QUBAHAN ACADEMIC JOURNAL
VOL. 4, NO. 2, June 2024
https://doi.org/10.48161/qaj.v4n2a211

Impact of Investment on Labour Productivity in Azerbaijan's Chemical and Petrochemical Industry

Vilayat Ismayilov [1]*, Nizami Gafarov [2] and Sabina Valiyeva [2]

[1] Department of Economics and Management, Azerbaijan Academy of Labor and Social Relations, AZ1130, 181 Azadlig Ave., Baku, Azerbaijan;
[2] Department of Economics of Agrarian Sphere and Industry, Azerbaijan Cooperation University, AZ1106, 93 Najaf Narimanov Str., Baku, Azerbaijan;

Corresponding author: e-mail: ismayilovvilayat012@gmail.com.

ABSTRACT: The subject of research related to the impact of investment on industrial productivity in Azerbaijan is relevant and essential for understanding the economic situation in the country and for designing effective strategies for the development of the industry. The purpose of this research is to explore the relationship between investment and labour productivity in the sectors of the Azerbaijani economy. The research employed a combination of analytical methods, including statistical analysis of data from the State Statistical Committee of Azerbaijan on labour productivity and investment in the chemical and petrochemical sectors. Functional analysis was used to examine the role of labour productivity, while systematic analysis explored the factors influencing productivity. The research also utilized deduction to establish general principles, synthesis to integrate data, and comparative analysis to identify effective investment areas. The study revealed that investing in the chemical and petrochemical sectors in Azerbaijan has a beneficial effect on labour productivity. Technological innovation, labour skills, working conditions, and infrastructure were identified as factors that impact labour productivity in these industries. Various investment areas that can enhance productivity have been identified, including investments in human capital, production organisation, and advanced technology. The study investigates the direct impacts of investments in technology, human capital, and infrastructure on labour productivity within Azerbaijan's chemical and petrochemical industries and identifies which specific areas of investment most effectively enhance productivity and the underlying reasons for their success. The practical significance of this research lies in utilising the identified findings to tackle issues about enhancing labour productivity in Azerbaijan's economic sectors, thereby elevating this process to a higher level.

Keywords: Economic Growth, Investment Efficiency, Labour Efficiency, Azerbaijan Industry, Statistics.

I. INTRODUCTION

In modern times, the chemical and petrochemical industries are key economic sectors in many countries, including Azerbaijan. These sectors play an important role in establishing employment, attracting foreign investment, and developing economic growth. In turn, investors, governments, and national companies are focusing on investing in these sectors to increase their competitiveness and profitability [1, 2]. However, despite the significant amount of investment, the efficiency of these investments is not always high enough [1, 3]. The impact of investment on labour productivity in Azerbaijan's chemical and petrochemical industry is an important issue that requires further examination. Identifying the best investment strategies in these sectors that can deliver sustainable productivity growth is a necessary step on the road to success in these areas [2].

For the purposes of this paper, the following definitions will be used consistently:

- Labour productivity refers to the ratio of output produced to the labour inputs used in the production process. It measures the efficiency with which labour inputs are utilized to generate output, and higher labour productivity implies more efficient use of labour resources.
- Investment strategies encompass the plans and approaches adopted to allocate financial resources across different areas such as technology, human capital development, infrastructure, and process optimization with the aim of enhancing productivity and achieving long-term growth.
- Efficiency denotes the extent to which resources and inputs are optimally utilized to maximize output while minimizing waste. In the context of production processes, higher efficiency implies producing more output with the same level of inputs or producing the same output with fewer inputs.

1. OBJECTIVES

The objective of this research is to quantitatively examine the impact of investments in technology, human capital, and production organization on labour productivity in Azerbaijan's chemical and petrochemical industries over the period 2018-2022. Specifically, this study aims to measure the correlation between different types of investments (technology, human capital, production organization) and changes in labour productivity from 2018-2022; identify which investment areas yield the largest improvements in labour productivity over this period; quantify how these investments have impacted key economic indicators like output and exports in these industries from 2018-2022. By addressing these issues, the government and investors will be able to identify the most effective development and investment strategies that can improve Azerbaijan's competitiveness in the global market and contribute to its economic growth.

It is essential for policymakers and stakeholders to have a thorough understanding of the relationship between investment and labour productivity in the chemical and petrochemical industries of Azerbaijan in order to make well-informed decisions. Furthermore, as Azerbaijan strives to establish itself as a significant participant in the worldwide energy market, the findings obtained from this study can provide valuable information for developing tactics to improve the long-term viability and adaptability of its industrial sector. This research aims to offer practical recommendations that can guide industrial development towards increased efficiency and competitiveness by conducting a detailed analysis of investment strategies and their impact on labour productivity.

2. HYPOTHESIS

Based on theory and previous research, we hypothesize that:

H1: Higher levels of investment in advanced technology are positively correlated with increases in labour productivity in Azerbaijan's chemical/petrochemical sectors from 2018-2022.

H2: Greater investment in human capital development (training, education, etc.) is associated with significant improvements in labour productivity in these industries over the study period.

H3: Increased investment in areas like equipment upgrades, process automation and logistics optimization (production organization) has a positive impact on labour productivity levels from 2018-2022.

These hypotheses will be tested by estimating regression models that measure the relationship between the investment variables and labour productivity indicators over 2018-2022, while controlling for other relevant factors.

The organisation of this paper is as follows: Section II explains the research gap. Section III provides a detailed description of the materials and methods used in the research, including the sources of data and the analytical techniques employed. Section IV of the report provides a comprehensive examination of the data concerning labour productivity, investment levels, and other relevant factors in Azerbaijan's chemical and petrochemical industries. Section V examines the findings in connection with the current body of literature and theories. Section VI provides a comprehensive summary of the main findings and identifies potential avenues for future research, ultimately concluding the paper.

II. CONTRIBUTIONS

While prior studies have explored the general impact of investment on productivity, this research provides a focused analysis specifically within the chemical and petrochemical sectors in Azerbaijan. These

capital-intensive industries play a pivotal role in the country's economic development, yet there is a paucity of empirical investigations examining the dynamics between investment strategies and labour productivity enhancement in this context. The study also adopts a multidimensional approach by examining the effects of various investment types on labour productivity. Rather than treating investment as a monolithic concept, the research disaggregates it into distinct components, including investments in technology, human capital development, and production organization. The research goes beyond merely establishing correlations by delving into the underlying factors that moderate the investment-productivity relationship. Through a comprehensive exploration of elements such as technological progress, workforce skills, regulatory environments, and market conditions, the study illuminates the intricate interplay of forces that shape the effectiveness of investment initiatives aimed at enhancing labour productivity.

The study's quantitative approach employs rigorous statistical and econometric techniques to measure the magnitudes and strengths of the relationships under investigation. By utilizing regression analysis and other advanced analytical methods, the research provides empirical evidence and numerical estimates, lending a high degree of reliability and objectivity to its findings. the research adopts a comparative perspective by contrasting the investment-productivity dynamics across different industrial sectors within Azerbaijan. This cross-sectoral analysis not only highlights the unique challenges and opportunities faced by the chemical and petrochemical industries but also facilitates the identification of best practices and successful strategies that can be adapted from other high-performing sectors. By identifying gaps in existing knowledge and potential avenues for further inquiry, the research paves the way for subsequent investigations that can build upon its findings, explore new dimensions, or replicate the study in different regional or industrial contexts.

This study makes several novel contributions that advance our understanding of the intricate relationship between investment and labour productivity, particularly within the strategic context of Azerbaijan's chemical and petrochemical industries:

- While the general link between investment and productivity has been explored, this research breaks new ground by providing pioneering empirical evidence focused explicitly on Azerbaijan's pivotal chemical and petrochemical sectors.
- Departing from the conventional approach of treating investment as a unidimensional concept, this study innovatively adopts a multidimensional lens by disaggregating investment into three distinct components: technology, human capital development, and production organization.
- Extending beyond mere correlational analyses, this research makes a contribution by integrating an examination of contextual factors that shape and moderate the investment-productivity relationship.
- This study advances the field by employing rigorous quantitative methods, including regression analysis and other advanced econometric techniques. This novel approach provides empirical evidence and numerical estimations, lending a high degree of reliability, objectivity, and precision to the findings.
- The research adopts a comparative perspective by contrasting the investment-productivity dynamics across multiple industrial sectors within Azerbaijan.
- By comprehensively examining investment trends, productivity patterns, and influential factors within Azerbaijan's chemical and petrochemical industries, this study establishes a novel and solid foundation for future research endeavours.

III. LITERATURE REVIEW

According to G. Alizada, enterprise performance depends both on operations and on innovation and investment processes [1]. While the importance of efficient operation of available means of production and accumulated funds is undeniable, the role of organisational and managerial factors that influence staff performance is underestimated. It is particularly relevant in the context of the growing significance of the intellectual component of modern production. Thus, it is essential to explore both the volume of investment and its distribution and the impact of organisational factors on productivity.

According to R. S. Azizova, an increase in labour productivity in an enterprise cannot be achieved only by investing in fixed capital [2]. Equally, attention must be paid to investment in human capital, as the skills and knowledge of workers have a huge impact on the success of innovation and the efficient use of

fixed capital. According to Sh. T. O. Aliyev and K. D. O. Mammadzadeh, in the current context of increasingly intelligent production processes, the level of human capital is even more critical to achieving high performance in production [3].

P. S. Q. Verdiyeva believes that for a long time, increasing labour productivity and increasing investment have been the key factors in economic growth [4]. These objectives are long-term economic policy priorities and should inform management decisions at all levels of government. They highlight the necessity of improving the quality of work and productivity in both the short and long term. In addition, it is important to consider factors such as innovation and management decisions that can significantly affect these purposes.

A. I. Sardoni argues that attracting investment in human capital is one of the key factors influencing the increase in labour productivity [5]. Establishing a favourable investment environment that encourages investment both in technology and in human capital development, stimulates the growth of efficiency in using basic production assets and enhances the quality of labour [6].

According to F. P. Rahmani, investment in the chemical and petrochemical industry in Azerbaijan is of strategic importance for the country's economic development and is one of the priorities of national policy [7]. In particular, to improve production efficiency, broaden the range of products and increase export opportunities, Azerbaijan is implementing major investment projects in the petrochemical industry, which have an impact on productivity.

The performance of a business and the productivity of its workforce are greatly affected by a combination of operational efficiency, innovation, investments in technology, fixed capital, and human capital. The success of innovation and the efficient use of fixed capital heavily rely on human capital, which encompasses the skills and knowledge possessed by workers. Investing solely in fixed capital is insufficient for achieving an increase in labour productivity. It is equally crucial to invest in human capital. The increasing importance of the intellectual aspect of contemporary production highlights the necessity for a well-rounded and comprehensive approach to enhancing enterprise performance and labour productivity. Moreover, the studies emphasise the necessity for additional empirical investigation regarding the relationship between different forms of investment and labour productivity in Azerbaijan's chemical and petrochemical industries.

Although these studies recognise the favourable influence of investment on productivity, there is a scarcity of empirical research that specifically investigates the correlation between various types of investment (such as technology, human capital, and production organisation) and labour productivity in Azerbaijan's chemical and petrochemical sectors. Furthermore, there is a lack of research on the factors that determine the success of investments in these industries. This study seeks to fill this void by conducting an extensive examination of the dynamics of labour productivity, investment trends, and the fundamental factors that influence their correlation in the chemical and petrochemical sectors of Azerbaijan. The study aims to utilise statistical data analysis and theoretical frameworks to offer valuable insights for the development of efficient investment strategies that can enhance productivity and competitiveness in the vital sectors of the Azerbaijani economy.

IV. MATERIAL AND METHOD

This research has involved a study of official data and reports from Azerbaijani statistical authorities on the development of the chemical and petrochemical industry in the country, the level of investment and labour productivity in the industry. The primary data sources for this study were obtained from the State Statistical Committee of the Republic of Azerbaijan [8, 9]. The research study on the current issues of the impact of investment on productivity was performed using methods that identify the subject of the study. The research framework can be seen in Figure 1.

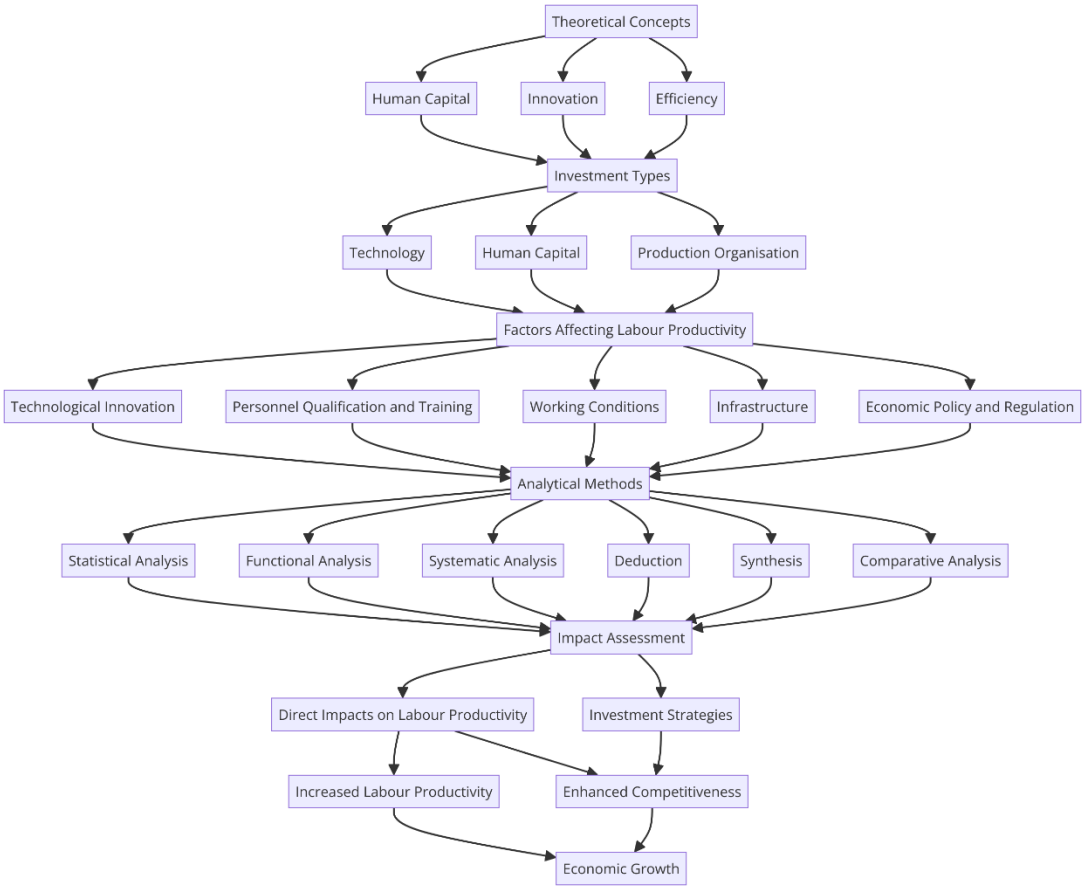


FIGURE 1. The research framework

Using the analytical method, investment activity in the chemical and petrochemical industry in Azerbaijan was explored, the factors affecting labour productivity were explored and the extent to which investment could increase labour productivity was assessed. Using the statistical method, the relationship between investment and labour productivity in the industry was assessed. This method allowed for determining how much a change in one variable (level of investment) affects a change in another variable (labour productivity). The functional method has helped to consider what tasks labour productivity solves in this industry, which elements influence labour productivity and how they affect the efficiency of production and the economy in general. The method of systems analysis has allowed for the analysis of the interactions between the various factors affecting labour productivity in the chemical and petrochemical industry, namely economic, political, social and technological. Using the method of deduction, it has been possible to establish general principles and patterns concerning the impact of investment on productivity, including various aspects of this relationship, such as increasing output, increasing the education of personnel, optimising production, etc. The synthesis method helped to link data and facts about productivity, investment and growth in Azerbaijan's economy, and to understand the current state of the country's chemical and petrochemical industry. The comparison method was used to identify the best areas for investment in the chemical and petrochemical industry and to determine the reason for their performance in labour productivity in this sector in Azerbaijan.

The research was carried out with certain aspects of the study revealed, encompassing both the theoretical and practical components. The theoretical aspect of the study involves analysing the concept of labour productivity and its measurement in Azerbaijan's chemical and petrochemical industry [8]. It also includes examining theories that explain how investment affects labour productivity, such as human capital theory, innovation theory, and efficiency theory [9]. According to human capital theory, allocating resources towards education and training can enhance the skills and productivity of workers. Innovation

theory suggests that allocating resources towards research and development can result in the emergence of novel technologies and methodologies that improve efficiency and productivity. The theory of efficiency centres around the optimisation of available resources, such as labour and capital, to achieve the highest possible output and productivity.

Information was gathered from diverse sources, encompassing industry reports, government publications, and academic studies. An amalgamation of statistical and qualitative methods was employed to analyse the data. Summary statistics, such as the mean and standard deviation, were employed to describe the data. Regression analysis, a form of inferential statistics, was employed to investigate the associations between variables. The data was analysed using qualitative methods, specifically content analysis, to identify recurring themes and patterns.

Another aim of the research was to examine real data and first-hand knowledge of investment in the chemical and petrochemical sectors in Azerbaijan, including specific investment projects in these industries within the country. To achieve this objective, an analysis was conducted on the labour productivity indicators in different sectors of the economy, and their overall trends were identified. The final step involves analysing the obtained results and making recommendations to address specific issues in labour productivity efficiency. These recommendations will help resolve the problems and foster the development of the industry in Azerbaijan. Consequently, this sequence was utilised to assess the viability of investing in specific industries, foster economic growth, and benefit the country as a whole.

The utilisation of these methods facilitated a thorough investigation of the research problem from various perspectives, encompassing theoretical underpinnings, empirical data analysis, and practical ramifications. This methodological approach can be utilised in future studies to assess the influence of investment on productivity in different industries or regions. Furthermore, the results can provide valuable insights for making policy choices regarding investment strategies and improving labour productivity in Azerbaijan's chemical and petrochemical industries.

The primary conjecture of this study posits that allocating resources to the chemical and petrochemical industry, specifically in domains such as technology, human capital, and production organisation, yields a favourable influence on labour productivity within these sectors in Azerbaijan. The outline of the research framework is provided below:

1. Analyse theoretical concepts such as human capital, innovation, and efficiency that are associated with investment and productivity.
2. Conduct a comprehensive analysis of statistical data about labour productivity and investment in Azerbaijan's chemical/petrochemical industry. Determine the key factors that have an impact on labour productivity in these sectors.
3. Analyse the correlation between various investment types and changes in productivity.
4. Assess the efficacy of investment strategies in improving productivity.
5. Suggest strategies for enhancing investment to enhance competitiveness.

The research aims to enhance the knowledge base on investment-productivity dynamics and facilitate evidence-based policymaking in Azerbaijan's strategic industrial sectors by testing this hypothesis and addressing the outlined objectives. The primary conjecture of this study posits that allocating resources to the chemical and petrochemical industry, specifically in domains such as technology, human capital, and production organisation, yields a favourable influence on labour productivity within these sectors in Azerbaijan.

To ensure a comprehensive analysis, the study considered the entire population of enterprises in the chemical and petrochemical industries of Azerbaijan, as reported in the State Statistical Committee's databases. No sampling was performed, and the analysis encompassed the complete set of available data points from 2018 to 2022 for these industries. This approach minimizes sampling bias and provides a holistic understanding of the dynamics between investment and labour productivity in the sectors under investigation.

A combination of statistical and qualitative techniques was employed to analyse the data. Descriptive statistics, such as growth indices and summary measures, were calculated to summarize and compare patterns in labour productivity and investment across industries and over time. Correlation analysis was conducted to evaluate the strength and direction of the relationship between investment and labour productivity. Furthermore, regression analysis was performed to assess the impact of investment on labour

productivity while accounting for potential confounding factors. Qualitative methods, including content analysis, were used to identify recurring themes and patterns in the data, supplementing the quantitative analyses.

The research methods' limitations and biases were identified and mitigated. Secondary data may have accuracy and completeness issues, but reliable sources and cross-checking address these issues. Statistical analysis may have biases related to variable selection and sample size, but appropriate statistical methods and a large sample size address them. Qualitative analysis may be limited by researcher subjectivity, but a structured approach and multiple researchers addressed this. A triangulation approach that combined different methods and data sources to improve research validity and reliability reduced limitations and biases. The results of these investigations will be presented in the following section, Data Analysis.

V. DATA ANALYSIS

One of the key determinants of economic growth and development today is the improvement of production efficiency through increased labour productivity. Labour productivity is an indicator of the efficiency of the production process, defined as the ratio of output to the inputs used to produce it. Increased labour productivity is a major factor in increasing production efficiency, reducing costs and making companies more competitive in a market economy. The importance of labour productivity in industrial development lies in its ability to produce more output with less labour and material input. It can reduce the cost of production, increase companies' profits and strengthen their market position [10].

Increased productivity can therefore mean a better quality of life for the population and economic growth for the country in general. Increased productivity enables companies to produce more output and increase their income, which can result in the establishment of new jobs and employment. Increases in employment and quality of life can, in turn, strengthen demand for products, contributing to further productivity growth [11]. Thus, labour productivity plays a key role in the development of industry and the economy in general.

In today's economy, productivity growth depends to a large extent on the efficient use of investment to upgrade fixed assets and absorb advanced technology. However, the establishment and implementation of new ideas and innovations are essential for increasing productivity. In addition, the utilisation of existing capacity is a crucial factor in this process [12]. Consequently, one of the main areas for achieving high productivity is increased investment in state-of-the-art technology, as this can ensure high efficiency of production processes and establish the conditions for further productivity growth in the chemical and petrochemical industry.

These days, the industry is undergoing a major technical overhaul, resulting in a gradual shift towards high-capacity units. It allows for significant reductions in capital investment and operating costs and increases productivity. However, as equipment capacity increases, requirements for reliability increase, as unexpected stoppages can cause significant losses in production. In this respect, the quality of maintenance and repair plays a special role. It is significant both to improve repair technology and the skills of repair workers and to diagnose and plan repairs effectively [13]. The responsibility for maintaining and repairing equipment is, therefore, great and requires a high degree of specialist skills. Investments to equip companies with modern equipment and technology will increase the reliability of equipment, reduce unplanned downtime and increase employee productivity.

Human capital is a very important factor affecting labour productivity, but its effectiveness depends on proper management and investment in its development. Investing in human capital involves spending on the training and professional development of employees. Increasing a worker's educational attainment can improve worker efficiency and result in increased productivity [14].

Acquiring new knowledge and skills can make an employee more capable, which can be important for the success of the organisation in general. Notably, the effectiveness of such investments may depend on the right choice of training programmes and methods and on the level of employee motivation and interest in mastering them.

In addition, investments in human capital can go towards maintaining and improving the health of workers, which includes spending on health care, health insurance, diet and other factors that can increase longevity and improve an individual's health. However, poor health can have an adverse effect on

productivity, so it may be in the company's interest to invest in the health of its employees. Another type of human capital expenditure can be employee mobility, which involves the relocation of workers in search of better career opportunities.

Another area of investment in productivity is in the organisation of production, which includes the purchase and modernisation of equipment, automation of production processes, optimisation of logistics, and training and implementation of new technologies [15].

For example, a company may invest in modern equipment with a higher capacity, allowing it to improve the efficiency of its production processes and increase output in the same period. In addition, investments can be made to optimise logistics, such as improving the warehousing and transport of finished goods, thereby reducing the time and cost of getting goods to the consumer. Staff training and the introduction of new technology are important elements in investing in the organisation of production. The development of new technologies can reduce production costs, improve product quality, and increase competitiveness. Staff training will improve their skills and abilities, which in turn will increase productivity.

Thus, investment in advanced technology, equipment maintenance and repair, human capital, and the organisation of production can have a significant impact on labour productivity, specifically in Azerbaijan's chemical and petrochemical industry.

The chemical and petrochemical industries play an important role in Azerbaijan's economy. The country is rich in oil and gas and other minerals, such as copper, iron, gold, silver, etc., which allows for the development of local resource-based chemical and petrochemical industries. Azerbaijan has large oil refineries, including plants for the production of petroleum products and plastics, and plants for the production of chemical fertilisers, synthetic fibres, dyes, varnishes and paints [16].

In addition, the country is developing the production of petrochemicals such as propylene, ethylene, butylene, etc. Azerbaijan is one of the largest oil and gas producers in the region, and most of the country's petrochemical industry is based on using petroleum products as feedstock. In addition, the country has natural gas-based industries, including the production of high-density polyethylene, which is used as packaging material. Chemical production in 2022 was about 704.5 million manats (about $415 million). Production of petrochemicals in 2022 was about AZN 787 million (about US$463 million) [7].

Azerbaijan's main major enterprises related to the chemical and petrochemical industry include: SOCAR – Azerbaijan's national oil company, which is engaged both in oil production and refining and in the production of chemical products such as ethylene, propylene, polypropylene and others; Azerkhalk – Azerbaijan's largest enterprise specialising in the production of nitrogen fertilisers and chemical products; Azerikimya – engaged in the production of synthetic rubbers, plastics, dyes and other chemical products; Azerneftekhim – the largest producer of petrochemicals in the country, including plastics, polyethylene, polypropylene, styrene and other products; Azerbaijan Catalytic Plant – produces catalysts for the refining and chemical industries; Azerbaijan Electrolysis Plant – specialises in the production of aluminium and its alloys. The following is an indication of the production capacity of some major chemical and petrochemical companies in Azerbaijan for 2021 (Table 1).

Table 1. Production capacity of chemical and petrochemical companies in Azerbaijan for 2021

Company	Production capacity (thousand tonnes/year)
SOCAR	10170
Azerkhalk	200
Azerkimya	3500
Azerneftekhim	1690
Azerbaijan Catalytic Plant	200
Azerbaijan electrolysis plant	140

Source: developed by the author based on data from [8].

A large proportion of the chemical and petrochemical production capacity is concentrated in Baku city and its suburbs, indicating the significant impact of these industries on the economy of the Azerbaijani capital. To explore the relationship between investment and labour productivity in Azerbaijan, a table

representing the dynamics of labour productivity in different industries over time (Table 2) and the dynamics of investment in these industries (Table 3) was compiled. In addition, this table allows for analysis of which sectors make better use of investment and which areas need additional investment to improve productivity.

Table 2. Dynamics of Azerbaijan's industrial productivity index from 2018 to 2022

Industry	2018	2019	2020	2021	2022	Growth index, 2022/2018
Chemical industry	103.3	101.8	98.1	100.3	102.4	0.99
Petrochemical industry	97.4	99.7	97.8	99.2	101.1	1.04
Mechanical engineering	104.0	108.2	108.0	110.6	110.7	1.04

Source: developed by the author based on data from [8].

Table 3. Investment by industry in Azerbaijan from 2018 to 2022

Industry	2018	2019	2020	2021	2022	Growth index, 2022/2018
Chemical industry	103.9	88.5	34.9	65.1	94.5	0.91
Petrochemical industry	793.5	587.1	167.2	407.1	672.4	0.85
Mechanical engineering	246.9	296.7	286.7	312.7	313.1	1.27

Source: developed by the author based on data from [8].

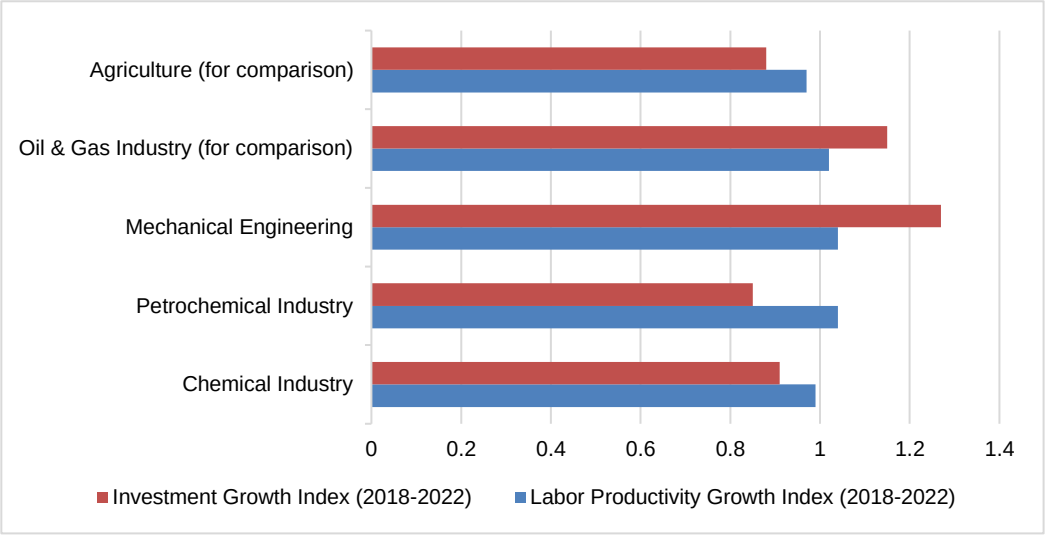
The labour productivity index in Azerbaijan's chemical and petrochemical industry has fluctuated in recent years. The index declined sharply in 2020, possibly due to the adverse impact of the COVID-19 pandemic on production, but over 2021 and 2022 it managed to recover its previous performance. The substantial decrease in labour productivity indices in 2020 can primarily be attributed to the disruptions caused by the COVID-19 pandemic. The chemical and petrochemical industry in Azerbaijan faced numerous challenges during the pandemic, which had an impact on production processes, workforce dynamics, and investment patterns. The enforcement of lockdowns and implementation of social distancing measures led to temporary shutdowns of manufacturing plants, decreased operational capacities, and disrupted supply chains, consequently causing a detrimental effect on production output. The workforce was also impacted, as employees either acquired the virus or had to undergo self-isolation, resulting in labour shortages and decreased productivity. Moreover, the pandemic-induced economic uncertainty resulted in a decline in investments, as companies adopted a more cautious approach towards their financial obligations and focused on immediate survival rather than long-term expansion. The convergence of these factors led to a significant decrease in labour productivity indices in 2020. In Azerbaijan's engineering sector, the index demonstrates the same dynamics.

Thus, the data presented in Tables 2 and 3 provide valuable insights into the performance and competitiveness of the chemical and petrochemical industry in Azerbaijan. The labour productivity indices displayed in Table 2 exhibit a fluctuating trend, characterised by a notable decrease in 2020 as a result of the COVID-19 pandemic, followed by a partial rebound in 2021 and 2022. This indicates that the industry has shown resilience in dealing with external disruptions, but it still encounters difficulties in maintaining steady growth in labour productivity. The investment data presented in Table 3 reinforces this observation, as it indicates a decline in investment levels in 2020, which could have contributed to the decrease in labour productivity [8, 9].

There is a significant impact of these trends on the overall economic performance and competitiveness of the chemical and petrochemical industry in Azerbaijan. A lower rate of growth in labour productivity may suggest that the industry is not fully capitalising on its potential, potentially impeding the country's economic growth and development. Furthermore, irregular investment trends could impede the industry's capacity to embrace innovative technologies, enhance infrastructure, and enhance workforce capabilities, all of which are crucial for boosting productivity and sustaining competitiveness in the global market.

To tackle these difficulties, policymakers and industry leaders should contemplate adopting strategies that aim to foster consistent and sustainable growth in labour productivity and investment. Possible approaches could involve implementing specific incentives to promote innovation and the adoption of technology, allocating resources towards training and developing the workforce, and cultivating a conducive business environment that promotes investment from both domestic and international sources in the industry. Azerbaijan's chemical and petrochemical industry can improve its competitiveness, boost the country's economic growth, and generate new employment opportunities by tackling these problems.

If comparing the chemical and petrochemical industry in Azerbaijan to other relevant industries, it is important to consider key factors such as the growth of labour productivity and investment dynamics. These factors are critical indicators of the performance and competitiveness of the sector (Figure 2).



Source: developed by the author based on data from [8].

FIGURE 2. The comparison of the different section in Azerbaijan

From the comparative analysis, several significant observations arise: The mechanical engineering sector surpassed the chemical and petrochemical industries in utilising investments to enhance labour productivity growth, possibly as a result of factors such as technological advancements, a skilled workforce, or efficient production processes. Although the petrochemical industry experienced some growth in labour productivity, the substantial decrease in investment levels indicates potential difficulties in attracting or efficiently utilising investments to further enhance productivity. The chemical industry witnessed a decrease in both labour productivity and investment, which has raised concerns regarding the sector's competitiveness and its capacity to effectively attract and utilise investments. When compared to other important sectors such as oil and gas (which experienced moderate growth in productivity and investment) and agriculture (which saw declines in both metrics), the chemical and petrochemical industries showed varying performance. This emphasises the importance of developing strategies that are specific to these sectors to tackle challenges related to productivity and investment. This analysis highlights the significance of customising investment strategies and measures to improve productivity based on the unique requirements and difficulties of each sector. It also emphasises the importance of adopting successful practices from high-performing industries, such as mechanical engineering in Azerbaijan.

This analysis highlights the significance of customising investment strategies and measures to improve productivity based on the unique requirements and difficulties of each sector. It also emphasises the importance of adopting successful practices from high-performing industries, such as mechanical engineering in Azerbaijan.

By comparing the productivity dynamics in different sectors of the economy with the amount of fixed capital investment in these sectors, some similarities can be seen in the results, which support the

hypothesis of a positive impact of investment on productivity growth. Similar changes may have occurred due to external influences such as COVID-19 and economic stability.

Investment in the chemical and petrochemical industry can be influenced by various factors, such as: global oil and gas prices, as the oil and gas industry is a key industry in Azerbaijan; availability of highly skilled personnel and availability of technological innovation; level of infrastructure development, including transport, energy and telecommunications infrastructure; government support through tax incentives, subsidies, government programmes and other support measures; macroeconomic stability and the level of investment risk in the country [17]. In general, investment in the chemical and petrochemical industry depends on many factors, their interrelationships can be complex and vary depending on the specific situation of a country's economy and the world market.

Factors affecting labour productivity in the chemical and petrochemical industry may include the following: technological innovation, as the introduction of new technologies, equipment and processes can increase production efficiency and labour productivity; personnel qualification and training, as employees' skill level and knowledge of production, affect labour productivity, and personnel training in new methods and technologies can improve labour productivity; working conditions, as a comfortable and safe working environment, and the availability of necessary equipment and materials, can affect labour productivity; infrastructure, as the availability and efficiency of transport, energy, communications and other infrastructure can affect labour productivity; economic policy and regulation, as government economic policy, tax rates, industry regulation and other factors can affect labour productivity in the chemical and petrochemical industry [18-22].

The similarity of some of the influences on investment and labour productivity may indicate that there is a causal relationship between investment in production and improvements in labour productivity. Factors that motivate companies to invest in production, such as modern technology, high profits, access to capital and others, can contribute to improved productivity. To achieve high productivity, it is necessary both to invest in product development and to consider other factors such as technological innovation, employee qualifications and motivation, management efficiency, resource availability, etc. Thus, the relationship between investment and productivity must be considered in designing an industrial development strategy, and an integrated approach to the management of production processes and resources must be considered.

An examination of the data showed substantial variations in labour productivity indices and investment levels in Azerbaijan's chemical and petrochemical sectors from 2018 to 2022. Notably, there was a significant decrease in 2020, which can be attributed to the negative effects of the COVID-19 pandemic. Although there was a recovery in productivity and investment in the following years, they did not return to the levels seen before the pandemic by 2022 in these sectors. In contrast, the mechanical engineering industry demonstrated a steady increase in productivity and investment over the period, indicating that it was relatively unaffected by the disruptions caused by the pandemic. The growth indices from 2018 to 2022 showed a slight decrease in productivity (0.99) and investment (0.91) for the chemical industry, a moderate increase in productivity (1.04) along with a decrease in investment (0.85) for petrochemicals, and positive growth in both productivity (1.04) and investment (1.27) for mechanical engineering. The findings emphasise the diverse impacts of external factors and investment patterns on labour productivity in different industrial sectors in Azerbaijan.

The analysis section of this study investigated the correlation between investment and labour productivity in Azerbaijan's chemical and petrochemical industry through the application of diverse statistical methodologies. Descriptive statistics, such as growth indices, were used to summarise and compare the patterns in labour productivity and investment across various industries from 2018 to 2022. Correlation analysis was conducted to evaluate the connection between investment and labour productivity, enabling the determination of the intensity and direction of their association. Furthermore, a regression analysis was performed to account for potential confounding factors and determine the effect of investment on labour productivity, while also considering other pertinent variables. The utilisation of these statistical techniques yielded a thorough comprehension of the correlation between investment and labour productivity within the designated industry and timeframe.

To obtain a more thorough comprehension of the factors that impact labour productivity and investment in Azerbaijan's chemical and petrochemical industry, it is crucial to examine a variety of

drivers. Technological progress can greatly enhance labour productivity and make the industry more appealing to potential investors. Labour productivity and the industry's competitiveness can be influenced by the availability, quality, and cost of labour. Government policies, such as fiscal incentives and subsidies, as well as regulatory policies, such as environmental and safety standards, have the potential to impact labour productivity and influence investment choices. Market conditions, such as the level of demand for chemical and petrochemical products within the country and abroad, can also have an effect on the efficiency of labour and the amount of money invested in the industry. Moreover, macroeconomic variables such as inflation, exchange rates, and economic growth have the potential to impact labour productivity and investment in the industry. Through analysing these diverse factors, it is possible to gain a deeper comprehension of the intricacies of the chemical and petrochemical sector in Azerbaijan and pinpoint prospects for expansion and enhancement.

These findings highlight the importance of maintaining steady growth in labour productivity and investment to guarantee the industry's long-term competitiveness and sustainable development. Policymakers should give utmost importance to the implementation of strategies that prioritise the promotion of consistent growth in labour productivity and investment. This can be achieved by offering specific incentives for innovation, technology adoption, workforce training, and creating a favourable business environment. Industry stakeholders should prioritise the improvement of productivity and competitiveness through investments in cutting-edge technologies, infrastructure upgrades, and the enhancement of workforce skills. Partnerships among industry stakeholders, academic institutions, and government agencies can enhance the exchange of knowledge and the development of best practices. Enhancing the calibre and accessibility of the workforce by implementing vocational training initiatives and advocating for the industry as an appealing career choice can effectively tackle the skills shortage and enhance labour efficiency. Ultimately, enhancing the industry's ability to compete by implementing trade agreements and offering export support to industry participants can effectively broaden the industry's scope and enhance its profitability. Subsequent investigations should delve into the fundamental factors that contribute to the varying patterns in labour productivity and investment, analysing the influence of particular policies, market conditions, and technological advancements. Conducting comparative studies with other countries or regions can offer valuable insights into potential benchmarks and lessons that can be learned. By taking into account these observations, individuals or groups with an interest in the matter can make well-informed strategic choices to improve efficiency, competitiveness, and sustainable growth in Azerbaijan's chemical and petrochemical sector. This, in turn, will ultimately contribute to the country's economic expansion and the creation of employment opportunities.

VI. DISCUSSION

A study conducted on the impact factors of investment on labour productivity demonstrates great relevance to the chemical and petrochemical industry in Azerbaijan. This subject is one of the key areas of research in economic science; it is a broad area where economists study how investment in fixed capital affects labour efficiency and productivity growth. In the chemical and petrochemical industry, for example, the introduction of new production technologies can significantly improve equipment efficiency, reduce energy and raw material costs and improve product quality. In addition, investment in training and development can improve the skills of workers and, as a result, increase productivity [23, 24]. Investment in fixed assets can lead to automation and optimisation of production processes, reducing errors and defects and speeding up the production cycle. In addition, investment in research and development can result in the development of new technologies that can increase production efficiency and improve product quality [25].

This research demonstrates that labour productivity is an important indicator that determines the efficient use of resources in the production process and that investment, in turn, is a key driver of economic development and has a positive effect on labour productivity. However, it should be noted that investments may not always lead to improved productivity. For example, investing in new equipment or technology may require additional staff training, which may result in a temporary loss of productivity [26]. In addition, the investment may not pay off if the production process is not improved in line with new technology and equipment. In addition, it is useful to consider that the impact of investment on labour

productivity may not manifest itself immediately, but with some delay. Since once fixed assets have been invested, it may take time to get them installed and up and running and to train workers and adapt them to the new environment [27, 28].

N. Maestas et al. estimated the econometric relationship between unit investment and labour productivity in their research [29]. They conclude that investment does not directly affect productivity, but through a series of intermediate steps. An important factor in this chain is increased investment in fixed production assets, which in turn leads to an increase in capital equipment and gross value added. It, in turn, contributes to the growth of productivity. In addition, the research has demonstrated that an increase in unit investment causes a smaller increase in productivity than an absolute increase in investment. For example, a 1% increase in unit investment could increase productivity by 0.44%.

These conclusions underline the importance of investment in fixed capital for increasing productivity and developing the economy in general. In addition, the efficiency of investments can be increased by streamlining production processes, introducing new technologies and improving the skills of personnel.

J. Li et al. highlight the subject of the interaction between investment and labour productivity and examine the dynamics and multidirectional relationship between investment and labour productivity in different types of economic activity [30]. Over the period under review, there has been steady positive growth in fixed capital investment, but productivity indices at different levels of economic activity demonstrate multidirectional dynamics.

These results may indicate an inefficient use of investment in the production process, possibly due to a lack of attention to modern technology and production management techniques. In addition, it is possible that investments were allocated to the wrong areas, where they could not reach their full potential in improving productivity. There is a necessity for a deeper analysis of the factors affecting labour productivity and the development of specific measures and strategies to increase labour productivity while increasing investment in fixed capital [31-33].

L. S. Baskoro et al. examined the impact of foreign direct investment on the productivity of local companies and identified factors that would help develop more effective policies to encourage attractive foreign direct investment practices [34]. Analysis of the impact of foreign investment on labour productivity has demonstrated mixed trends, depending on the country's economic modernisation, the amount of investment in research and development and the level of production costs. The arrival of foreign direct investment in the country indicates different areas of investment, the short-term nature of the investment and the predominance of speculative motives. The growing foreign presence indicates that workers in sectors with a high share of foreign investment are paid higher wages [35-37].

In general, foreign direct investment can be an important source of economic development, but its potential adverse effects, such as dependency on foreign investors, capital flight, and social and environmental problems [38], must be considered. It is therefore important to find a balance between attracting foreign investment and protecting the interests of local economic actors and society in general.

In their study, A. Habib and M. M. Hasan identify factors that contribute to the impact of investment on the productivity of various sectors of the economy [39]. Different types of investment can have different effects on labour productivity. For example, investments in new technology, research and education increase productivity, whereas investments in real estate have no such impact. The industry of the economy can affect labour productivity when investing in fixed capital. Some industries, such as high-tech manufacturing, are more dependent on investment than others [40].

In addition, a country's level of development can play a role in the impact of investment on labour productivity. In more developed countries, investment in fixed capital may have a greater effect on labour productivity than in less developed countries [41].

J. Onkelinx et al. in their work analysed investment in personnel as a factor in increasing productivity in the enterprise [42]. Research demonstrates that investing in staff can lead to improved quality of work, increased productivity and better relations between colleagues. There are many ways to invest in staff, such as training and skill development, increasing employee satisfaction, establishing teamwork, etc. [43]. These measures can lead to greater employee motivation and efficiency, ultimately leading to improved productivity.

P. A. Peña conducted a similar study analysing an investment in human capital as a factor influencing labour productivity [44]. Workers with high qualifications can perform their duties more effectively and

adapt more quickly to changes in production processes. Investing in education and skills development allows a broader base for innovation and research, which increases the competitiveness of the economy in general [45].

However, notably, investment in personnel is not a one-size-fits-all solution for increasing productivity in an enterprise. Each business has its own unique characteristics and requirements, and not always investing in staff is the best choice [46]. Therefore, it is necessary to analyse and evaluate the effectiveness of different types of investment to determine the most effective methods of increasing productivity in a particular enterprise.

In general, investment in fixed capital and personnel is the most effective way of increasing productivity in enterprises. The impact of investment on labour productivity depends on several factors, including industry specifics, the level of education and skills of workers, the technological level of production, etc. [47]. Attracting foreign direct investment can increase productivity in the enterprise, but the effect can be ambiguous and depends on several factors. Investment in the chemical and petrochemical industry can lead to increased productivity and competitiveness for enterprises, establish new workplaces, and increase exports, which can have a positive impact on the country's economy in general.

VII. CONCLUSION

The research has characterised the concept of labour productivity and its role in industrial development. The main areas of investment that affect productivity are highlighted. These include investments in advanced technology, maintenance, equipment repair, human capital and organisation of production. Investments in human capital include investments in training, professional development, motivation, health care and insurance. Investments in production organisation include the purchase and modernisation of equipment, automation of production processes and optimisation of logistics. In addition, the role of the chemical and petrochemical industry in Azerbaijan's economy has been defined. The main major enterprises in the industry are outlined. Research has been conducted to identify the relationship between investment and labour productivity, using tables representing the dynamics of labour productivity in different industries over a given period, and the dynamics of investment in these industries. The results confirmed the assumption that investment has a positive effect on productivity growth. In addition, factors affecting investment and productivity in the chemical and petrochemical industry have been highlighted. The similarity of some factors has indicated the existence of a causal relationship between investment and labour productivity.

In conclusion, investment in Azerbaijan's chemical and petrochemical industry is an effective way to increase the productivity and competitiveness of enterprises. However, in addition to the investment, productivity is affected by other factors such as the organisation of production, technology, staff qualifications, etc. To further investigate, it is advisable to examine the possibilities of green investments and sustainable technologies in the chemical and petrochemical industry, as these sectors are becoming increasingly significant on a global scale. Furthermore, exploring the impact of digitalization and Industry 4.0 on enhancing labour productivity could provide fresh insights for policymakers and industry participants. In addition, conducting comparative studies with other nations could offer valuable insights and exemplary methods for Azerbaijan to further bolster its industrial competitiveness and promote sustainable growth.

REFERENCES

1. Alizada, G. (2021). Factor influence to the labor productivity level in Azerbaijan republic. In: *70th International Scientific Conference on Economic and Social Development* (pp. 747-755). Baku: ESD.
2. Azizova, R. S. (2020). Role of human capital in innovative economic development. *Fundamental Research*, *9*, 5–10.
3. Aliyev, Sh. T. O., & Mammadzadeh, K. D. O. (2021). Issues and prospects for accelerating the development of the economy of Azerbaijan in the post-pandemic period. In: *3rd International Scientific and Practical Conference "Recent Scientific Investigation"* (pp 46-55). Oslo: Scientific Publishing Center.
4. Verdiyeva, P. S. Q. (2019). Investing in the Azerbaijani economy is a factor in the improvement of the recycling mechanism. *European Journal of Humanities and Social Sciences*, *4*, 113–118.
5. Sardoni, C. (2024). Public spending and growth: A simple model. *Structural Change and Economic Dynamics*, *69*, 56–62.
6. Pomperada, J. R. (2022). Human Resource Information System with Machine Learning Integration. *Qubahan Academic*

Journal, *2*(2), 5–8.
7. Rahmani, F. P. (2020). Mechanisms of application of innovative strategy in the development of industrial enterprises in Azerbaijan. *Development Prospects of Market Economy*, *1*, 81–94.
8. The State Statistical Committee of the Republic of Azerbaijan: Industry. (2023). https://www.stat.gov.az/source/industry/.
9. The State Statistical Committee of the Republic of Azerbaijan: Labour Market. (2023). https://www.stat.gov.az/source/labour/?lang=en.
10. Pariboni, R., & Tridico, P. (2019). Structural change, institutions and the dynamics of labor productivity in Europe. Journal of Evolutionary Economics, 30(5), 1275–1300.
11. Vasyl'yeva, O. O., Sokolov, A. V., Lisnichenko, M. O., Halan, O. Y., & Butenko, T. V. (2023). Socio-Economic Dimension of Human Potential of World Countries in the Digital Space of the Labor Market. *Qubahan Academic Journal*, *3*(4), 106–129.
12. Walheer, B. (2021). Labor productivity and technology heterogeneity. *Journal of Macroeconomics*, *68*, 103290.
13. Newman, C., Rand, J., Talbot, T., & Tarp, F. (2015). Technology transfers, foreign investment and productivity spillovers. *European Economic Review*, *76*, 168–187.
14. Arfah, A. (2021). The effect of labor, private investment and government investment on productivity in the industrial sector. *Golden Ratio of Social Science and Education*, *1*(1), 50–60.
15. Radło, M. J., & Tomeczek, A. F. (2022). Factors influencing labor productivity in modern economies: A review and qualitative text analysis. *WSEAS Transactions on Environment and Development*, *18*, 291–314.
16. Hamidova, L. (2018, November 1). *The modern state of the level of competitiveness of industrial products in Azerbaijan*. SSRN. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3276614.
17. Boaventura, K. M., Peixoto, F. C., Fernandes, H. L., & Pessoa, F. L. (2022). Long-range investment assessment in a petrochemical industry: Cost and safety considerations. *Computers & Chemical Engineering*, *161*, 107737.
18. Ma, Y., Zhang, Q., & Yin, H. (2020). Environmental management and labor productivity: The moderating role of quality management. *Journal of Environmental Management*, *255*, 109795.
19. Danchuk, V., Shlikhta, H., Usova, I., Batyrbekova, M., & Kuatbayeva, G. (2021). Integrated project management systems as a tool for implementing company strategies. *Periodicals of Engineering and Natural Sciences*, *9*(4), 259–276.
20. Berisha, B., & Rexhepi, B. (2022). Factors that determine the success of manufacturing firms: Empirical evidence from Kosovo. *Quality – Access to* Success, *23*(191), 194-202.
21. Kawiana, I. G. P., Rexhepi, B. R., Arsha, I. M. R. M., Swara, N. N. A. A. V., Yudhistira, P. G. A. (2023). Accelerating values in shaping ethical leadership and it's effect on organisational performance. *Quality – Access to* Success, *24*(196), 295–302.
22. Teta, J., & Xhafka, E. (2023). Impact of Total Quality Management in Productivity. *Economic Affairs*, *68*, 861–867. https://doi.org/10.46852/0424-2513.2s.2023.32.
23. Kenesbayev, S. M., Oralbekova, A. K., Sartayeva, N. T., & Zhailauova, M. K. (2017). Programme and summary of research work on ICT competence development for future elementary school teachers in the conditions of inclusive education. *Espacios*, *38*(25), 10.
24. Krutsevich, T., Pengelova, N., & Trachuk, S. (2019). Model-target characteristics of physical fitness in the system of programming sports and recreational activities with adolescents. *Journal of Physical Education and Sport*, *19*, 242–248.
25. Aviv, I., Levy, M., & Hadar, I. (2008). Socio-engineering knowledge audit methodology (SEKAM) for analyzing end-user requirements. Paris: Actes de la conférence AMCIS.
26. Aviv, I. (2022). The distributed ledger technology as development platform for distributed information systems. In: Sharma, H., Vyas, V.K., Pandey, R.K., & Prasad, M. (Eds.), *Proceedings of the International Conference on Intelligent Vision and Computing (ICIVC 2021)*. Springer.
27. Sandra, L., Heryadi, Y., Lukas, Suparta, W., & Wibowo, A. (2021). Deep learning based facial emotion recognition using multiple layers model. In: *2021 International Conference on Advanced Mechatronics, Intelligent Manufacture and Industrial Automation, ICAMIMIA 2021 – Proceeding* (pp. 137-142). Surabya: Institute of Electrical and Electronics Engineers.
28. Canaj, K., Nimani, A., Canaj, B., & Spahija, D. (2022). Management and internationalization of research strategies in higher education institutions as a basis of economic well-being. *Corporate and Business Strategy Review*, *3*(2), 221–229.
29. Maestas, N., Mullen, K. J., & Powell, D. (2023). The effect of population aging on economic growth, the labor force, and productivity. *American Economic Journal: Macroeconomics*, *15*(2), 306–332.
30. Li, J., Miao, E., & Zhang, J. (2021). The legal environment, specialized investments, incomplete contracts, and labor productivity. *China Economic Review*, *66*, 101583.
31. Danchuk, V. D., Kozak, L. S., & Danchuk, M. V. (2015). Stress testing of business activity using the synergetic method of risk assessment. *Actual Problems of Economics*, *171*(9), 189–198.
32. Kenzhin, Z., Bayandin, M., Primbetova, S., Tlesova, A., & Bogdashkina, I. (2016). Streamlining human resource management at enterprises operating within Kazakhstan's present-day agro-industrial complex. *Journal of Internet Banking and Commerce*, *21*(S6).
33. Bendig, D., Göttel, V., Eckardt, D., & Schulz, C. (2024). Human capital in corporate venture capital units and its relation to parent firms' innovative performance. *Research Policy*, *53*(6), 105003.
34. Baskoro, L. S., Hara, Y., & Otsuji, Y. (2019). Labor productivity and foreign direct investment in the Indonesian manufacturing sector. *Signifikan: Jurnal Ilmu Ekonomi*, *8*(1), 9–22.

35. Bozorgmehr, K., & Díaz, E. (2022). Assessment of the European Union's ability to accept refugees and descriptive characteristics of migration waves. *European Chronicle*, *7*(4), 23–34.
36. Naka, L., & Spahija, D. (2022). Impact of English language as a human capital in the higher education institutions' development strategy. *Corporate and Business Strategy Review*, *3*(2), 262–272.
37. Mammadov A. I. (2019). Effective utilization of human potential and labor productivity. In: *37th International Scientific Conference on Economic and Social Development – "Socio Economic Problems of Sustainable Development"* (pp. 288-294). Baku: Azerbaijan State University of Economics (UNEC).
38. Opitasari, Yaddarabullah, & Sensuse, D. I. (2023). Employee welfare financing system with support vector machine and Naïve Bayes to Syariah banking. *AIP Conference Proceedings*, *2482*, 100005.
39. Habib, A., & Hasan, M. M. (2019). Business strategy and labor investment efficiency. *International Review of Finance*, *21*(1), 58–96.
40. Jianing, P., Bai, K., Solangi, Y. A., Magazzino, C., & Ayaz, K. (2024). Examining the role of digitalization and technological innovation in promoting sustainable natural resource exploitation. *Resources Policy*, *92*, 105036.
41. Dragos, C. M., & Przybytniowski, J. W. (2022). Social insurance in Europe: A comparative legal study. *European Chronicle*, *7*(1), 5–12.
42. Onkelinx, J., Manolova, T. S., & Edelman, L. F. (2016). The human factor: Investments in employee human capital, productivity, and SME internationalization. *Journal of International Management*, *22*(4), 351–364.
43. Kulakhmet, M., Hajrullina, A., Oleksiuk, N., Tvrdon, M., Protas, O., & Ragozina, V. (2022). Professional training of managers in the information and educational environment of universities. *Journal of Higher Education Policy And Leadership Studies*, *3*(2), 53-70.
44. Peña, P. A. (2020). Relative age and investment in human capital. *Economics of Education Review*, *78*, 102039.
45. Younis Masiha, R. (2022). Effects of Cryptocurrencies on Global Economics: A Review Study. *Qubahan Academic Journal*, *2*(2), 9–15.
46. Kopnova, O., Shaporeva, A., Iklassova, K., Kushumbayev, A., Tadzhigitov, A., & Aitymova, A. (2022). Building an information analysis system within a corporate information system for combining and structuring organization data (on the example of a university). *Eastern-European Journal of Enterprise Technologies*, *6*(2 (120)), 20–29.
47. Aitymova, A., Iklassova, K., Abildinova, G., Shaporeva, A., Kopnova, O., Kushumbayev, A., Smolyaninova, S., Aitymov, Z., & Karymsakova, A. (2023). Development of a model of information process management in the information and educational environment of preschool education organizations. *Eastern-European Journal of Enterprise Technologies*, *2*(3 (122)), 95–105.