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Parvin Verdiyeva
Department of Economics, Baku Eurasian University

Jale Dadashova
Department of Economics, National Aviation Academy

Vuqar Bayramov
Department of Economics, National Aviation Academy

Ruhiyya Aliyeva
Department of Economics, Azerbaijan State University of Economics

<https://doi.org/10.5109/7342461>

出版情報 : Evergreen. 12 (1), pp.387-398, 2025-03. Interdisciplinary Graduate School of Engineering Sciences, Kyushu University, Japan

バージョン :

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Green Growth Strategies for Sustainable Economic Development

Parvin Verdiyeva^{1,*}, Jale Dadashova², Vuqar Bayramov², Ruhiyya Aliyeva³

¹Department of Economics, Baku Eurasian University, Parvin Verdiyeva - AZ1110, 135A H. Aliyev Str., Baku, Azerbaijan

²Department of Economics, National Aviation Academy, Jale Dadashova and Vuqar Bayramov - AZ1045, 30 Mardakan Ave., Baku, Azerbaijan

³Department of Economics, Azerbaijan State University of Economics, Ruhiyya Aliyeva - AZ1001, 6 Istiqlaliyyat Str., Baku, Azerbaijan

*Author to whom correspondence should be addressed:

E-mail: par.verdiyeva@gmail.com

(Received September 24, 2024; Revised December 26, 2024; Accepted February 16, 2025).

Abstract: The study aimed to address the impact of different green policy concepts on economic growth and environmental sustainability. For this purpose, existing green concepts and statistical indicators were analysed, and current green growth strategies in different countries and regions of the world were compared. The study employed conceptual and theoretical analyses to identify the complex interrelationships between economic growth, environmental sustainability, and social well-being that need to be addressed to develop effective green growth and sustainable development strategies. Statistical indicators have led to the conclusion that the world has made progress in social well-being thanks to the Sustainable Development Goals: child mortality, extreme poverty, and the income gap between the rich and poor have been reduced, but environmental problems remain unresolved. It has been established that green growth significantly affects gross domestic product (GDP) and economic growth, opening up new potential for the clean technology, energy efficiency, and renewable energy industries. The examination of Azerbaijan's green strategy revealed the country's efforts to create sustainable resource management practices and renewable energy sources. The policies and initiatives of the United States of America, the European Union, Germany, China, India, Sweden, Norway, Canada, and Australia were also taken into consideration. Through a comparative analysis of the evaluated techniques, suggestions were developed to enhance existing strategies and policies. The findings indicated that in order to achieve sustainable economic growth and environmental improvement, more funding is required as well as the creation of practical measures.

Keywords: energy efficiency; international programmes; eco-innovations; investments; national projects; just transition

1. Prerequisites for the publication

The loss of natural resources, climate change, and environmental degradation are some of the issues that 21st-century economies frequently confront. Ecosystems are not the only things at risk from these issues. The population's welfare and economic stability are also at risk. The unrestrained use of natural resources is one of the main issues. Conventional economic development models lead to irreversible changes in ecosystems, which can impair life quality, reduce biodiversity, and increase the frequency of extreme weather events. These models mainly rely on the depletion of non-renewable resources and environmental pollution. The relationship between rising temperatures and an increase in the frequency of

natural catastrophes, which have a major negative impact on the population and the economy, is another significant risk brought about by climate change. The issue of social injustice and economic inequality also bears on the transition to a green economy. The transition to sustainable development may temporarily increase production and consumption costs in addition to needing significant financial outlays. This could have a negative effect on vulnerable people and worsen social unrest and economic inequality.

Green growth, as defined by the Organisation for Economic Co-operation and Development (OECD), refers to fostering economic growth and development while ensuring that natural resources continue to provide the environmental services essential for human well-being¹⁾.

This strategy promotes eco-friendly technologies, renewable energy, and sustainable consumerism to combat resource depletion and environmental damage. Energy efficiency, waste management, urban greening, and sustainable agriculture are just a few of the fields in which the idea is applicable. There are still many unanswered questions regarding the long-term socioeconomic impacts of green growth, particularly in various geopolitical contexts, despite the fact that current research shows that it has the ability to spur economic innovation and lessen environmental impact. The current study attempts to fill these gaps by looking at both real-world applications of green development strategies in different nations as well as theoretical frameworks like the circular economy and sustainable well-being theory.

Researching sustainable development and green growth policies is essential to creating plans that successfully integrate environmental and financial objectives. Innovative resource management techniques, the creation of renewable energy sources, the mitigation of greenhouse gas emissions, and the establishment of sustainable economic growth circumstances should all be part of these plans. In order to lessen the adverse effects of the shift to a green economy, measures like worker retraining and social support programs are also required. If these tactics are not put into practice, society will be confronted with escalating environmental and economic problems that have the potential to threaten international stability and cause grave losses for coming generations.

A study by R.I. Hasanov²⁾, L. Dogaru³⁾, and M. Capasso et al.⁴⁾ focused on the effectiveness of green policy and prospects for its development. R.I. Hasanov pointed to the need for investment in green technologies and improved regulation to support the transition to sustainable development in Azerbaijan's energy sector. L. Dogaru, in turn, analysed the concepts of green economy and green growth and found that they help reduce harmful environmental impact and improve the quality of life. A similar conclusion was reached by M. Capasso et al., arguing that green growth has significant potential to stimulate economic development while reducing the negative impact on the environment.

The problem of differences between traditional economic growth and green growth was considered by C.I. Fernandes et al.⁵⁾, L.J. Belmonte-Ureña et al.⁶⁾, J. Hickel and G. Kallis⁷⁾. C.I. Fernandes et al. determined that sustainable technologies and innovations can lead to trade-offs that are not always perfectly aligned with economic growth objectives. L.J. Belmonte-Ureña et al. have shown that circular economy and green growth approaches have their unique advantages and challenges, which require further study of the contextual features of countries and regions for the successful implementation of these approaches. Theoretical and empirical evidence of economic growth without harming natural resources and ecosystems was provided by J. Hickel and G. Kallis. The study results showed that green growth is possible but

requires significant changes in approaches to economic development.

S. Ren et al.⁸⁾ and S. D'Alessandro et al.⁹⁾ addressed alternative approaches and strategies. S. Ren et al. determined that the digital economy stimulates inclusive green growth by improving resource efficiency, developing innovative environmental solutions, and creating new jobs. S. D'Alessandro et al. also highlighted various ways to reduce environmental impact and use resources sustainably. Nevertheless, further research is needed to identify mechanisms that facilitate knowledge sharing and technological innovation between institutions and states.

Research on sustainable development and green growth has come a long way, but there are still many substantial gaps that need to be filled. Among these is the requirement for a thorough examination of particular instances of green technology and tactics, together with their long-term impacts on the economy and society. A special focus on the contextual characteristics of nations and areas is necessary for the effective application of different sustainable development strategies.

The goal of the study is to determine how various approaches to sustainable development and green policies affect and are effective in promoting environmental sustainability and economic growth in various nations and areas. The study's objectives included examining the theoretical underpinnings of sustainable development and green growth, such as the ideas of ecosystem services, the circular economy, and sustainable well-being theory; contrasting the approaches taken by Azerbaijan, the EU, the USA, China, India, Scandinavia, Canada, and Australia in terms of green policy; analyzing important initiatives and programs that aim to achieve energy efficiency, develop renewable energy sources, and become climate neutral; and evaluating the influence of green policy on economic growth and innovation; identifying best practices and recommendations for implementing effective green policy and transition to sustainable development.

2. Materials and methods

The principles and tactics of sustainable development and green growth were examined and analysed in this study. Ecosystem services, the circular economy, eco-innovation, just transition, sustainable consumption and production, and eco-design were among the theories taken into consideration. This demonstrated the connection between the implementation of these ideas and sustainable economic growth since recycling and other green theories reduce waste and maximise resource utilisation while also promoting long-term social sustainability.

General information, among other materials, was reviewed in the study on the Sustainable Development Goals (SDGs)¹⁰⁾, Secretary-General's Report on the Advancement of the Sustainable Development Goals¹¹⁾, Sustainable Development: The 17 Goals¹²⁾, and Global

Sustainable Development Report¹³⁾. Data about the SDGs and their effects on child mortality, income, and HIV/AIDS were emphasised and examined, along with the connection between the SDGs and closing the wealth gap between the rich and the poor.

The economic and social benefits of green growth were studied in detail, including creating new jobs in the renewable energy and energy efficiency sectors, improving working conditions, and increasing incomes. The study of the economic, social, and environmental aspects of green growth examined various terms and concepts, which identified relevant patterns and trends. The impact of green technologies on economic growth, the emergence of new markets and industries, the enhancement of production methods and resource efficiency, the assessment of the social impact of green growth on employment, social inequalities, and quality of life, and the assessment of the environmental impact of green technologies were all taken into account in the analysis of the economic aspect. A better quality of life and improved public health are the results of enhancing the environment and lowering the environmental load through the use of green technology, according to the information synthesis.

To review current green growth strategies in the world, the experience of different countries in implementing these strategies was analysed. The selection criteria for the countries include a focus on countries with well-established green strategies and policies that address sustainable development, energy efficiency, and environmental protection. The study specifically took into account countries that have put in place important green growth-related policies or programs, including Azerbaijan, the European Union, the United States, China, India, Sweden, Norway, Canada, and Australia. These nations were selected due to their varied strategies and quantifiable initiatives in sustainable agriculture, renewable energy, and environmental laws.

Azerbaijan's green development policy was studied, which includes the National Sustainable Development Strategy¹⁴⁾, laws and projects aimed at improving energy efficiency¹⁵⁾, the National Water Management Strategy¹⁶⁾, and several environmental laws: Law of the Azerbaijan Republic "On Ecological Safety¹⁷⁾," Law of the Azerbaijan Republic "On Fertility of Lands¹⁸⁾," Law of the Republic of Azerbaijan "On Subsoil¹⁹⁾," Law of the Republic of Azerbaijan "On the Protection of Atmospheric Air²⁰⁾," Law of the Azerbaijan Republic "On Water Supply and Sewage²¹⁾," Law of the Republic of Azerbaijan "On Environmental Protection²²⁾," Water Code of the Azerbaijan Republic²³⁾, and international agreements such as the Paris Climate Agreement²⁴⁾ and the United Nations (UN) Sustainable Development Goals (hereinafter SDG)²⁵⁾.

The study also considered: The European Green Deal²⁶⁾ and Horizon Europe programme²⁷⁾ of the European Union, the energy turnaround²⁸⁾ and KfW – Responsible banking

programme²⁹⁾ in Germany, the Inflation Reduction Act of 2022³⁰⁾ in the United States and Belt and Road Initiative of China, and Clean India mission³¹⁾ of India and EcoAction Community Funding Programme³²⁾ and green energy innovation funding. The reviewed programmes were compared, which identified successful practices in the development and implementation of green policies, as well as challenges and obstacles faced by countries in their implementation.

3. Results

3.1 Key concepts and theories of green growth strategy: Effectiveness of SDGs

For a deeper understanding of the issues of this study, it is necessary to address several theoretical aspects that go beyond the generally known information about climate change and natural resource depletion. One such aspect is the concept of ecosystem services (or benefits). Ecosystem services refer to the many benefits that ecosystems provide to humankind, such as crop pollination, climate regulation, water purification, and biodiversity support. Scientists believe that underestimation and degradation of these services can lead to significant economic losses³³⁻³⁵⁾. Ecosystem services are an important element in a green growth strategy, as their maintenance and restoration contribute to long-term economic sustainability.

A further key idea in theory is the closed-loop economy. A circular economy, as opposed to a linear one that operates on the take-produce-dispose model, aims to maximise resource utilisation and minimise waste through recycling and reuse³⁶⁾. This concept not only lessens the impact on the environment but also creates new jobs and avenues for creativity in the recycling and reuse of resources. In order to achieve truly sustainable development, the theory of sustainable well-being advocates for the integration of social, economic, and environmental factors. This includes switching from using gross domestic product (GDP) as the only indicator of success to more inclusive metrics that take social equity, quality of life, and environmental sustainability into account. Metrics such as the Human Development Index (HDI) and the Ecological Footprint Index are believed to offer a more comprehensive view of progress and well-being³⁷⁻³⁹⁾.

Examining the phenomenon of eco-innovation is also pertinent. New methods and technologies that support sustainable development, such as sustainable agriculture, green building, and renewable energy, are referred to as eco-innovations. Scientists concur that those favourable conditions, such as encouragement of private investment, support for research and development, and the formation of regulatory frameworks, are necessary for the development and application of eco-innovations. Furthermore, the idea of a just transition is a crucial theoretical component. A just transition suggests that all

social groups' interests, particularly those of the most vulnerable and least protected, should be taken into account when making the adjustments required to achieve sustainable development. Among the ways to achieve a just transition, scholars point to the development of policies and programmes that support workers affected by the transition to a green economy through training, retraining, and the creation of new employment opportunities.

In addition, the idea of sustainable production and consumption is crucial to green growth. In order to lessen the load on the environment, this idea emphasises altering patterns of consumption and production. It does this by creating ecologically friendly products and services, encouraging sustainable supply chains, and increasing consumer knowledge of the effects their decisions have on the environment. The creation of goods and procedures known as "ecodesign" takes into account a product's complete life cycle, from the point of design until disposal. Reducing emissions and waste, increasing energy efficiency, and minimising resource consumption are the core tenets of eco-design. Understanding the intricate linkages that exist between social progress, environmental sustainability, and economic growth is essential for creating strategies that promote green growth and sustainable development. This understanding is based on the theories and concepts that have been studied.

Green growth and sustainable development are moving up to the top of the international agenda in response to environmental concerns and changes. The need to update conventional development models is a result of the pursuit of a balance between environmental preservation and economic growth. The ambitious plan with 17 targets to be accomplished by 2030 was given by the Sustainable Development targets, which were suggested at the 2012 Rio+20 summit. Three main areas were addressed by these objectives: environmental protection, social welfare, and economic development¹²⁾. It is noteworthy that the world's social well-being has significantly improved over the past few decades: child mortality has more than halved, the number of people living with HIV/AIDS has decreased by nearly 40%, and more than a billion people have been lifted out of extreme poverty. The COVID-19 pandemic's aftereffects, economic instability, conflicts, and climate crisis obstacles are impeding the attainment of these objectives, nevertheless¹⁰⁾.

Other statistics reviewed showed that, overall, the achievement of all the SDGs by 2030 is highly doubtful, as only 17% of the targets are on track. At the same time, 35% of the targets showed no progress or regression, and 48% showed insufficient progress¹¹⁾. The dynamics of the global income gap are shown in Fig. 1.

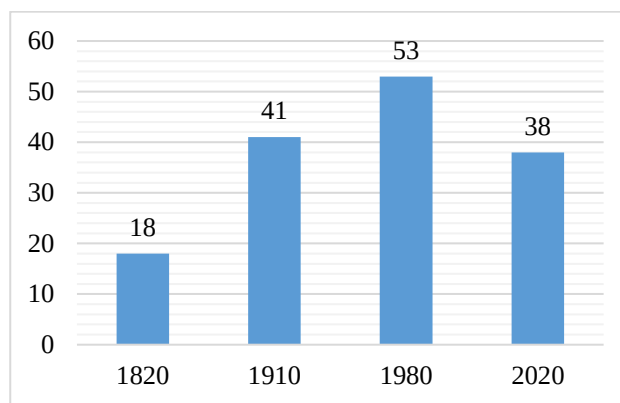


Fig. 1: The ratio of the average income of the richest 10% of the global population to the average income of the poorest 50%.

Source: compiled by the authors based on the *Global Sustainable Development Report*¹³⁾

The income difference peaked in 1980 and then started to diminish, eventually surpassing the levels from 1910. These findings might point to the benefits of SDG projects and other social programs; sustainable practices that boost socioeconomic development and lessen inequality are starting to show tangible effects. A focused approach to incorporating social and environmental factors into economic policy can significantly raise living standards and lessen social inequality. This makes achieving goals like raising income inequality and expanding access to essential services like health and education possible, which ultimately helps create a society that is more sustainable and equitable.

3.2 Economic, social and environmental aspects of green growth

Green growth contributes to GDP and economic development by stimulating new economic opportunities in the renewable energy, energy efficiency, and clean technology sectors, which contributes to job creation, increased innovation, and a better quality of life. Improving resource efficiency and reducing dependence on hydrocarbons contribute to sustainable economic growth and reduce economic risks associated with climate change and resource depletion. The transition to sustainable practices requires initial investment but ultimately leads to lower operating costs and risks, increased resource efficiency, and reduced environmental impact. This helps to increase the competitiveness of companies, create new market opportunities, and strengthen their reputation among consumers, investors, and the public; sustainable practices help to attract talented employees, improve brand image, and reduce the risks of social instability.

Green technologies and innovations play a key role in stimulating economic growth. They create new markets and business opportunities, for example, in renewable energy and energy-efficient technologies, which opens new industries and sectors⁴⁰⁾. Green technologies improve

production processes and increase resource efficiency, reducing operating costs and positively impacting the competitiveness of companies. Investments in green technologies also enhance the innovation potential of the economy, promote research and development, attract highly skilled professionals, and stimulate the creation of new technologies⁴¹⁾. In addition, green innovations improve the environment by reducing the costs of environmental rehabilitation and climate change adaptation. Green growth has a significant impact on employment and social equality; it creates new jobs in sectors related to renewable energy, energy efficiency, sustainable construction, and environmental management. Many skill sets are needed in this industry, from engineers and researchers to installation and maintenance workers, which leads to a rise in employment and a wider range of career options. Significantly, green growth raises workplace standards by giving workers better and safer working environments. Numerous green technologies are designed to lessen their negative effects on the environment and enhance public health, both of which lower occupational risks and morbidity. Furthermore, the adoption of green technologies and sustainable development initiatives can lessen reliance on energy, increase the availability of clean resources, and facilitate access to energy-efficient solutions. These benefits are particularly crucial for vulnerable populations like low-income families and those living in rural areas.

The social cohesion and quality of life are greatly impacted by green growth. Improving the environmental state is crucial. Green technology and sustainable development methods contribute to a decrease in soil, water, and air pollution, which enhances human health and lengthens life expectancy⁴²⁾. Social welfare is directly impacted by the economic advantages of green growth, since rising living standards, better working conditions, and the creation of new jobs in the energy efficiency and renewable energy sectors all contribute to the reduction of social inequality. The creation of parks and green spaces, together with the greening of urban spaces, improves the ambiance of cities by lowering noise pollution and heat waves, which makes inhabitants feel more comfortable and safer⁴³⁾. The fact that green growth strengthens social capital and social responsibility is another important benefit. Social cohesion and a healthy public discourse are strengthened when residents take part in environmental projects, public consensus grows around environmental issues, and awareness of the need for sustainable development rises.

Green growth has a significant impact on reducing emissions and improving air quality. Energy-efficient technology in industry and transportation, along with renewable energy sources like solar and wind power, contribute to the reduction of pollutants and greenhouse gas emissions. In addition to lessening the adverse effects on the climate, cutting back on emissions from factories and automobiles also lowers the population's risk of

respiratory and cardiovascular disorders. Measures to preserve biodiversity and natural resources, which are aimed at the sustainable use of ecosystems, are also a component of green growth. To this end, initiatives are being taken to create and protect nature reserves, parks, and other protected areas and to introduce sustainable agricultural and forestry practices. The main strategies include sustainable forest management, restoration of degraded land, protection of water resources, and support for biodiversity. These measures are aimed at ensuring the long-term sustainability of ecosystems and preserving natural resources for future generations.

3.3 Analysis of current green growth strategies

Azerbaijan is implementing various policies and programmes to support green growth and sustainable development. Azerbaijan has developed a National Sustainable Development Strategy that includes elements of green growth¹⁴⁾. The goals of the strategy are aimed at improving energy efficiency, reducing greenhouse gas emissions, and developing renewable energy sources. The strategy pays special attention to environmental protection and sustainable use of natural resources.

Azerbaijan's policy is also aimed at developing renewable energy sources, diversifying the energy sector, increasing the share of renewable energy sources (solar and wind), and reducing dependence on hydrocarbon resources. The programme is implementing projects to build solar and wind power plants, which have increased the generation of green electricity from solar power plants by 93 times from 2013 to 2019. Azerbaijan is actively planning laws and projects aimed at improving energy efficiency in industry, transport, and the housing and utilities sector by modernising infrastructure, introducing energy-saving technologies, and raising public awareness of the importance of energy efficiency¹⁵⁾. The National Water Resources Management Strategy in Azerbaijan includes steps to improve water management, including measures to protect water bodies, improve water supply and sanitation, and reduce water pollution¹⁶⁾.

Azerbaijan has adopted several laws and regulations aimed at environmental protection, waste management, biodiversity protection, and forest conservation. These laws set standards and requirements for the prevention of environmental pollution and the sustainable use of natural resources: Law of the Azerbaijan Republic "On Ecological Safety¹⁷⁾," Law of the Azerbaijan Republic "On Fertility of Lands¹⁸⁾," Law of the Republic of Azerbaijan "On Subsoil¹⁹⁾," Law of the Republic of Azerbaijan "On the Protection of Atmospheric Air²⁰⁾," Law of the Azerbaijan Republic "On Water Supply and Sewage²¹⁾," Law of the Republic of Azerbaijan "On Environmental Protection²²⁾," Water Code of the Azerbaijan Republic²³⁾. In addition to domestic policy, Azerbaijan is actively involved in international initiatives and agreements aimed at sustainable development and environmental protection, such as the Paris Climate

Agreement²⁴⁾ and the UN SDGs²⁵⁾. These policies and programmes indicate Azerbaijan's commitment to sustainable development and green growth; they often focus on environmental protection, energy efficiency, and the development of renewable energy sources.

Numerous laws and initiatives are also being implemented in other nations to support sustainable development and green growth. The current green policy in the European Union aims to achieve carbon neutrality by 2050²⁶⁾. It consists of steps to lower greenhouse gas emissions, transition to renewable energy, enhance energy economy, and enhance energy efficiency. Research and innovation in sustainable development, encompassing green technologies and environmental solutions, are funded under the Horizon Europe²⁷⁾ initiative. Germany's Energy Transition (Energiewende) policy aims to increase energy efficiency, decrease reliance on fossil fuels, and shift to renewable energy sources²⁸⁾. KfW Responsible Banking Programme²⁹⁾: This programme provides financial support for environmental innovation projects that enhance energy efficiency, develop renewable energy sources, and lower emissions.

Released in 2022, the US Inflation Reduction Act of 2022³⁰⁾, includes significant investments in renewable energy, green technologies, and climate change mitigation strategies. The 14th Five-Year Plan of China includes a Green Development Plan that attempts to promote

renewable energy sources, enhance energy efficiency, and lower emissions. Green initiatives and environmental criteria for infrastructure developments in partner nations are also part of the Belt and Road Initiative. Enhancing waste management and sanitation is part of the Clean India Mission program³¹⁾, which also helps the country's environmental performance. While Norway is actively working to cut emissions, a large portion of this effort is tied to the advancement of electric vehicles and renewable energy sources within the Nordic region. The Canadian climate plan, "A healthy environment and a healthy economy³⁹⁾" includes measures to reduce greenhouse gas emissions, develop green technologies, and create jobs in environmentally friendly sectors. The EcoAction Community Funding Programme³²⁾ finances local environmental projects aimed at protecting nature, improving air and water quality, and raising awareness of sustainable development issues.

The ARENA Renewable Energy Agency finances innovative renewable energy projects, including solar, wind, and hydroelectricity. The policies and programs under evaluation illustrated the variety of national approaches to sustainable development and green growth while emphasising the value of cross-border collaboration and experience sharing in this field. Table 1 compares various strategies for implementing green policy.

Table 1. Approaches to green policy in the world.

Country/union/region	Approach	Main features
Azerbaijan	Integration of green growth into national sustainable development strategies and economic programmes	Development of renewable energy sources, improving energy efficiency and protecting the environment through the National Sustainable Development Strategy
European Union	Integration of green growth into all aspects of policy through the European Green Deal	The goal of achieve climate neutrality by 2050, the development of a circular economy, and significant investments in research and innovation
USA	Federal and regional initiatives with a focus on stimulating private investment and the introduction of green technologies	The law on reducing inflation, major investments in renewable energy and climate measures
China	State planning and integration of green growth into national and international initiatives	Green aspects of the Five-Year Plan, environmental standards under the Belt and Road Initiative, and the development of renewable energy sources
India	A combination of national programmes and local initiatives with a focus on renewable energy and improved sanitation	National Solar Mission, Clean India Mission programme
Scandinavian countries	Stringent environmental standards and stimulating innovation in green technologies	Striving for climate neutrality (Sweden by 2045), development of electric transport (Norway)
Canada	Combining climate action with economic development	Climate plan "A healthy environment and a healthy economy", financing of local environmental projects (EcoAction Community Funding) ³²⁾
Australia	Adaptation to climate change and support for renewable energy sources	National Strategy for Climate Change Adaptation, ARENA programme for financing renewable energy

Source: A. Ibishov¹⁴⁾, Horizon Europe²⁷⁾, Inflation Reduction Act of 2022²⁸⁾, A healthy environment and a healthy economy⁴⁴⁾, EcoAction Community Funding Program³²⁾

The approaches discussed differ in their emphasis on public and private investment, innovation, renewable energy, and climate change adaptation, but all are aimed at achieving sustainable economic growth while preserving natural resources.

3.4 Challenges and prospects on the road to sustainable development

Economic barriers include the high upfront investment costs of green technologies and practices, which can deter companies and governments from moving towards sustainable development. The uneven distribution of economic benefits is also a problem, especially for developing countries. The challenges of financing and investment attractiveness of sustainable projects also imply a long-term payback for green technologies, which can be an obstacle for investors accustomed to faster paybacks in traditional sectors. The risk of changes in environmental and legal regulations may deter potential investors. Political obstacles frequently stem from a lack of global coordination and coherence between states, a lack of political will, and a lack of policy documents to support sustainable development. These factors make it challenging to create and carry out successful international agreements and strategies. There is also a risk of political instability and corruption within countries, which can lead to changes in environmental policies and hinder sustainable development. In addition to a lack of knowledge about the advantages of green growth, which calls for public education and awareness campaigns, social barriers can also be linked to consumer and public opposition to modifications in long-standing routines and consumption patterns.

Technological hurdles encompass the high cost and restricted availability of green technologies, together with the requirement for more research and development to enhance their economic feasibility and performance. One of the issues facing agriculture is the restricted availability of cutting-edge technologies, such as precision farming instruments, which necessitate substantial financial outlays and infrastructure for data gathering and analysis. High upfront expenditures and the requirement to convert existing facilities frequently impede the adoption of energy-efficient technology in manufacturing, such as automated machinery and smart grids, making the shift challenging for smaller enterprises. Similar to this, the transportation industry's transition to electric vehicles is hampered by a lack of suitable charging infrastructure, limited battery life, and their high price in comparison to traditional cars. Overcoming these barriers requires a comprehensive approach, including efforts by governments, international organisations, businesses, and the public to create incentives, the right policy and legal framework, and the development and implementation of innovative solutions.

New technologies play a key role in sustainable development by offering innovative solutions to

environmental and social problems. The development of renewable energy sources, such as solar and wind power plants, makes it possible to reduce dependence on fossil fuels and reduce greenhouse gas emissions. Energy efficiency technologies in buildings and industry help to reduce energy and resource consumption, which reduces the environmental footprint and saves energy costs. Waste management and recycling technologies minimise waste by directing it to recycling or use in production processes. Digitalisation and Internet of Things (IoT) technologies offer new opportunities for monitoring and managing environmental processes, such as water management, air quality control, and forest fire prevention^{45,46}. These technologies help to increase the efficiency of resource use and improve the sustainability of ecosystems. Digital technologies play a key role in supporting green growth by providing innovative solutions to environmental challenges and improving economic sustainability. They improve the monitoring and management of resources through sensors and IoT systems, contributing to savings and reducing losses. Digital platforms and analytical tools enable the collection and analysis of environmental data, helping to make informed decisions for sustainable development. Digital technologies support environmental innovations and start-ups, facilitating the development and implementation of new green technologies, which stimulates economic growth and reduces environmental impact.

The following suggestions are offered to enhance the current green growth strategies and policies in light of the evaluated information:

1. Promoting global agreements and activities targeted at lowering greenhouse gas emissions and safeguarding the environment is one way to strengthen international cooperation. The shift to sustainable development can be greatly accelerated by the creation of cooperative worldwide standards and laws, as well as by experience and technology transfer.
2. Financing sustainable projects: creating more accessible and reliable financial mechanisms for sustainable projects. For example, subsidies, tax credits, government grants, and other forms of support to help reduce risks and encourage private investment in green technologies and practices.
3. Education and awareness: strengthening education programmes and public awareness campaigns on the benefits of sustainable development to overcome social resistance and accelerate the adoption of new consumer models and technologies.
4. Research and development: support for research and innovation in green technologies. investments in environmentally friendly production techniques, sustainable agriculture, and renewable energy to boost the productivity and competitiveness of sustainable initiatives.
5. Political support: development and implementation of national and local policies aimed at

stimulating green growth through the introduction of effective environmental norms and standards, tax measures, and regulatory instruments that promote sustainable development.

6. Integrating sustainable practices into the economy: promoting sustainable production chains and consumption patterns.

Implementation of these recommendations can contribute to a more efficient and rapid transition to sustainable development, help preserve the environment, and improve the quality of life of the population.

4. Discussion

This study examines the challenges and prospects for green growth. The high costs of deploying new technologies and infrastructure highlighted financial barriers that may limit investment, while social impacts, such as the need to retrain workers and ensure a just transition, confirmed the importance of integrating social aspects into green growth strategies. This means that a successful transition to a green economy requires not only technological and financial solutions but also social ones to minimise the negative impacts on vulnerable groups. Consistent with the results of this study, T. Jackson and P.A. Victor⁴⁷⁾ found that green growth can support resource sustainability, which in turn supports enhanced quality of life and economic growth. Both studies, however, also emphasised the issues related to the high costs of infrastructure and technology, as well as the uncertainty surrounding the long-term returns on investments. These issues can impede the growth of green growth, particularly in nations with limited resources, such as Azerbaijan. As a result, it is crucial to research budget optimisation in relation to the nation's green growth.

This study's examination of China's "green growth" policies reveals the government's focus in advancing renewable energy sources and green technology adoption. China has focused a lot of attention on the advancement of eco-design and sustainable production methods as part of its sustainable development strategy, which helps to reduce environmental effects and use resources more efficiently. The results of this study on the necessity of promoting the adoption of green growth techniques through collaboration are consistent with a study by M. Song et al.⁴⁸⁾ that discovered notable regional variations in green growth productivity in China. Simultaneously, D. Zhang et al.⁴⁹⁾ investigated how public funding under the Belt and Road Initiative affected green projects. The findings demonstrated that greater public investment in ecologically friendly initiatives promotes economic expansion and the advancement of green technology. Green financial tools, including green bonds and funds, encourage private investment in environmentally friendly projects while also assisting in the effective use of public resources⁵⁰⁾.

The development of renewable energy sources and the

introduction of environmentally friendly technologies are the main goals of India's current green growth initiatives, which reflect the country's ambition to lessen its reliance on fossil fuels and cut greenhouse gas emissions. India is making major investments in solar energy, which is boosting the proportion of renewable energy sources in the country's energy mix. If the National Solar Mission's objectives are met, this might assist in drastically cutting carbon emissions and enhance air quality. Danish and R. Ulucak performed an investigation of how environmental technologies affect green growth in the BRICS nations, which includes India⁵¹⁾. The adoption of clean technologies is a critical component of sustainable development and green growth, as demonstrated by the results, which also demonstrated that clean technology adoption significantly improves energy efficiency and reduces pollution.

Government green growth programmes in the US, Canada, and Germany include significant investment in green technologies, which stimulates green entrepreneurship and private investment, greenhouse gas emissions reduction, and job creation in green sectors, which improves energy efficiency and develops solar and wind power, as well as the transition to renewable energy sources and the reduction of fossil fuel use, which improves energy efficiency and supports innovation and green entrepreneurship. Simultaneously, the G7 countries had their green growth indicators analysed by K.S. Herman et al.⁵²⁾ in their study. The study's findings demonstrated that inconsistent outcomes were obtained in spite of considerable attempts to promote green growth. The researchers found that while Germany has made great strides in generating renewable energy sources and increasing energy efficiency, the United States has achieved considerable strides in lowering greenhouse gas emissions and increasing energy efficiency. It was also discovered that Canada was making modest progress and had little money for environmental projects. The current shortcomings of green growth indicators highlight the need for more thorough and precise approaches to assessing green growth in order to guarantee its applicability and efficacy.

Digitalisation and IoT play an important role in optimising the use of resources, increasing energy efficiency, and reducing negative environmental impact⁵³⁾. The introduction of IoT in various sectors of the economy allows for more efficient management of production processes, better environmental monitoring, and optimised energy consumption. A comparison of these findings with the study by C.N. Mensah et al.⁵⁴⁾ showed that technological innovation plays a key role in stimulating green growth in OECD countries. The study by the researchers determined that innovations in renewable energy, energy-efficient technologies, and sustainable materials significantly contribute to reducing greenhouse gas emissions and improving energy efficiency. These technological advances help OECD

countries not only reduce their environmental footprint but also increase their competitiveness in the global market. M. Mohsin et al.⁵⁵⁾ came to a similar conclusion: the study results indicated that technological innovation and the development of renewable energy play a key role in stimulating economic growth.

The study's discussed the theory of sustainable consumption and production centers on altering patterns of consumption and production in order to lessen environmental burdens. This entails creating environmentally friendly products and services, promoting sustainable supply chains, and increasing consumer awareness of how their decisions affect the environment. P. Glavič's⁵⁶⁾ study, which examined sustainable consumption and production in the context of a changing climate and finite resources, offered significant analogies and new insights into these issues. Sustainable consumption and production are becoming increasingly important, with a growing interest in reducing consumption, increasing energy efficiency, moving towards renewable energy sources, and creating circular economies. Both studies agreed on the need to change consumer habits and behaviour to reduce our ecological footprint. Promoting the theory of sustainable consumption and production requires further research and development of initiatives aimed at sustainable consumption and production.

Green growth stimulates new economic opportunities in the renewable energy, energy efficiency, and clean technology sectors, which means that the adoption of such technologies leads to job creation, increased innovation, and improved quality of life⁵⁷⁾. For example, the transition to sustainable practices requires initial investment, which means higher costs in the short term but leads to lower operating costs, increased resource efficiency, and reduced environmental impact. In this way, companies become more competitive and strengthen their reputation among consumers and investors. A comparison of these data with the study by P. Demirel et al.⁵⁸⁾ showed that green entrepreneurship plays a key role in promoting environmental sustainability and economic growth. The study by the researchers revealed the importance of entrepreneurial initiatives aimed at developing and implementing environmentally friendly technologies, products, and services.

The authors of the reviewed studies concurred that energy efficiency and the introduction of environmentally friendly technologies are essential to achieving sustainable development, and this is known as "green growth." This results in less of an impact on the environment, increased quality of life, and the creation of new jobs. Significant challenges have also been noted, though, including the high expense of adopting new technology, a lack of funding, and the requirement to modify legislative frameworks. These difficulties emphasise how crucial it is to incorporate social factors and international cooperation in order to successfully

transition to a green economy. There is variation in green growth results among nations, which requires the development of more precise measuring methodologies and effective solutions to address existing hurdles.

5. Conclusions

According to this report, sustainable development and green growth are important components of the global agenda meant to protect natural resources and raise living standards. The theoretical foundation for comprehending these processes is provided by the ideas of eco-design, just transition, eco-innovation, circular economy, sustainable well-being, and eco-services. All of the ideas presented supported the necessity of shifting toward more sustainable patterns of production and consumption as well as the significance of integrating environmental, social, and economic factors.

The statistics presented in this paper demonstrate that only 17% of the Sustainable Development Goals are on track, 48% of the goals show insufficient progress, and 35% show no progress or regression. Given the climate crisis, economic instability, conflicts, and the impact of COVID-19, achieving all the SDGs by 2030 seems doubtful. Nevertheless, the successes achieved, such as reducing the income gap to the level of the early 20th century and improving access to basic services, confirm the positive impact of targeted measures.

The economic, social, and environmental aspects of green growth highlighted in the study revealed a comprehensive and multidimensional approach to the economic development of society aimed at preserving and restoring natural resources, reducing negative environmental impact, and improving the quality of life. The study determined that the introduction of green technologies and innovations contributes to the creation of new markets and jobs, improves the environment, and increases the sustainability of the economy. Despite existing barriers and challenges, such as financing of sustainable projects and social inequalities, international cooperation and exchange of experience can significantly accelerate the transition to sustainable practices.

A study of national green growth and sustainable development strategies in different countries has shown a variety of approaches and measures aimed at achieving environmental and economic goals. In Azerbaijan, the National Sustainable Development Strategy and several other programmes and laws have been developed, including measures to develop renewable energy sources and improve energy efficiency and sustainable water management. These strategies are aimed at reducing dependence on fossil fuels and increasing resilience to climate change.

A comparison of the green programmes of Azerbaijan, the EU, the US, China, India, Canada, Australia, and the Scandinavian countries showed that successful strategies include clear goals, incentives, support for innovation, and international cooperation. China and India, for instance,

are making investments in sustainable agriculture and environmental technology, but Sweden and Norway are setting the standard for sustainable development because of their significant investments in green technologies and corporate social responsibility. The EU has an ambitious plan to attain climate neutrality by 2050. Germany actively supports the development of renewable energy sources and ecologically friendly technology, while Canada and Australia place a strong focus on protecting natural resources and biodiversity. Strengthening international collaboration and experience-sharing, investing more in research and development, and ensuring a fair transition that takes into account the interests of all social groups were suggested as ways to improve present strategies and policies. The introduction of digital technologies can also significantly improve the monitoring and management of resources, leading to more informed decisions and support for environmental innovation.

Limitations of the study include differences in national conditions and political contexts, which may reduce the relevance of the findings to other countries. It is advised that future research be done in greater detail on particular instances of the application of green technologies and strategies, as well as their long-term effects on the economy and society. This will enable future research to identify particular and universal relationships between green growth and economic development in various nations.

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