

THE IMPACT OF THE INNOVATION ON THE ECONOMY: AN EMPIRICAL ANALYSIS FOR AZERBAIJAN

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Abstract: *Innovation is a basic and important element of economic success. Innovation is seen as a significant factor in boosting product competitiveness in both domestic and global markets, replacing outdated manufacturing equipment, and creating demand for highly skilled workers. It is commonly acknowledged that for the state to develop an effective scientific and technical policy, an information base that depicts the status, scale, and direction of innovation activities throughout the economy is required. Therefore, it is critical to consider both the decimal and descriptive aspects of the information. In short, creating the groundwork for an innovative economy is critical to achieving good outcomes in the country's socioeconomic growth. The study's major goal is to examine the economic effect of innovative development in Azerbaijan. The State Statistics Committee of the Republic of Azerbaijan provided the study with statistical information for the years 2000–2021. To begin, the study performed a literature review of various scholars on the issue, and the initiatives adopted by the state in different years to promote creative growth in Azerbaijan were analyzed.*

Furthermore, indicators such as GDP, the number of people employed in the economy, fixed assets, and innovation costs were utilized to estimate the impact of innovations on economic growth. When coefficients represented in individual variables in the generated model are compared, it is clear that the influence of innovation costs (0.877 or 87.7%) on the amount of activity in the economy is bigger than the effect of fixed assets (0.292 or 29.2%) and the number of employees (0.020 or 2%). At the 0.05 level of significance, the t-statistics and their probabilities associated with the coefficients show that the number of employees has a negative effect on GDP, whereas production funds and expenditure on innovations have statistically significant positive effects on GDP. The estimated F-Statistic and its probability imply that the cumulative result of innovation expenditure on GDP is statistically significant. The study claims a connection between innovation spending and GDP, and that the former has a major influence on the latter. The research also demonstrates that the model's explanatory variables account for about 98.4% of the changes in the explained variable. This suggests that, in the framework of the model, spending on innovation accounted for about 98.4% of the variation in GDP over the study period. This study, therefore, contributes to the expanding amount of evidence indicating that expenditure on innovation is related to and has a significant impact on GDP. The results of the model also show that an increase in production funds of 1% generates a rise in GDP of 29.3%, a rise in employee numbers of 1% causes a boost in GDP of 2%, and an expansion in innovation expenditures of 1% causes a GDP rise of 87.7%. In this regard, it is thought appropriate to raise innovation costs, particularly during the digital economy transition.

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Introduction

Digitalization is already a leading indicator of the rate of modernization and progress in a world that is developing quickly. We may observe how technological advancements-also is known as partial or full digitalization-are integrating into our lives and all the spheres around us. The economy is also undergoing significant changes due to digitalization. Thus, the phrase "digital economy," as it is used today, refers to a new form of economics based on technological progress and digitized understanding. With the benefit of clients, the economic system offers sophisticated information and communication technology (ICT) infrastructure. This field is developing new digital knowledge and skills that affect civil society, the government, and industry. The digital economy is currently creating a completely new and modernized model of how the state works and interacts with society. The main innovations include transportation and utility cards, wireless communication, electronic financial services, and electronic commerce (Silvanskiy et al., 2019). Technological economics is the economic domain that is controlled by a hundred of millions of everyday interactions that occur online between individuals, companies, equipment, information, and procedures. The technology sector is built on hyper connectivity, or the increasing interconnectedness of population, equipment, and corporations as a consequence of the web and cellular equipment and the internet of things. The advantages of digitization for economic growth should also be mentioned. The growth rate of the digital economy is shown by global experience to be twice that of the traditional economy. Nevertheless, this pace is anticipated to keep up with rising dynamics. Either direct or indirect effects of digitalization on economic development are present. The factor for investments is an illustration of a direct effect. International studies indicate that countries with a high level of digitalization attract more investments. Reductions in transaction costs also boost macroeconomic GDP. Many experts, including Watanabe (2016), Brynjolfsson (2018), Nakamura (2018), Moulton (2018), and others, emphasize how challenging it is to accurately assess a digital economy that is defined by quickly evolving goods and services. Undoubtedly, the improvement in education and employment skills contributes to economic development. Regarding the indirect consequences, we can point to advantageous outcomes like improved production, expanded coverage, the abolition of geographical limits, etc. As the digital economy takes shape, it is challenging long-held beliefs about how businesses are organized, how they work together, and how consumers access goods, services, and information. Although the digital economy is founded on digital computer technologies, it is frequently thought of as one that conducts commerce through the internet and World Wide Web-based platforms. The Internet Economy, New Economy, and Web Economy are other names for it. The digital economy is made up of three primary elements: Consider of enabling infrastructure, electronic business processes (how business is done), and electronic commerce transactions as the three main parts of the digital economy (selling of goods and services online). The digital economy has likewise been called the emerging, net, and online economy owing to its reliance on internet connectivity. The digital economy is more sophisticated than simply using technologies to carry out already-existing functions on computers, although some businesses and individuals do so. It goes beyond merely using a computer to complete tasks that were previously completed manually or with analog equipment. Instead, the digital economy emphasizes the chance and requirement for businesses and people to use technology to carry out those duties more effectively, quicker, and frequently in a different way than before. Additionally, the phrase refers to the capacity to use technologies to carry out operations and take part in activities that weren't previously feasible. The associated concept of "digital transformation" includes such chances for current companies to do things more, differently, and in new ways. Disruptive waves have been produced by the digital economy. New

businesses and communication techniques have appeared. However, many businesses and sectors that chose not to or were unable to use technology to transform their business models have seen a decline in revenues, a loss of market share, and even a total collapse. Organizations, whether they are profit companies, service providers like healthcare systems, or charity and governmental institutions, will need innovative leaders and staff if they want to compete in the next years.

Literature review

Innovation and technology Adoption is critical in the digital economy. The value of utilizing the advantages of the digital economy for innovation, economic growth, and social development is becoming more widely recognized by governments. As everyone is aware, for the economy to thrive, some innovations must be implemented. Innovations, smart applications, and also other developments in the digital economy have the potential to improve services and address policy issues in a variety of fields, such as health care, agribusiness, public administration, finance, transit, education, and the ecology. Indeed, Information and Communication Technologies (ICTs) add to the process and organizational innovation as well as product innovation. Innovation is not a new notion; rather, it is the process of turning new concepts and information to new goods and services (Gerguri & Ramadani, 2010). It might be as old as humans. The early commercialization of a notion is an example of innovation (Fagerberg, 2004). In recent work, Canadian scientist Benoit Godin analyzed the concept's history of innovation. Even though the idea of innovation has been around for a while and has always dealt with novelties in their fullest meaning, encompassing imitation, invention, creative imagination, and change, it has recently been limited to technical innovation (Godin, 2015; Bontems, 2014; Blok & Lemmens, 2015). Furthermore, The creativity of today is connected to the creation of new technologies as well as to the marketing of such technologies (Schomberg & Blok, 2018). Edward S. Phelps, an American economist, defines a successful innovation as "Sufficient demand among users to sustain putting the concept into regular production" (Phelps, 2009). Innovation is defined as "the first commercial application or manufacture of a new process or product" (Freeman & Soete, 1997). The scientific integration of innovation into economic processes has expanded further, starting with Austrian economist Joseph Schumpeter's book "The theory of economic development", based on many detailed studies. The concept of "Creative destruction" or "Schumpeter's storm" presented in the mentioned work means the transformation process that continuously changes the economic structure from the inside, continuously destroys the old element existing in the system, and forms a new one (Schumpeter, 1982). In this case, referring to Schumpeter, it is possible to say that the driving force of capitalist mechanisms is innovation. Thus, the fact that entrepreneurial entities, which constitute the essence of the capitalist system and are based on the principles of private ownership, establish their activities in a competitive environment, and from time to time, with the emergence of the "competitive advantage" factor, one entity replaces another in terms of market share, confirming the mentioned hypothesis. According to Joseph Schumpeter, innovation is an action that results in a new generating function or a new product. He breaks this activity down into multiple phases (Schumpeter & McDaniel, 2002):

- Originating a new product;
- Initiating a new technique of manufacturing;
- Establishing new markets;
- Locating suitable raw material sources;
- Establishing a new industry organization.

The economic impact of innovation is enormous. Innovation brings new technology and products that assist address global challenges, as well as new methods of producing and providing services that increase productivity, create job opportunities, and improve people's life span (Gerguri & Ramadani, 2010). Innovation is the beating heart of the twenty-first-century economy, continually pumping new revitalizing activity across the system.

When all of these changes come together, they can lead to the creation of a digital economy. The term "digital economy" was initially put out in 1995 by Canadian businessman, author, consultant, and speaker Don Tapscott, who said that "the Internet and the World Wide Web are creating a new economy founded on the networking of human knowledge" (Tapscott, 1995). The digital economy was spawned by the quick development of digital technologies including artificial intelligence, cloud computing, and mobile communications. (Brennen & Kreis's,

2016). The availability of digital technology has increased with its spread. (Robert et al., 2021). The digital economy supports nations throughout the world in slowing down their rate of economic growth and raising total factor productivity. (Hu et al., 2021). Many nations are prioritizing and supporting the digital economy as a force for economic advancement. (Nakatani, 2021). The "new economy" or "Internet economy" are other titles for the digital economy. However, a US Department of Commerce document titled *The Emerging Digital Economy* presents a more detailed explanation, defining a digital economy as being concentrated on sectors and types of economic activities that are IT enabled. The IT industry itself, business-to-business electronic commerce, digital product, service delivery, and IT-enabled retail sales of tangible goods and services are some of these activities. (Kling & Lamb, 2000). The digital economy also encompasses economic, social, and cultural activities carried out online and through other online communication tools. The middle of the 20th century saw the invention of the microwave, which laid the foundation for digitalization. However, it was not until the widespread use of computers in the 1970s caused such a disruption in economic institutions that people began to talk of a (third) industrial revolution. Manufacturing automation was the product of this quantum leap, referred to as a digital, or perhaps electronic, revolution. This quantum leap, referred to as a digital, or potentially electronic, revolution, resulted in production automation as well as far-reaching changes to workflows in both the industrial and service sectors. With the introduction of the personal computer (PC) at the beginning of the 1980s, digital technologies began to have an increasing impact on private households and hence consumer behavior patterns. The next level of digitization required expanding connectivity via the internet. In 1991, the internet was made available to the general public for the first time. Digital interconnectedness via the internet has brought companies and individuals closer together around the globe, and the rate of globalization is accelerating. These essential characteristics allow the digital economic system: Firstly, data components on which the digital economic system is based are general and disunited in some areas, consumers may receive and share facts at discounted prices. (Kim, 2018). Secondly, the extension of digital products may reach new users at "virtually no cost," offering network value-added advantages, in contrast to conventional financial transactions, which are subject to the rule of point of diminishing profits. (Zhenyu, 2020). Thirdly, the development of production models toward customization and personalization is facilitated by the globalized era, which also allows for actual-set communication between manufacturers and consumers. In the digital era, big data can follow consumer network behaviors (Kotler et al., 2020). The modern economy's distinctive characteristics have far-reaching consequences for the whole public economic growth. (Carlsson, 2004). The efficiency of regional innovation and corporate entrepreneurial activity has often increased due to the electronic business. (Sorescu & Schreier, 2021), making it simpler to develop effective local technologies (Audretsch et al., 2015). Some academics also highlighted the negative aspects of the digital economy, such as how its growth is linked to industrial corporations (Belykh et al., 2021), which may impede optimal competitiveness in the market and the improvement of client safety. (Heng et al., 2020). The digital economy's operation is distorted by a lack of digital safety (Leahovcenco, 2021), an absence of institutional development (Molchanova et al., 2020), and a reduced capacity to collaborate with informal governance mechanisms (Keller et al., 2021). Digitization and innovation have resulted in enormous structural shifts throughout the economy. Digital technology is increasingly determining corporate value generation processes and consumer behavior patterns. Computers are now used in almost every aspect of economic activity. The digital economy's technological advances and hyperconnectivity are opening up new channels of competition and sources of competitive advantage for businesses. In light of this recently found fact, (Wielgos et al., 2021) create and methodologically describe the crucial online marketing strategy capacity, as well as evaluate its effects on business and client productivity. A digital business capability is made up of three interconnected capabilities: a strategic approach, connectivity, and management. The global digital economy increased its contribution to the global economy from 40.3% to 41.5% between 2018 and 2019, and it is continuously increasing. The virtual economy has grown to different extents, including advanced and emerging economies, assisting in closing the income interval and fostering productivity expansion. (Legowo, et al., 2021). In conclusion, many academics have researched scientific themes for the online business, innovation progression, and providing a solid conceptual base; yet, the next flaws remain: To begin with, much of the literature has only concentrated on the general impact of the digital economy, keeping it harder to grasp the function of the digital economy in various types of segmented markets. Second, some researchers have forgotten touching to key factors, making it impossible to describe an underlying link between e-commerce and innovation, hindering the establishment of academic

understanding of the connection way. Based on this, this article investigates the technique for identifying the association between innovation and electronic business, as well as their influence on the economy, by utilizing the digital economies of the world's countries.

To ensure lengthy and durable economic growth, one among the most important methods is to "create a knowledge economy, to expedite the production of science-intensive technologies, goods". In this regard, scientific development is prioritized while keeping local features and global trends in mind, and the gradual path of full implementation into global knowledge proceeds, the substance and technical foundation of science are modernized by improving scientific infrastructure, and the transfer of information provision systems in this field to electronic form is ensured. Ensuring the shift toward a knowledge-based culture, developing a creative and knowledgeable economy, increasing the usage of Technology and operations provided electronically in self-government entities at the state and municipal levels, as well as actions in data protection, satisfying the culture's need for data items and amenities, strengthening efficient and output Technological capabilities, training highly qualified specialists and scientific personnel. In the modern world market, where technology is developing rapidly and inter-commodity competition is strong, economies are trying to increase their ability to adapt to innovation. Strengthening the innovation potential of the economy is also a priority for Azerbaijan. Innovation potential: on the one hand, it is a combination of various resources necessary for the implementation of innovation activity; on the opposing side, this is the economic relationships framework of various economic activity subjects for the formation of joint innovation ability for the implementation of innovation activity in the reproduction process (Huseynova, 2016). If we look at the history, we can see that Azerbaijan is rated negligible amongst the world's governments in many fields in comparison with the current years. The table below shows the statistics for 2013 on the main socio-economic factors affecting the degree of innovation in Azerbaijan. Such as is observed, Azerbaijan's location among 141 countries is very low.

Many government programs have been adopted to eliminate backwardness, and innovation and ensure comprehensive development of the state. Those state programs are listed below in historical time order:

- "Government Plan of Cultural Development of the State of Azerbaijan's Regions in 2009-2013"
- On the acceptance of the "Azerbaijan 2020: Future Eyesight" Growth Plan
- "Government Strategy for Industrial Growth in the Azerbaijani Republic during 2015-2020"
- Sustainable Road Map for the Economic Development of the Azerbaijan Republic.
- "Government Strategy for Economic Improvement of Azerbaijan's Regions in 2019-2023"
- "Azerbaijan 2030: State Socio-economic and demographic Growth Goals"

The "Government Plan of Cultural Development of the State of Azerbaijan's Regions in 2009-2013" was designed to carry on the work begun under the "Measures Program for Growth of Baku's Socioeconomic Expansion City Settlements during 2006-2007." The "Government Plan of Cultural Development of the State of Azerbaijan's Regions in 2009-2013" aimed to accelerate non-oil economic expansion in the nation, achieve equilibrated local and sustained socioeconomic growth, and raise the social conditions of the populace.

One of the fundamental goals of the industry is the repair and rehabilitation of existing industrial firms in the regions, as well as the establishment of new enterprises. Special emphasis was placed here on the rehabilitation of agricultural product processing firms and the expansion of export potential.

One of the most significant responsibilities in science is to strengthen the practical value of research and to enable the tighter formation of relationships between scientific research and project institutions, as well as economic issues.

On the acceptance of the "Azerbaijan 2020: Future Eyesight" Growth Plan. Ensuring the country's economy grows in a balanced and stable manner, improving the nation's socioeconomic well-being, as well as creating organic connection and mutual reconciliation between the current, medium, and long-term periods of socioeconomic development, as well as accelerating the progress of society in all directions, forming a qualitatively new model of development is central to the state of Azerbaijan's activity takes up space. Order No. 1862 of the President of the Republic of Azerbaijan dated November 29, 2011, the Growth Plan "Azerbaijan 2020: Future Eyesight" was created with the help of appropriate state agencies, scientific organizations, and highly qualified specialists, as

well as in the conditions of effective cooperation with international organizations operating in the country. With the expectation of democratic principles, the concept was submitted for open discussion, and the final document was prepared to take into account numerous opinions and suggestions from interested parties, including civil society institutions and citizens.

The necessity for such a notion stems from the reality that our nation has progressed to a new level of development. The achievements allow Azerbaijan to establish greater goals for itself and specify the activities that will result from these goals.

The main challenges of our modern era can be tentatively grouped as follows (<https://e-qanun.az/framework/25029>):

- With the qualitative growth of innovation activity in the internationalization context, the pace at which economic and economic systems evolve, inventive inventions' diffusion, as well as their use within the field of production, are growing at an unprecedented rate. It's a "favorably supercharged" internationalization result since it permits more and more nations to profit from advances in innovation, improved technology standards, and innovative administration approaches. As stated by projections, development in a global economy in the near or relatively distant will be brought about as a consequence of all these elements.
- That major challenge for Azerbaijan is to avoid lagging underneath its world's majority concerning development. This necessitates, first and foremost, the current dependence of the economy on petroleum resource exports or avoiding the risk of the global economy becoming a raw material supplement and a technology "outsider" in the distant and short-term.
- One of the most distinctive features of globalization is negative economic processes' development as well as positive factors such as the dissemination of new technologies and breakthroughs, as well as several methods' power to seize control of nations participating in terms of global economic integration.

"Government Strategy for Industrial Growth in the Azerbaijani Republic during 2015-2020". The Azerbaijan Republic has designated 2014 as the "Year of Industry." To ensure that Azerbaijan becomes a strong industrial center in the region by utilizing existing potential more efficiently in industrialization's next phase, the "Government Strategy for Industrial Growth in the Azerbaijani Republic during 2015-2020" was made, keeping in mind the action plans outlined in the Growth Plan "Azerbaijan 2020: Future Eyesight".

International experience reveals that growth rates and stages of development of the business differ according to the nations' income levels. As countries grow, low-tech and labor-intensive food, light, and furniture sectors relinquish their leadership position to medium-tech chemical, metallurgical, shipbuilding, machinery, and equipment manufacturing industries. High-tech areas such as electronics, computer manufacturing, pharmaceuticals, and the space industry operate as locomotives and play a vital part in the worldwide expansion of industry in the most recent stage of industrialization.

Sustainable Road Map for the Economic Development of the Azerbaijan Republic. It was authorized by the President of the Azerbaijan Republic on December 6, 2016. That strategic vision till 2020 will be used to provide the groundwork for the economy to be constructed for 2025 and beyond. Azerbaijan's vital position in Europe's energy security, as well as the development of transport-logistics corridors, will be protected, as will the country's economic progress in the lines outlined in the Strategic Road Map. The desired plan for the years following 2025 envisions the development of a robust, efficient, and equitable economy founded on high technological growth and an ideal economic model, ensuring increased social welfare and the highest human development index (<https://e-qanun.az/framework/28964>):

- The first goal is connected to a rigorous fiscal as well as the monetary framework. An essential component of the macroeconomic environment is the effective implementation of a tight monetary policy framework and objectives. In this respect, the continued development of economic potential requires the execution of monetary policy in conjunction with fiscal policy, as well as the evaluation of required modifications in monetary components to reflect changes in the economy.

- Aside from the interplay of monetary and fiscal frameworks to improve economic potential, another strategic aim is privatization and changes in state-owned firms. This paper contains measures for improving the government firm's economic efficiency therefore as a consequence of the government's acceptance shareholding strategy and the state enterprise reform program's implementation. The Strategic Road Map aims to attract foreign direct investments by supporting existing initiatives to increase the activity of the country's private sector, increase the efficiency of state enterprises, and improve the business environment, with the steps to be taken in this area described in the second goal.
- The third aim is to accelerate Intellectual resources improvement as a component of attempts to achieve viable, egalitarian, and long-term economic objectives. Initiatives for this aim are justified, and measures are planned by the following guidelines: Contribution of education to human capital, increase in worker productivity to assist firms in operating more effectively.
- The fourth aim is to continue to strengthen the business environment. The boost towards the ecosystem because a result of budget and macroeconomic policy might enable more effective utilization of existing resources in a favorable business climate. The state economy's comprehensive route plans give a more specific approach to strengthening the business climate to assist the economy.

The following are the strategic goals of the Sustainable Road Map for the Economic Development of the Azerbaijan Republic. (<https://e-qanun.az/framework/28964>):

- Strengthening fiscal stability and adopting a sustainable monetary policy
- Implementation of privatization and state-owned business reforms
- Human capital development
- Creation of a favorable business environment

"Government Strategy for Economic Improvement of Azerbaijan's Regions in 2019-2023. The Presidency of the Azerbaijan Republic's lengthy economic growth policy is to guarantee the state's divisions' sustained and equitable growth, including an ecological security system establishment that ensures a dynamic economy founded on environmental growth concepts, high-quality societal well-being, efficient Utilization of mineral wealth and dependable ecological preservation craves to provide a supportive ambiance. The following are the primary aims and duties of the State Program (<https://president.az/az/articles/view/31697>):

- taking measures to increase investment and innovation activity in the regions;
- strengthening the local economic (natural-economic, production-technical, and scientific-technical) potential depending on the request of advanced technical technology, hardware or involving them during the economic cycle as fully as possible;

The priority areas of program implementation are (<https://president.az/az/articles/view/31697>):

- To support the realization of the areas' growth prospects, new SMEs' creation, existing SMEs' development, and the formation and efficient operation of the SME Friends network across the country, which will ensure the convenient access of SMEs to state support mechanisms;
- provision of remote settlements in the regions where gasification is not technically and economically efficient with alternative heat sources;

The following results will be achieved after the end of the execution of the actions outlined in the Government Plan (<https://president.az/az/articles/view/31697>):

1. The development potential of regions, including rural areas, will be further strengthened and the efficiency of using this potential will increase;
2. The economy in the regions will be further diversified, new modern processing facilities will be opened, and the non-oil industry will develop further;
3. The competitiveness of the local economy will increase;
4. A series of SMEs in the areas will grow, activities will expand., and will stimulate the growth of added value in the local economy;
5. The regional efficiency of community amenities and economic structure will increase further;
6. Supply of high-speed fiber-optic broadband Internet and modern communication services will increase in the regions;

7. Regional economic growth that is durable and equitable will be achieved.

"Azerbaijan 2030: State Socio-economic and demographic Growth Goals". As a sovereign and nation entity, Azerbaijan is beginning a fundamentally unique strategy stage around the post-pandemic and post-conflict era, that spans the years 2021-2030. The power of the Azerbaijani state should be increased in this updated strategies and tactics period, which is characterized by reestablishing the state's geographical unity through deep structural-institutional reforms, a high-welfare society should be established, and a historical return to the liberated regions and permanent settlement should be ensured by finding sources of high economic growth. The 5 Primary Objectives in the government's economic development listed below can be completed during the next decade(<https://president.az/az/articles/view/50473>):

- Sustainably growing competitive economy. The following two objectives must be met for this priority to be implemented effectively:
 - sustainable and high economic growth;
 - internal and external impact resistance.
- A society based on dynamic, inclusive, and societal equity. Continuous, strong economical development should assist in vibrant, societal inclusion building, and each person should be able to see this progress in his or her daily life. People should have equitable and fair access to economic possibilities, regardless of their social class or geographic location.
- Competitive human capital and a place of modern innovations. International competitiveness has intensified even more in the face of recent dramatic technical advancements in the global economy. Deep digitization, active usage of modern technologies, or the contemporary sectors' quick growth no personal intervention will characterize future living. To prepare for growing global competitiveness in the next years, every country's aim should be to develop extremely rivalry personal resources. The primary elements of this are contemporary education, fertile surroundings which stimulate invention, and people's health.
- Great return to the liberated territories. Ensuring Azerbaijan's territorial integrity holds a special position in our country's centuries-long history. By re-establishing country boundaries, Azerbaijani citizens accomplished the previous age's greatest tactical and political success. The return of those displaced from their own country must be safeguarded for the triumph to be sustained. This Great Return will serve as a link in the long-term settlement of local constituents in occupied regions, as well as their incorporation into the country's economic operations.
- Clean environment and "green growth" country. Environmental health, quick restoration, increased greenery, effective use of water resources, and sustainable energy sources should be assured alongside the state's potential advancement.

In the meantime, the aforementioned National Priorities are of particular relevance in terms of carrying out the commitments emanating from the United Nations Organization's "Transforming With us Globe: A Environmental Sustainability Ideology Thru 2030." All agreed state plans will result in technological infrastructure growth, possibilities increase for delivering contemporary electronic services to the public, and the provision of broadband, low-cost, high-quality Internet access throughout the nation, including remote communities. Distance education, e-commerce, telemedicine, and other contemporary services will become more common, and regulations will be strengthened to safeguard the protection and safety of e-commerce participants. The use of ICT in the regions will be extended, as will the population's digital preparedness and the level of assimilation in the state into worldwide data surroundings. Professionals in the field of technological innovation, using effective technologies, enable production enterprises to increase productivity and obtain a guarantee of competitiveness since the 2nd quarter of the twenty-first age, resulting in economic growth and achievement of set goals in easier and more efficient ways (Mazanov, 2013). Taking into consideration the connection of ICT and intellectual property, as well as the access to the global digital network of various items covered by intellectual property rights and virtual laws.

establishment structure is being created that is predicated on an internet license or another layout assistance. Simultaneously, relevant steps for the growth of the space industry will be adopted. The placement of communications satellites in geostationary orbit would assure dependable satellite communication and boost the

government's data protection. The modern techniques' usage inside the telecoms system will also be expanded, as well as nationwide tv or airwaves demonstrates' spacecraft packet transmitting will indeed be organized. Simultaneously, low-orbit satellites will be launched into space, making operations for ecosystem safety fields, farming, terrain, or mapping, in addition to national security, more efficient throughout the country. Innovation has become the primary notion of economic growth as the consequence of the fast development of ICT (Mercan&Goktash, 2011). To assure the country's access to the region's ICT services markets, and initiatives. The development of transshipment data roadways, geographic online databases, as well as managed services structures will all be carried out. "Adequate steps shall be done consistently and progressively to establish an electronic government." It intends the current data's and interaction techniques' usage in the country bodies increase, stable data transfer between state bodies based on a single infrastructure ensure, digital facilities for the citizenry on workable activities supplies, as well as details shelter expands. Simultaneously, the electronic maintenance' rate will be increased, and the maintenance will be accessible by phones, and data terminals, as well as someone else contemporary ways. The integration of state IT funds as well as structures will be ensured by the usage of conforming technological standards, as well as the provision of uniform information space, will be created the focus will be on guaranteeing data protection, preventing cyberattacks on web motorists trying to enter the state protecting data flows, protecting government agencies' data assets as well as structures and by potential dangers, and increasing nationwide readiness inside the area of data protection, and raising awareness ICT training will be upgraded as well. To meet the growing demand for highly qualified specialists as well as science personnel, the country's higher education institutions will generate a favorable ecosystem for the near integration of education with scientific research and innovation, and connections to the globe's foremost teaching organizations will be strengthened, as well as efficient metrics to keep "skills shortage" out beyond the state will be implemented.

Methodology

Modern economic and social progress need the activation of innovation activity as well as the broad dissemination of innovative technology, goods, and services. As a result, innovation is a highly complicated process that necessitates the use of specialized approaches and models. Innovation necessitates the creation of appropriate models and projections of socioeconomic growth, as well as a rise in investment. The establishment of a new production-innovation method in the innovative economy that assures socioeconomic, financial, socio-psychological, and socio-ecological efficiency is the foundation for the successful growth of industrial businesses. The major purpose is to secure the long-term development of industrial companies by releasing new, enhanced types of goods, improving their production techniques, and continuously improving production-innovation processes targeted at delivery, realization, and service supply.

To analyze the influence of research and innovation on economic growth, the components that will be incorporated in the mathematical models must be mentioned individually. Databases that represent the innovation system are made up of two key information blocks:

- key socioeconomic indicators (GDP, labor costs, number of people employed in the economy, fixed assets, investments);
- key innovation indicators (expenditure on study and improvement, several people engaged in study and improvement, a lot of patents, main funds of scientific research, innovation activity, expenditure on technological innovation).

Data and empirical result

To review the influence on innovations of industrial progress, the components that will be included in the mathematical models must be mentioned individually. The databases that represent the innovation system are made up of two primary information blocks: the key socioeconomic indicators (GDP, number of persons employed in the economy, main funds) and the main innovation indicator (expenditure on innovations). When assessing the influence of innovation on economic development:

$$Y = a K^{\alpha} L^{\beta} I^{\gamma} \quad (1)$$

Here, Y - GDP and services, K - production funds (capital), L - labor costs, I - innovation costs, a, α , β , γ - components. As it is evident, considering the advancements in the academic and practical fields. Cobb-Douglas

production function has been added with a factor \dot{I} , γ . The practical application of the model will be implemented in the following order utilizing information from the aspects of the Azerbaijan's economy in 2020.

Table 1. Indicators of the impact of innovation on economic development

Years	Y	L	K	I
2000	4718.1	3855.5	0.67	16.04
2001	5315.6	3891.4	0.65	18.07
2002	6062.5	3931.1	1.16	18.28
2003	7146.5	3972.6	2.18	23.22
2004	8530.2	4016.9	3.42	25.45
2005	12522.5	4062.3	4.78	27.54
2006	18746.2	4110.8	5.40	32.18
2007	28360.5	4162.2	6.04	48.23
2008	40137.2	4215.5	8.34	66.44
2009	35601.5	4271.7	6.03	88.92
2010	42465	4329.1	5.96	92.78
2011	52082	4375.2	10.62	109.81
2012	54743.7	4445.3	10.19	117.30
2013	58182	4521.2	11.14	122.00
2014	59014.1	4602.9	9.34	123.80
2015	54380	4671.6	9.93	120.90
2016	60425.2	4759.9	10.16	124.70
2017	70337.8	4822.1	8.62	129.90
2018	80092	4879.3	12.36	147.50
2019	81896.2	4938.5	11.80	163.90
2020	72578.1	4876.6	13.79	162.83
2021	92857.7	-	-	-

Source: The State Statistical Committee of the Republic of Azerbaijan <https://www.stat.gov.az/>.

From the table chart outcome indicator is the volume of work in the economy, and the factor indicators consist of three main indicators of the volume of work: fixed assets, number of employees and expenditure on innovation. Since major subject the research is effect of innovation on economic process, this table was compiled on the types of activities with indicators of economic development. The study is founded on the production function, and to this model is added the coefficient “I” related to innovation. As it can be seen, the given statistical data is non-linear and should be brought into a linear regression equation to determine its coefficients (a , α , β , γ). This is done by logarithmization. To determine the parameters, a system of normal equations is established and the solution is based on the method of least squares. The unknown parameters a_0 , α , β , γ are found by solving the regression equation (1) using the EViews software package.

Table 2. E-Views Regression Analysis Results

Contingent element: Y				
Technique: Minimum Shapes				
Day:09/03/22 Hour: 20:41				
Portion (modified): 2000 2021				
Covered monitoring: 21 following changes				
Variety	Amount	Std. Error	t-Statistic	Issue
K (production funds)	0.292748	0.078501	3.729249	0.0017
L (number of employees)	0.020227	1.102628	0.018344	0.9856
I (expenditure on innovations)	0.877374	0.141410	6.204488	0.0000
C	2.577844	3.819014	0.675003	0.5088
R-squared	0.983751	Mean dependent var		4.457412
Adjusted R-squared	0.980884	S.D. dependent var		0.430787
S.E. of regression	0.059562	Akaike info criterion		-2.633971
Sum squared resid	0.060309	Schwarz criterion		-2.435014
Log likelihood	31.65669	Hannan-Quinn criter.		-2.590792
F-statistic	343.0737	Durbin-Watson stat		1.088927
Prob(F-statistic)	0.000000			

Source: E-Views Regression Output.

The model is obtained by considering the calculated parameters a_0 , α , β , γ in formula (2). By comparing the coefficients obtained for individual factors in this model, it can be seen that the impact of economic innovation costs (0.877 or 87.7%) on the volume of work is higher than the impact of fixed assets (0.292 or 29.2%) and the number of employees (0.020 or 2%).

$$Y = a K^{0.292} L^{0.020} I^{0.877} \quad (2)$$

The results show that the signs of the coefficients of the number of employees, productive capital and expenditure on innovation are consistent with expectations regarding the relationship between GDP. This means that the coefficients of the number of employees, production assets and expenditure on innovation are not inversely related to GDP, and these coefficients have a positive effect on GDP.

The t-statistics and their probabilities associated with the coefficients show that, at the 0.05 level of significance, number of employees have negative effects on GDP, whereas production funds and expenditure on innovations have statistically significant positive effects on GDP. The computed F-Statistic and its probability indicate that the combined effect of expenditure on innovations on GDP is statistically significant. As a result, the study contends that there is a link between expenditure on innovations and GDP, and that the former has a substantial effect on it.

The study also demonstrates that model's explanatory variables account for about 98.4% of the changes in the explained variable. This suggests that, in the framework of the model, spending on innovation accounted for about 98.4% of the variation in GDP over the study period. This strong explanatory power implies that the model is well-fitting and that these components of innovation spending are major predictors of Azerbaijan's GDP.

Conclusion

The impact of expenditure on innovation on GDP in Azerbaijan between 2000 and 2021 was examined in this study. This study has added to the empirical research on the effects of expenditure on innovation on GDP. This research also contributes to the expanding number of studies demonstrating that investment in innovation is related to and significantly affects GDP. Additionally, the model's findings indicate that a 1% improvement in production expenditure results in a 29.3% rise in GDP, a 1% level of employee numbers results in a 2% rise in GDP, and a 1% growth in innovation spending results in an 87.7% GDP boost. In this regard, it is considered appropriate to increase innovation costs, especially throughout the change to a digital economy.

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