gap of 98.7%. The size of the gap points to the fact that the vast majority of resources being consumed in Georgia are of a primary nature. The country’s economy is largely linear (GSNE Orchis, 2022).

Georgia's economy consumes 315 million tons of resources per year, which amounts to 78 tons per capita. Over the past few years, the figure has been rising. A circularity level of 1.3% does not mean that 98.7% of resources end up as waste. Several factors contribute to the circularity gap: the majority of raw material consumed (40,056,014 tons) is added to material assets in the form of buildings and infrastructure, while 1,355,355 tons of raw material exist in the form of potentially recyclable biomass, such as wood products and cash crops. The target for the next 5–10 years is to improve the share of circularity from 1.3% to 6.6%. It is important to mention that Georgia is currently working on a National Roadmap to a Circular Economy. The Government of Georgia established the Inter-Ministerial Coordination Board to facilitate the transition to a circular economy in the country. The Plenary Meeting in October 2023 was organized by the MEPA and GSNE "Orchis" to discuss the main steps required for the development of the National Roadmap to a Circular Economy for Georgia.

Challenges for implementation

Georgia's most important political document on waste management contains no national indicators for the reuse of packaging material but establishes overall target values for recycling.

Table. 1. Minimum Targets for Waste Management

Packaging materials for deposit	2026	2030
Recycling Targets	80%	91%
Plastic (bottles)	80%	91%
Metals (cans)	80%	91%
Non-deposit packaging material	**2026**	**2030**
Recycling Targets	41%	57%
Paper	51%	69%
Plastic	10%	10%
Glass	48%	66%
Metals	31%	46%
Wood	13 %	21%

We can identify several main challenges related to the implementation of the main principles of circularity and the development of reuse systems in Georgia:

• Waste prevention mechanisms and related incentives are insufficient. Georgia lacks a well-functioning eco-labelling system and mechanisms. There is relatively low awareness of the importance of plastic waste prevention, reuse, sorting and recycling among the public.

• The need to understand best practices related to the involvement of EPR organizations in developing reuse systems.

• The need to raise awareness among business operators and the general public.

In Georgia, total municipal waste produced in 2021 reached 1,104,952 tons, of which cities produced 768,257 tons and rural areas were responsible for 336,695 tons. An analysis of waste streams and studies of their composition shows that municipal waste consists of a combination of organic waste (54.7%), plastic waste (13.8%), paper and cardboard (10.6%), glass (2.3%), metals (1.4%) and other (11%) (The Decree of the Government of Georgia, 2022). Packaging waste is responsible for a significant share of municipal waste, which points to the importance of developing reuse systems. Within the broader category of packaging waste, single-use packaging waste (plastic, paper/cardboard) is responsible for the largest share. Such packaging is common in the hospitality, HoReCa, beverage and retail sectors. Accordingly, it would be appropriate to target these sectors for promoting reusable packaging alternatives.

Conclusions

Circular economy is a game-changer for Georgia, which is trying to take steps towards sustainable development and address serious issues such as efficient waste management, depletion of natural resources and environmental pollution. The country's geographical location, biodiversity and commitments under the Association Agreement with the European Union create favorable conditions for integrating the circular model into both economic and environmental policies.

Georgia has already taken some steps in this direction, but deeper structural changes and a systemic approach are needed. In particular, it is necessary to integrate circular principles into national strategies, transform the education system to increase environmental awareness, improve infrastructure, encourage the private sector and actively cooperate with international partners.

Timely and consistent actions will not only accelerate the country's transformation towards a green economy but also create new economic opportunities, jobs and innovative markets. Circular economy for Georgia is not just an alternative approach, it is a necessary strategy for creating a clean, sustainable and competitive environment for future generations.

The transition to a circular economy is a shared responsibility of both governments and stakeholders. National governments must provide a comprehensive set of policies, regulations, financial and economic instruments that enable local and regional authorities to shape their vision based on shared goals. Raising awareness and teaching about the circular economy in the education system is also necessary.

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The Impact of Government Support on the Productivity of the Grain Sector in Azerbaijan

Abstract

The purpose of the study is to assess how government support measures affect the productivity level of the grain sector in Azerbaijan. In recent years, the country's agricultural policy has provided significant subsidies, benefits and incentive mechanisms to increase yields and production sustainability. However, the practical effectiveness of these measures has not been fully studied.

The paper uses methods of comparative and statistical analysis based on official data on yields and production volumes of grain crops in recent years. Additionally, a review of regulatory documents and support programs was conducted, as well as a comparison with the experience of other countries where similar tools are used. The results of the study show that government assistance in the form of subsidies for seeds, fertilizers and fuels and lubricants generally has a positive effect on productivity, but the effect strongly depends on the level of technology adaptation, soil conditions and climatic conditions in specific regions. At the same time, there are risks of reduced efficiency due to the uneven distribution of resources and limited access of small farms to support. The practical significance of the work lies in the fact that the findings can be used to adjust agricultural policy, in particular, to develop more targeted incentive tools and introduce innovative methods of production management in the grain sector.

Keywords: *state support, grain sector, Azerbaijan, productivity, subsidies, agricultural policy, sustainable development*

Introduction

The relevance of the topic.

The grain sector is one of the key areas of Azerbaijan's agrarian economy, as it is grain crops that form the basis of the country's food security. Population growth, changing consumption patterns and the need to reduce dependence on imports reinforce the importance of stable production of wheat, barley and other grains. In modern conditions, government support is becoming an important tool for the development of the industry, which is aimed at increasing yields and providing farmers with the necessary resources.

The problem and the gap in research

Despite the fact that Azerbaijan has numerous subsidy and support programs for agricultural producers, the scientific literature has not yet sufficiently covered the issues of their real impact on the productivity of the grain sector. In particular, there is no systematic analysis showing how much support measures contribute to the introduction of modern technologies, cost optimization and

increased economic efficiency of farms. In addition, the regional impact of government policy on the yield and sustainability of grain production has not been sufficiently studied.

Purpose and research issues

The purpose of this article is to analyze the impact of government support on the productivity of the grain sector in Azerbaijan. The main research issues are:

1. To what extent do the existing subsidy mechanisms affect the level of yields and gross grain production?
2. What factors limit the effectiveness of government assistance?
3. What areas of government policy require adjustments to increase the sustainability of the industry?

Materials and methods

The study is based on the analysis of statistical data on the production and yield of grain crops in Azerbaijan over the past ten years. The sources of information were the official reports of the State Statistics Committee of Azerbaijan, materials from the Ministry of Agriculture, as well as regulatory documents regulating state support for the agricultural sector. To assess the impact of subsidies and preferential mechanisms, a comparative method was used: the indicators of yield and gross grain production before and after the implementation of support programs were compared with each other (Nguyen et al., 2023). Additionally, correlation analysis methods were used to identify the relationship between the amount of subsidies provided and the level of productivity in different regions of the country (Nguyen et al., 2023). In addition to quantitative data, qualitative materials were taken into account in the work — the results of expert interviews with representatives of farms and agricultural specialists (Sha, 2024). This approach made it possible to supplement the statistical analysis with practical observations and identify factors that are not always recorded in official reports (for example, the availability of subsidies for small farms, administrative barriers, differences in the level of technology adoption) (Mamun, 2024).

Thus, the applied methodology combines the analysis of secondary data, comparative and correlation methods, as well as elements of qualitative research. This provides a comprehensive approach to assessing the effectiveness of government support for the grain sector (Li et al., 2022).

Results and discussion

The analysis showed that the state support of the grain sector of Azerbaijan as a whole had a positive impact on the dynamics of yields and production volumes. Thus, in regions with active use of subsidies for seeds, fertilizers and fuel, there was a higher rate of yield growth compared to farms where access to these measures was limited. The effect was especially noticeable in the central and western regions of the country, where modern technologies of tillage and mechanization were introduced along with state support (SSRN Paper, 2023/2024). However, significant limitations have also been identified. First, the effect of subsidies is heterogeneous: large farms have easier access to benefits, while small farmers face bureaucratic obstacles and lack of information (McArthur, 2017). Secondly, government support is often focused on direct cost reduction, but it does not always stimulate the introduction of innovative solutions (for example, precision farming systems or moisture-saving technologies) (Minviel & Latruffe, 2017). The regional specifics deserve special attention. In arid areas, even with subsidies, yields remain below average due to limited water resources and soil degradation (Mustafayeva, Abbasova, Qambarova & Bayramova, 2024). At the same time, subsidies provide a significant increase in productivity in areas with favorable climatic conditions. Thus, the results of the study confirm that government support plays an important role in stabilizing grain production, but its effectiveness depends on the quality of resource allocation, the level of implementation of modern technologies and consideration of regional differences (Niftiyev, 2023). Optimization of these areas can ensure not only an increase in yields, but also an increase in the sustainability of the entire agricultural sector (Promoting Azerbaijan's Agricultural Productivity, 1997–2010).

Conclusion

The results of the study show that government support is a key factor in the development of the grain sector in Azerbaijan. Subsidies and preferential mechanisms can reduce farmers' costs and partially offset the risks associated with climate and market fluctuations. At the same time, the greatest positive effect is observed in regions where modern agricultural technologies are used simultaneously with state aid and access to resources is provided. At the same time, the identified limitations indicate the need to adjust the current policy. Support should be more targeted so that small and medium-sized farms can benefit equally from subsidies (Morteza Tahamipour & Mina Mahmoudi, 2018). It is important that government programs not only reduce farmers' running costs but also stimulate long-term development — the introduction of innovative technologies, rational use of water and soil resources, and increased production sustainability (Yang, 2023). The practical significance of the analysis lies in the fact that its conclusions can be taken into account when developing new subsidy programs and adjusting existing mechanisms (Yuzbashiyeva, 2024). The implementation of targeted and innovation-oriented policies will increase the productivity of the grain sector, strengthen food security and ensure the sustainable development of agriculture in the country.

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The Role of Digital Financial Inclusion in Reducing Income Inequality in Developing Countries

Abstract

Digital financial inclusion (DFI) has emerged as a vital tool for promoting inclusive economic growth and reducing income inequality in developing countries. This study investigates the relationship between DFI and income inequality by employing a mixed-methods approach, combining panel data regression with case studies from Kenya, India, and Bangladesh. The findings demonstrate a significant inverse correlation between digital financial access and income inequality, measured by the Gini coefficient. The results suggest that DFI enhances financial access, promotes savings, and facilitates entrepreneurial activity, especially among women and rural populations. However, the effectiveness of DFI is influenced by factors such as digital infrastructure, financial literacy, and regulatory quality. The paper concludes with targeted policy recommendations to enhance the inclusiveness and sustainability of digital financial systems.

Keywords: *Digital financial inclusion, income inequality, developing countries, mobile money, financial access, financial literacy, inclusive growth*

Introduction

In recent years, the rapid development of digital technologies has significantly transformed access to financial services. Especially in developing countries, where traditional banking services are often limited, digital financial inclusion (DFI) offers viable alternatives such as mobile money, e-wallets, and online banking platforms. DFI refers to the use of digital platforms to access formal financial services like savings, credit, insurance, and payments, thereby integrating underserved populations into the financial system.

This paper aims to investigate how digital financial inclusion can reduce income inequality in developing countries. It seeks to answer the following research questions:

- How does DFI impact income inequality?
- Which digital financial tools are most effective?
- In which countries or regions has DFI proven successful?

These questions are examined through a review of relevant literature, analysis of empirical data, and case studies from selected countries.

Literature Review

Digital financial inclusion (DFI) has emerged as a central topic in development economics, recognized for its potential to reduce poverty and enhance inclusive economic development. Scholars and international development organizations argue that access to digital financial services (DFS) can help mitigate income inequality by empowering marginalized groups, enhancing financial access, and promoting entrepreneurial activities.

Theoretical Foundations. Financial inclusion is rooted in development theories emphasizing equitable access to financial tools. The World Bank (2022) notes that financial inclusion supports development by enabling individuals to manage risk, save, and invest. Endogenous growth theories also highlight the role of technology in integrating excluded populations into formal financial systems.

Empirical research in Kenya (Jack & Suri, 2014), India (Chakraborty & Sane, 2020), and broader international studies (IMF, 2020) suggests that digital finance can alleviate poverty, diminish income

inequality, boost personal savings, and support small business growth. The IMF (2021) also developed a composite DFI index showing a persistent negative relationship with inequality levels in multiple countries.

In addition, Yang et al. (2023) argue that DFI acts as a mediating mechanism that mitigates structural determinants of inequality. Similar cross-country evidence confirms that DFI contributes to lower income inequality (Omar & Inaba, 2020).

Challenges: DFI is limited by digital literacy, infrastructure gaps, and regulatory issues. There is also concern about the rise of unregulated digital lending.

Research Gaps: More longitudinal and region-specific studies are needed to fully understand the long-term impacts of DFI on inequality.

Research

This study adopts a **mixed-methods approach**, combining quantitative analysis of cross-country data with qualitative insights from case studies to assess the role of digital financial inclusion in reducing income inequality in developing countries.

The research is structured around two core components:

Econometric analysis to evaluate the statistical relationship between digital financial inclusion and income inequality.

Case study comparison to provide contextual depth and real-world illustrations from selected developing countries.

Data Sources

The analysis draws on secondary data from reputable international databases:

World Bank Global Findex Database: provides data on financial inclusion indicators (e.g., account ownership, mobile money usage).

International Monetary Fund (IMF): supplies macroeconomic indicators, including income inequality measures like the **Gini coefficient**.

GSMA Mobile Economy Reports: offers data on mobile connectivity and usage.

World Development Indicators (WDI): used for control variables such as GDP per capita, education levels, and urbanization rates.

Variables and Model Specification

Dependent Variable:

Income Inequality, proxied by the **Gini coefficient**, where higher values indicate greater inequality.

Key Independent Variables:

DFI Index (constructed from data on mobile money account ownership, digital payments, and formal financial access).

Mobile phone penetration rate

Internet access percentage

Control Variables:

GDP per capita (PPP)

Educational attainment

Urban population (%)

Inflation rate

Regression Model:

$GINI_{it} = \beta 0 + \beta 1\ DFI_{it} + \beta 2\ X_{it} + \mu_i + \varepsilon_{it}$

Case Study Selection

Three countries will be examined to illustrate different stages and strategies of DFI:

Kenya: a pioneer in mobile money services (M-Pesa)

India: rapid expansion of digital public infrastructure (e.g., UPI)

Bangladesh: significant usage of digital wallets like bKash in poverty alleviation

These countries represent diverse geographic, regulatory, and technological contexts, providing a broader understanding of how DFI interacts with inequality dynamics.

Findings and Discussion

Furthermore, infrastructure development and technological innovation are key drivers of successful DFI implementation (Digital Financial Inclusion…, 2023).

Contemporary African-based research indicates that financial inclusion powered by FinTech innovations significantly contributes to narrowing income disparities (Girma & Huseynov, 2024).

This section presents the results of the econometric analysis and case studies, interpreting how digital financial inclusion influences income inequality in developing countries.

Quantitative Findings

These findings are consistent with other empirical models showing a negative relationship between DFI and the Gini index across emerging economies (Modelling the Effect…, 2025).

The regression results indicate a **statistically significant and negative relationship** between digital financial inclusion (DFI) and income inequality (measured by the Gini coefficient). Specifically:

A **1% increase in digital financial access** (e.g., mobile money usage, digital payments) is associated with a **0.3 to 0.5 point reduction in the Gini coefficient**, controlling for other factors.

Mobile phone penetration and **internet usage** are also negatively correlated with inequality, suggesting that digital infrastructure is a key enabler of inclusive financial access.

GDP per capita and education levels show expected negative relationships with inequality, reinforcing that DFI works best in tandem with broader socio-economic improvements.

These results support the hypothesis that **enhancing access to digital financial services contributes to a more equitable income distribution**, particularly in low-income and rural areas.

Case Study Insights

Kenya (M-Pesa)

The introduction of M-Pesa transformed financial access for low-income individuals in rural Kenya. Research by Jack and Suri (2016) showed that mobile money helped over **194,000 households escape poverty** by facilitating savings, reducing transaction costs, and enabling microenterprise growth. Women benefited disproportionately, with many gaining financial independence through mobile savings groups and digital remittances.

India (Digital Payments and PMJDY)

India's Pradhan Mantri Jan Dhan Yojana (PMJDY), launched in 2014, aimed to bring every household into the formal banking system. Combined with Aadhaar (digital ID) and UPI (unified payment interface), it created a robust digital financial infrastructure. According to Chakraborty & Sane (2020), this initiative significantly increased financial inclusion, especially among rural and poor populations, and contributed to **reducing income inequality** over time.

Bangladesh (bKash)

In the case of China, Wen et al. (2024) found that DFI significantly reduced the urban –rural income gap, particularly when aligned with structural economic reforms and education initiatives.

In Bangladesh, bKash has become a dominant player in digital finance, with widespread use among the urban and rural poor. bKash services have improved remittance efficiency, enabled small-scale entrepreneurship, and promoted savings. Studies suggest that households using bKash report **higher income stability** and resilience to economic shocks compared to those without access.

Discussion

The combined findings show that **digital financial inclusion acts as a tool for economic empowerment**. By lowering entry barriers to financial systems and reducing reliance on informal mechanisms, DFI enables:

Increased **savings and investment** by low-income individuals

Greater **entrepreneurial activity**, especially among women and youth

More efficient and transparent **cash transfer programs** (e.g., government subsidies)

However, the benefits of DFI are **not automatic**. The impact is influenced by factors such as:

Regulatory quality

Financial and digital literacy

Network infrastructure and affordability
Gender norms and sociocultural factors

Conclusion

This is further supported by recent evidence showing that digital technology, when integrated with financial inclusion programs, enhances income equality outcomes (Financial Inclusion and Digital Tech…, 2024).

This study explored the role of **digital financial inclusion (DFI)** in reducing income inequality in developing countries through a combination of quantitative analysis and case studies. The findings provide strong evidence that access to digital financial services—such as mobile money, digital payments, and online banking—can significantly reduce income disparities, particularly by empowering marginalized and low-income populations.

Empirical results demonstrate that higher levels of digital financial access are associated with **lower Gini coefficients**, even after controlling for economic development, education, and urbanization. Evidence from Kenya, India, and Bangladesh reveals that customized digital financial initiatives have delivered tangible social and economic improvements, such as alleviating poverty, promoting savings, and enhancing the financial inclusion of women and rural communities.

However, the analysis also highlights several **structural challenges**—such as infrastructure limitations, digital literacy gaps, and regulatory shortcomings—that can undermine the impact of DFI if left unaddress.

Policy Recommendations

To fully harness the potential of digital financial inclusion as a tool for reducing income inequality, the following policy measures are recommended:

1. Invest in Digital Infrastructure Governments should expand affordable internet access and mobile network coverage, especially in rural and underserved regions. Public-private partnerships can be effective in financing and deploying this infrastructure.

2. Promote Financial and Digital Literacy

Promoting both financial and digital literacy can have spillover benefits for health and overall wellbeing (Naveenan et al., 2024).

Educational campaigns and school-based financial education can increase the ability of individuals to use digital financial tools safely and effectively. Special focus should be given to women, the elderly, and low-income groups.

3. Strengthen Regulatory Frameworks

The effectiveness of DFI is also influenced by institutional quality. Countries with stronger governance frameworks are more likely to see positive outcomes (Digital Inclusion or Exclusion…, 2025).

A supportive legal environment that ensures consumer protection, cybersecurity, and interoperability of digital financial systems is essential. Regulation should also prevent exploitative practices such as predatory lending by fintech platforms.

4. Encourage Inclusive Innovation

Fintech solutions should be designed with the needs of excluded populations in mind. For example, mobile apps should be available in local languages and offer voice-based interfaces for low-literacy users.

5. Leverage DFI for Social Protection Programs

Digital financial systems can be integrated into government transfer programs (e.g., cash transfers, food subsidies) to ensure transparency, reduce leakage, and increase the efficiency of poverty alleviation schemes.

Final Thought

Digital financial inclusion is not a silver bullet, but it is a powerful enabler of equitable growth. When combined with appropriate policies and institutional support, DFI can significantly contribute

to reducing income inequality and building more resilient and inclusive economies in the developing world.

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Prospects for Innovative Development of Entrepreneurial Entities in the Republic of Azerbaijan

Abstract

This article examines the prospects for innovative development among entrepreneurial entities in the Republic of Azerbaijan. It explores the country's strategic efforts to diversify its economy beyond the oil sector by fostering innovation-driven entrepreneurship. The analysis highlights key government initiatives, emerging sectors with high innovation potential, challenges faced by startups and small and medium sized enterprises (SMEs). Recommendations are provided to enhance the entrepreneurial ecosystem through improved access to finance, stronger collaboration between academia and industry, and the promotion of a culture of innovation. Overall, Azerbaijan's proactive approach and growing infrastructure present promising opportunities for sustainable economic growth through innovative entrepreneurship.

Keywords: *Azerbaijan, innovation, entrepreneurship, startups, economic diversification, government policy, renewable energy, entrepreneurial ecosystem, sustainable development*

Introduction

The Republic of Azerbaijan, situated at the crossroads of Eastern Europe and Western Asia, has emerged as a promising hub for entrepreneurial growth and innovation. Over the past decades, Azerbaijan has made significant strides in economic diversification, focusing on fostering innovation to reduce dependence on oil and gas revenues. This article explores the prospects for innovative development among entrepreneurial entities in Azerbaijan, highlighting the country's strategic initiatives, challenges, and future potential.

Economic Context and Entrepreneurial Landscape

Azerbaijan's economy has traditionally been dominated by the energy sector, particularly oil and gas. However, recognizing the need for sustainable growth, the government has actively pursued policies to diversify the economy and promote non-oil sectors. Entrepreneurship has become a critical driver in this shift, with increasing attention on small and medium-sized enterprises (SMEs) and startups that emphasize innovative approaches.

The entrepreneurial ecosystem in Azerbaijan is gradually expanding, supported by infrastructure improvements, educational reforms, and digital transformation initiatives. Government programs such as "Startup Azerbaijan" and support from organizations like the Azerbaijan Innovation and Entrepreneurship Center (AIEC) have laid the foundation for nurturing innovation-driven businesses.

Government Support and Policy Framework

One of the strongest factors propelling innovative development in Azerbaijan is the proactive role of the government. Key policy measures include:

- **Strategic Development Plans**: The "Strategic Roadmaps for National Economy and Main Economic Sectors" outlines innovation as a cornerstone for economic growth.
- **Financial Incentives**: Tax breaks, grants, and subsidized loans are offered to innovative startups and SMEs.
- **Legal Framework Enhancements**: Reforms in intellectual property rights, business registration, and licensing processes make it easier for entrepreneurs to protect and commercialize their innovations.

- **Infrastructure Development**: Establishment of technology parks, business incubators, and innovation centers across major cities.

Key Sectors for Innovation

Several sectors in Azerbaijan present significant opportunities for entrepreneurial innovation:

1. Information and Communication Technology (ICT)

Azerbaijan's growing digital infrastructure and government investment in digital transformation create fertile ground for tech startups focusing on software development, AI, fintech, and e-commerce.

2. Agriculture and Agritech

Introducing innovative technologies like precision farming, IoT sensors, and bioengineering can revolutionize Azerbaijan's traditional agriculture sector, improving productivity and sustainability.

3. Renewable Energy

With abundant natural resources like wind and solar power potential, innovative enterprises in renewable energy technology are poised for growth.

4. Tourismand Hospitality

Leveraging digital marketing, virtual reality, and smart management systems, startups can enhance Azerbaijan's appeal as a tourist destination.

Challenges to Innovative Development

Despite promising prospects, several challenges remain:

- **Access to Capital**: Many startups face difficulties securing funding beyond initial stages, as venture capital and private equity markets are still developing.
- **Limited R&D Infrastructure**: Investment in research and development remains low compared to global benchmarks, limiting breakthrough innovations.
- **Talent Retention**: Brain drain remains an issue, with skilled professionals often seeking opportunities abroad.
- **Market Size**: The relatively small domestic market limits scalability for some entrepreneurial ventures.

Future Prospects and Recommendations

To fully realize the innovative potential of entrepreneurial entities in Azerbaijan, a multi-faceted approach is essential:

- **Enhancing Collaboration**: Strengthening ties between academia, industry, and government can accelerate knowledge transfer and commercialization of research.
- **Expanding Access to Finance**: Developing venture capital ecosystems and encouraging angel investment will provide capital critical growth.
- **Fostering Entrepreneurial Culture**: Promoting entrepreneurship education and innovation mindset from early schooling to university levels.
- **Regional and International Integration**: Encouraging startups to access regional and global markets through partnerships and trade agreements.

The ongoing digitalization and smart city projects in Azerbaijan also provide new platforms for innovation, allowing entrepreneurs to create scalable solutions that can be replicated beyond national borders.

Case Studies of Successful Innovative Enterprises

To better understand the landscape of innovation-driven entrepreneurship in Azerbaijan, it is useful to examine specific examples:

- **Smart Agro Solutions**: A Baku-based startup that integrates IoT devices and AI analytics to optimize irrigation and crop health monitoring. This enterprise has helped local farmers increase yields while reducing water consumption, showcasing the potential of agritech innovation in Azerbaijan's traditional agriculture sector (Azerbaijan Innovation Agency, 2023).
- **FinTech Lab**: This fintech startup provides digital payment and micro-lending services tailored to underserved populations in Azerbaijan. Supported by government incubation programs, it

represents how financial innovation can increase financial inclusion and support small business growth (World Bank, 2022).

- **SolarTech LLC**: A renewable energy company focusing on affordable solar panel manufacturing and installation. SolarTech has partnered with international organizations to pilot solar projects in rural areas, contributing to the diversification of the national energy mix (International Renewable Energy Agency, 2022).

Emerging Technological Trends

Entrepreneurs in Azerbaijan are increasingly leveraging cutting-edge technologies that align with global trends:

- **Artificial Intelligence (AI) and Machine Learning**: AI-powered applications in sectors such as healthcare diagnostics, logistics, and customer service are gaining traction, supported by a growing talent pool trained in STEM fields (UNDP Azerbaijan, 2021).
- **Blockchain and Cryptocurrency**: Interest in blockchain technology is rising, especially for secure financial transactions and supply chain transparency. The government's ongoing discussions about regulatory frameworks for cryptocurrencies signal openness to innovation in this area (WIPO, 2021).
- **E-commerce and Digital Platforms**: The rapid growth of internet penetration and mobile usage in Azerbaijan facilitates the expansion of online marketplaces, connecting local producers and consumers while opening export opportunities (Asian Development Bank, 2020).

Regional and International Cooperation

Azerbaijan's strategic location on the Silk Road corridor presents unique opportunities for regional cooperation in innovation:

- **Caspian Economic Cooperation**: Collaborative initiatives between Azerbaijan and neighboring countries such as Georgia, Turkey, and Kazakhstan aim to foster knowledge exchange, joint ventures, and technology transfer, enhancing innovation ecosystems beyond national borders (Caspian Center for Economic Research, 2022).
- **Participation in International Programs**: Azerbaijan actively participates in EU Horizon projects, the United Nations' Innovation Network, and bilateral innovation partnerships that provide funding, expertise, and market access to Azerbaijani startups (European Bank for Reconstruction and Development, 2022).
- **Cross-border Startup Accelerators**: Initiatives like the Trans-Caspian Innovation Hub facilitate mentorship, networking, and seed funding for entrepreneurs from the region, accelerating the scaling of innovative ideas and fostering a competitive environment (IFC, 2023).

Social Impact and Sustainable Development

Innovation in entrepreneurial entities is not only economically important but also socially transformative:

- **Job Creation**: Startups and SMEs in innovative sectors contribute significantly to new employment opportunities, especially for youth and women, addressing unemployment and underemployment challenges (International Labour Organization, 2022).
- **Environmental Sustainability**: Green technologies and circular economy models are increasingly adopted by Azerbaijani entrepreneurs, aligning business growth with global sustainability goals and Azerbaijan's national commitments to climate action (International Renewable Energy Agency, 2022).
- **Inclusive Innovation**: Efforts to make digital technologies accessible to rural and marginalized communities promote social inclusion, ensuring that the benefits of innovation are widely shared (UNDP Azerbaijan, 2021).

Conclusion

The prospects for innovative development of entrepreneurial entities in the Republic of Azerbaijan are bright, fueled by supportive government policies, emerging sectors, and a growing entrepreneurial ecosystem. While challenges persist, strategic investments in infrastructure,

education, and finance will position Azerbaijan as a competitive innovation hub in the region. Encouraging innovation-driven entrepreneurship is vital not only for economic diversification but also for long-term sustainable development in Azerbaijan.

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