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SUSTAINABLE DEVELOPMENT IN AZERBAIJANI AGRICULTURE: A COMPARATIVE STUDY OF EXPERT VIEWS

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Abstract

Purpuse. This study, based on the sustainability assumptions, provides the comparative evaluations and proposals of the views of academic and professional experts in order to contribute to the research on the implementation of sustainable development in agricultural sector of Azerbaijan. The aim of our study is to form a theoretical opinion with the views of experts by examining the barriers and opportunities of the Azerbaijani agriculture. This, in turn, allows our research to fill the gap in the literature by forming a deeper understanding of the views of experts regarding sustainability in the agriculture of Azerbaijan.
Methodology. Our research is conducted on the basis of the theoretical basis referring to the previous studies and statistical data on Azerbaijan's agriculture and in-depth interviews conducted with 4 academic and 4 professional experts. Comparative assessments are applied to the results of the expert interview.
Findings. The results show that there are differences in approaches between academics and professionals on some issues related to the implementation of sustainable development in agriculture. During our research, it is observed that the professionals mostly touched on the issues observed in the field, while the academics mostly cited the opinions based on the statistics and reports provided by the state.

Keywords: agriculture, ecological problems, sustainable development

JEL classification: O13, Q11, Q15

Introduction

Agriculture is one of the most important sectors that plays a role in meeting the food needs of people, which are the basis of their livelihoods. Although the advances in science and technology today, especially the precursors of the Fourth Industrial Revolution, artificial intelligence and robots, have caused some sectors to lose their importance, agriculture has maintained its importance against these innovations for thousands of years and has even used them for its development (Abdul Razak et al. 2024). Like many studies, an article from Maryville University (2022) highlights that one of the main themes of many studies today is trying to discover methods in agriculture that are more productive, efficient, require fewer resources, etc (Blakeney, 2022, Karunathilake et al., 2023).

Today, the rapid increase in the world's population and the resulting increase in demand for products worldwide make it important to use resources properly for the future without compromising the needs of today's humanity, as the Brundtland Commission (WCED) put forward in its 1987 report on Sustainable Development.

According to Abdulgani (2020), the issue of food security, based on the rapid growth of the world population, is making the agricultural sector even more important. Since the excessive use of resources to meet the needs of a growing population in many countries can lead to even greater problems (deforestation for cropland, increased desertification due to livestock farming), the implementation of sustainability in agriculture has become an important factor in the fight against climate change (Pandey et al., 2024).

Azerbaijan's rich climate, vast arable land, and fertile soil have made agriculture a key sector of the country's economy. Although agriculture accounts for a small percentage of Azerbaijan's GDP, it is the main export sector in the non-oil sector (Customs, 2023). The fact that Azerbaijan signed the UN Millennium Declaration in 2000, declared 2024 the “Year of Solidarity for a Green World”, and successfully hosted the UN Climate Change Conference among Eastern European countries in the same year is a clear indication that the country is taking a close look at the issue of sustainable development and environmental protection.

Despite the attention of the state and the modernization taking place in the world, the low level of implementation of sustainable development in agriculture in Azerbaijan necessitates the investigation of the opportunities and barriers affecting it. The relevance of the topic is to examine the sustainable development of agriculture, which will play an important role in the future development of Azerbaijan, based on the opinions of various experts and a literature review, to put forward ideas and appropriate proposals regarding the factors that may affect it, and also to reveal the differences between the opinions of both academic and professional experts on the topic.

The study consists of five chapters, including introduction, literature review, research methodology, analysis and results of expert interviews, conclusion and proposals. The introductory part of the dissertation describes the general overview of the topic and the relevance of the research.

In the first part of the study, a literature review is conducted, which constitutes the theoretical basis of the study. Initial concepts related to the topic are given based on the literature used during the study. Here, the concept of Sustainable Development, Sustainability in the context of Agriculture and the state of agriculture in Azerbaijan are examined. The sustainable development potentials of the agricultural sector of Azerbaijan are reviewed.

The methodology of the study is explained in detail in the second part of the study. It shows the methods of collecting primary and secondary data in data collection for the study and analyzing the collected data. It describes how the interview was conducted according to the qualitative method during the study and according to which indicators the experts were selected.

In the third chapter of the dissertation, the primary data collected in expert interviews are described, the results of the analysis of the experts' answers are explained separately. Also, a analysis of the interview results is performed based on the differences and similarities between two different expert groups.

The final chapter presents the conclusions and suggestions as a result of the research. Here, the overall results of the research are described and suggestions are put forward regarding the implementation of sustainable development in Azerbaijan.

1. Literature Review

As Safarov's 2016 research highlights, the idea of "sustainable development" was first encountered in scientific literature in the book "Forest Economy" published by the German scientist Hans Karl von Karlowitz in 1713 on forestry. In Karlowitz's book, he showed that trees are as important to us as bread in our daily lives, emphasized the need to organize a successful economy in order not to suffer from shortages in the future, and emphasized the importance of creating a balance between the development of forestry and wood processing in the future. Thus, the concept of using resources with a view to the future that he put forward laid the foundation for the formation of the idea of sustainable development. (Safarov, 2016).

Although sustainable development has been explained in different terms in the literature since the emergence of the concept of sustainability, it has essentially had the same meaning. Howarth et al. (1997) notes that sustainable development is accepting intergenerational equity, taking responsibility for future generations today and maintaining sufficient natural resources to meet their needs. In other words, even if we use them today, we should not increase our use according to our own needs, but we should also maintain them for the future. Accordingly, Moiseyev (1999) in his study showed sustainable development as a process and explained it as the implementation of activities that create a state of equilibrium between the biosphere and society. Mammadov (2019) confirmed previous studies, emphasizing that sustainable development is the use of resources by recording the future, and also highlighted the importance of not stagnating in today's development to achieve this goal.

Khaustova et al (2018) state that sustainable development evolves with modern needs, requiring harmony between society, economy, and ecology at global, regional, and local levels. Baum (2021) adds that institutional factors also shape sustainability by addressing societal needs.

While sustainability includes environmental, economic, and social aspects, environmental issues often dominate due to their stronger impacts, such as natural disasters causing migration and economic challenges (Fischer et al., 2023).

According to Drasticova (2024), although the concept of Sustainable Development was defined by the World Commission on Environment and Development, different approaches can be observed in the explanation of this concept today. However, at the core of each study, the importance of the three pillars of sustainable development, Social, Economic, and Ecological systems, is emphasized.

The "three pillars" of sustainability often invoke the "Triple Bottom Line" model, introduced by John Elkington in the 1990s to assess corporate performance beyond economic profits. Unlike traditional models, it incorporates environmental and social indicators (Arslan & Kisacik, 2017). According to Elkington (2004), the Triple Bottom Line integrates economic, social, and environmental dimensions, helping assess resource efficiency. These components, known as the 3Ps - People, Planet, Profit - form the foundation of sustainability.

With the population expected to reach nine billion, advancing agriculture is vital to meet food demands. In the 20th century, agriculture shifted from traditional to industrial methods, integrating technology to boost productivity (Godfray et al., 2010). Thus, the focus on economic

growth has ignored the damage done to the environment, resulting in problems such as climate change, biodiversity loss, soil salinization, water pollution by fertilizers, and water waste (EPA, n.d.). The impact of these problems on future generations necessitates sustainability based on innovative solutions in agriculture.

The complexity of sustainability in agriculture makes its definition challenging, as it involves interconnected economic, environmental, and social aspects with varying indicators. This complexity has led to the development of key principles (Altieri & Nicholls, 2005). According to Samofatova (2019), all three aspects of sustainability can be applied to agriculture. The economic aspect ensures food security, raw material supply, and profitability. The social aspect focuses on income generation, women's participation, and rural employment. The ecological aspect emphasizes meeting economic and social needs without harming the environment.

Table 1 presents the explanation of the three aspects of Sustainable Development in the scientific literature as function, result and system. In this table, first Karwacka et al. (2020) explains the development of the three aspects as a function, secondly Silva et al. (2023) shows the results in agriculture, and finally Höse et al. (2022) explains the sustainability that the three aspects themselves embody.

Table 1. Statements on the Aspect of Sustainable Development in Literature

Aspect	Karwacka et al. (2020)	Silva et al. (2023)	Höse et al. (2022)
Economic	Innovative reproduction of production facilities, maximum income from used resources.	Income earned by the farmer from agriculture.	Ensuring long-term economic growth and profitability in the economic system.
Social	Development of human capital, creation of jobs, high quality of life.	Relationships and family values built with the farmer's family.	Ensuring equality regardless of gender, religion, race, etc.
Environmental/ Ecological	Balanced use of natural resources, environmental protection, and human health.	Minimal damage caused by the farmer to the environment.	Protecting resources without harming the environment.

Source: compiled by the author

Golicic et al. (2016) studied sustainability in winemaking, assessing it on the basis of economic, social and environmental sustainability. They found that few wineries adopt all three aspects during their operations, while the majority consider one or two aspects of sustainable development. The main reason why many winemakers adopt sustainability practices is to meet the demands of foreign buyers or to comply with legal requirements. Considering that winemaking has developed in Azerbaijan in recent years (Valiyeva, 2020), research on this topic may be of particular importance.

The importance of sustainability in agriculture is increasingly evident when assessing its environmental impact. Agriculture has a negative impact on the environment through overuse of freshwater resources, as well as through pollution, global greenhouse gas emissions, the use of habitable land, and deforestation (Ritchie et al., 2022). Food production accounts for 26% of global greenhouse gas emissions, uses 70% of freshwater, and is responsible for 78% of ocean and freshwater pollution.

Ritchie (2019) highlights the role of the agricultural food production sector in greenhouse gas emissions, which accounts for 26 percent of total emissions. Methane gas related to livestock production has the largest share of greenhouse gas emissions of food production by sector, at 31 percent.It was followed by fertilizer use during planting and emissions from agricultural machinery at 27 percent. Desertification as a result of deforestation for agriculture and over-

grazing of animals accounted for 24 percent, and emissions during transportation and packaging of products accounted for 18 percent.

Agriculture is important to the Azerbaijani economy, accounting for 4.8% of GDP in 2022, employing approximately 35.8% of the workforce, or 1.75 million people, mainly in rural areas. Despite its small share in total exports, agriculture plays an important role in the non-oil sector, and thus agricultural exports increased by 6.2% in 2023 compared to the previous year, reaching 969.2 million USD.Among the products that play a major role in agricultural exports, tomatoes account for 16.7 percent, dates for 13.1 percent, cotton for 12.6 percent, and hazelnuts for 12.4 percent (Ereforms, 2024; Customs, 2023).

The liberation of Karabakh, 20% of Azerbaijan's territory, from occupation is thought to create a huge agricultural and livestock potential for the country's future development. This region, which accounted for 35-40% of Azerbaijan's agricultural output before the occupation, is expected to increase the country's gross domestic product by more than 8% in the future. During the occupation, the region's agricultural infrastructure, including 1 million hectares of irrigated land, large livestock and crop production, was severely damaged. The restoration of these regions will further develop the Azerbaijani economy by increasing food security and agro-processing capabilities (Fikratzadeh et al., 2020, Manafov, 2021).

In many developing countries, businesses prioritize profits over sustainability, neglecting environmental protection (Kindangen et al., 2023). According to their research, considering Azerbaijan, the obstacles to sustainable development in agricultural enterprises in Azerbaijan are reflected in Table 2.

Table 2. Barriers to implementing sustainability in agriculture

Low earnings for farmers	**Low entrepreneurship and awareness**
Despite significant effort, farmers often sell crops at low prices, reducing their motivation to adopt sustainable practices, especially since most farms are individually managed (banker.az, 2023).	Poor coordination among farmers and reliance on traditional methods in rural areas stem from limited knowledge about sustainability (bizim.media, 2023).
Limited access to technology	**Consumer indifference**
Challenges in accessing agricultural technologies lower productivity and discourage farmers from focusing on sustainability (xezerxeber.az, 2022).	Guliyev (2025) found low public awareness of sustainable development, with few customers valuing sustainability in agro-food products.

Source: compiled by the author

Although sustainable development is a constant focus in Azerbaijan, the implementation of sustainable practices in agriculture is not observed. According to the 2022 Environmental Performance Index, Azerbaijan ranks 104th globally, behind Armenia (56th) and Georgia (103rd). Problems in agriculture such as limited water resources, outdated irrigation methods, unused arable land, and low rural literacy remain relevant (Alekperov et al., 2023).

Women's participation in agriculture is also limited, with only 23.1% of women employed in agriculture, while the female participation rate in the economy is 39.8 percent. Private farms dominate agriculture in Azerbaijan, with women accounting for 48.7% of the workforce (Etsim, 2024).

Research by Rzayev (2021) and Guluzadeh (2023) shows that water scarcity remains a critical problem due to significant losses in water transportation due to outdated infrastructure, and 26.84% of water withdrawn from the source is lost before reaching its final destination. Efficiency through the creation of modern irrigation systems is important, especially as drought conditions are exacerbated by climate change (Guliyev, 2023).

2. Methodology

The research methodology is the process of conducting an investigation aimed at addressing a gap in the scientific literature. In this study, a qualitative method is preferred to establish a sustainability theory and understand the situation of enterprises operating in the agricultural sector. During the research, primary data collected through in-depth interviews and secondary data based on previous studies on this topic, as well as statistical data shared by official institutions in Azerbaijan, are utilized.

For the collection of primary data, in-depth interviews are conducted with experts related to the topic in accordance with the qualitative method. In-depth interviews are the most suitable approach for understanding respondents' thoughts on the research subject and clarifying their opinions. Here, questions typically start broadly and become more specific, taking either an unstructured or semi-structured form to clarify the issue. If necessary, follow-up or clarifying questions are also asked.

During the research, eight experts - four academics and four professional experts - who meet the requirements are selected for interviews. Among the academic experts, two professors and two doctoral students conducting research in areas such as sustainable development management, agricultural management, and green economy in Azerbaijan are invited._These individuals are identified by reviewing information on the websites of the country's leading universities and selecting researchers whose articles have been published in renowned academic journals. Contact is established through shared connections.

For the professional field, two employees from companies operating in Azerbaijan's agricultural sector with at least three years of experience and two independent farmers are chosen as experts. To connect with suitable professionals, the websites of active companies in the sector are reviewed to identify authorized representatives, or LinkedIn is used to search for experts working in the field, who are then invited to participate in the interviews.

To ensure that experts can express their thoughts more comfortably and fully understand the questions, the interviews are conducted online and in the Azerbaijani language, according to their preferences. Before the interview begins, experts are informed at the invitation stage that their participation is voluntary and that the data collected will be used for research purposes only. To facilitate the proper conduct of the interviews, an interview plan is developed as shown in Figure 1.

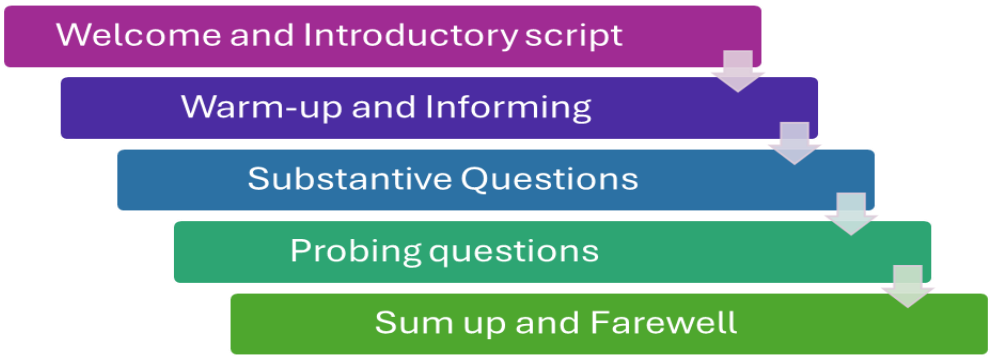

Figure 1. Plan of In-Dept interview

Source: own study

According to the plan, in the "Welcome" and "Introduction" sections, the researcher introduces himself, provides information about the university he belongs to, his education, the research topic, the purpose and importance. The researcher also informs the expert that their opinions during the interview will be used for the research. Then, he asks for permission to record

the interview and use the information provided. In the second section, the procedure for conducting the interview is explained, introductory questions are asked to help the interviewee focus on the topic. In the third section, the main questions are presented in a broad and specific way based on the topic. Then, clarifying questions are used to clarify and clearly understand the expert's ideas. In the final section, the interviewee's answers are summarized and they are asked if they have anything to add. The researcher thanks the participant for their contribution and concludes the interview with a farewell.

To collect secondary data, a literature review is conducted, reports and statistical data shared by various scientific journals, scientific publications, academic books, research articles, informative websites, and official institutions are reviewed. Initially, search keywords appropriate to the topic name are selected - "Sustainability in Agriculture", Agriculture and Climate Change", "Sustainable Agro Management", "Agriculture in Azerbaijan", etc., then relevant studies are searched in scientific databases such as Google Scholar and ResearchGate, and articles that meet the selection criteria described in Table 3 are selected and analyzed according to content analysis.

Table 3. Literature selection criteria

Inclusion criteria	Exclusion criteria
• Articles that are relevant to the topic of sustainable development in agriculture and the keywords selected based on it. • Articles published in recent years according to the year of publication, as well as studies that maintain their relevance regardless of the year of publication. • Studies shared in well-known scientific research databases for the reliability of scientific articles. • Articles whose full text is available or can be requested to read, as some articles are paid.	• Non-management articles related to sustainable development but not related to economics, such as engineering, biology, animal husbandry. • Articles published in languages other than Azerbaijani, Turkish and English and difficult to understand. • Old articles that have lost their scientific relevance, regardless of the date of publication

Source: own study

3. Analysis and Results of Expert Interviews

In conducting the research, eight Azerbaijani experts from academic and professional fields are invited to participate in the interview for compare the evaluations of the responses. The demographic data is shown in Table 4, Expert 1, Expert 2, Expert 3, Expert 4 are professional experts of the study, and Expert 5, Expert 6, Expert 7, Expert 8 are academic experts.

Table 4. Demographic profiles of experts (Created by Author)

	Age	Gender	Education	Profession	District	Economic region
Expert 1	26-45	M	Bachelor	Farmer	Beylagan	Mil-Mughan
Expert 2	18-25	M	Master	Agronomist	Hajigabul	Shirvan-Salyan
Expert 3	45+	M	PhD	Agro manager	Imishli	Mil-Mughan
Expert 4	18-25	M	Bachelor	Farmer	Khachmaz	Guba-Khachmaz
Expert 5	26-45	M	PhD	Assist. professor	Ganja	Ganja-Dashkasan
Expert 6	18-25	M	PhDc	Teacher	Baku	Baku

Expert 7	45+	F	PhD	Assoc. professor	Ganja	Ganja-Dashkasan
Expert 8	18-25	M	PhDc	Student	Riga	-

Source: own study

Looking at Table 4, which describes the demographics of the experts, it is reflected that four are in the age range of 18-25, two are 26-35, and two are 45+. Seven of the Experts are male and one is female, and each of them has a higher education (2 Bachelor's, 1 Master's, 2 PhD Candidate, 3 PdD). Experts working in academic and professional fields from different regions of Azerbaijan participated in the in-depth interview. Only one of the experts currently lives abroad because he is studying to advance his academic career.

The professional experts are experienced professionals who are actively participating in the country's agricultural labor market. Two of them work in private family farms, while the other two work in enterprises that have a significant impact on the agricultural sector of Azerbaijan. To provide a balanced perspective, two of the experts have relatively less experience (3-5 years), while the other two have more than ten years of experience (see Table 5).

Table 5. Information about the work activities of professional experts

	Position	**Years of experience**	**Company name**	**Manufactured products of the company**
Expert 1	Farmer	12	Family farm	Clover Grain Milk
Expert 2	Agronomist	5	"Pluton Tokhumchulug" LLC	Barley seed Wheat seed
Expert 3	Agriculture manager	25	"Azərşəkər" LLC	Barley Corn Soya Sugar beet Wheat
Expert 4	Farmer	3	Family farm	Grapes Vinegar Wine

Source: own study

Expert 1 is from Beylagan, one of the plain regions of Azerbaijan, and has been involved in agriculture since a young age, working on the family farm. Although he has a bachelor's degree in management, he prefers to work in agriculture, which is the main source of income for the family. The family farm grows crops such as grain and alfalfa, and also has several cattle for milk production. In recent years, as some of the family members have moved to the city, they have been forced to sell their cattle for financial reasons.

Expert 2 works as an agronomist at his family's company, Pluton Tohumchuluq LLC, one of the largest seed producers in Azerbaijan. He is also studying for a master's degree at the Azerbaijan State Agriculture University, the country's leading agricultural educational institution, to specialize in his field.

Expert 3 has 25 years of experience in agriculture and holds a PhD. He is currently the Agricultural Manager at "Azershekar" LLC, Azerbaijan's largest sugar company. Over his six years there, he has worked on crops like barley, corn, soy, sugar beet, and wheat, as well as sugar products. His previous roles include positions at the Ministry of Agriculture and the Research Institute of Erosion and Irrigation.

Expert 4 has three years of experience and a bachelor's degree in economics. His family works in vineyards located in the mountainous regions of Azerbaijan, Khachmaz, Ismayilli, and Shamakhi. They plan to expand their business to the Kalbajar and Zangilan regions of Eastern Zangezur in the future. The family sells its grapes in markets in Baku and also uses them for wine production.Four experts from academia are selected for in-depth interviews.

Academic experts contribute to agriculture from various aspects through their research. Two of them are candidates of sciences, and the other two are studying for doctoral degrees. Three of the experts work at universities in Azerbaijan, and one is continuing his education in Latvia (See Table 6).

Table 6. Information about research activities of academic experts

	University	**Faculty**	**Research area**
Expert 5	Azerbaijan State Agrarian University	Agrarian Economy	Educational Management
Expert 6	Academy of Public Administration	Sustainable Development Planning and Management	Sustainable Development
Expert 7	Azerbaijan State Agrarian University	Agribusiness and Management	Agricultural Management
Expert 8	University of Latvia	Business, Management and Economics	Behavioral Economics

Source: own study

Expert 5 works as a data analyst in a government agency with over 10 years of academic experience. He holds a bachelor's degree from the Azerbaijan Academy of Public Administration, a master's degree from Northeastern University in the United States, and a doctorate from Azerbaijan State Agricultural University. His research interests include agricultural education and awareness.

Expert 6 is a doctoral student with over 8 years of experience in the field of Sustainable Development research at the Academy of Public Administration under the President of Azerbaijan. He also works as a teacher and student coordinator at his institution.

Expert 7 is a professor of agricultural economics and management at Azerbaijan State Agriculture University. With extensive academic experience, she is an author of scientific works and has made significant contributions to the development of agricultural education in Azerbaijan.

Expert 8 is a doctoral student in Economics and Business at the University of Latvia. His research in the field of behavioral economics focuses on consumer motivations for purchasing sustainable agricultural products. He received his bachelor’s degree in Azerbaijan and his master’s degree from the University of Lodz, Poland..

Experts are first asked introductory questions to introduce themselves, which help to gather information about their demographics, careers, and work activities. They then answer 10 key questions about sustainability in agriculture. The answers are organized into specific thematic categories for analysis, and a comparison is conducted between the opinions of professional and academic experts based on codes defined for the selected topics.

The results of the analysis of the experts' answers to the main questions are shown in turn. The first of these questions is related to the main obstacles to the implementation of sustainability in the agrarian sector of Azerbaijan. When experts gathered their opinions on this topic, the main obstacles can be grouped as the low level of awareness among the people in this field, the low level of farmers' access to advanced processing technologies and productive

seed varieties, the presence of old infrastructure that does not meet modern standards, and the lack of a unified information and research base as a result of the low level of cooperation.

The second question examines the reason why the concept of green entrepreneurship is rarely encountered in Azerbaijan and asks experts to make suggestions on this topic. According to experts, the reason why green entrepreneurship is not widespread in the country is the low level of awareness among farmers, lack of interest due to financial constraints, and lack of ideas about this concept among entrepreneurs.

The third question clarifies the promotion of economic strategies for sustainable agriculture and asks experts to describe the main difficulties encountered in implementing these strategies. Experts propose strategies such as implementing projects under the supervision of specialists in sustainable development while protecting the property rights of farmers, developing state mechanisms for sustainable development in agriculture and making changes to the legislation in this direction, providing the necessary equipment for agriculture on preferential terms, creating conditions for free competition, reducing import duties and, accordingly, reducing costs per unit of product. Considering the answers to this question, it seems that many experts recommend a concessional assistance strategy, but the funding that the state should allocate for these issues is the main obstacle to the implementation of these strategies.

In the fourth question, experts are asked to assess the impact of factors such as developed infrastructure, scientific and technical potential, investment attractiveness, and resource provision on sustainable development in Azerbaijan. Among the answers, the problem of irrigation of agricultural fields, the importance of a transparent environment for entrepreneurs to invest in the development of the agricultural sector, infrastructure development, and investment attractiveness are noted as having an impact. All experts agree that Azerbaijan has the potential for sustainable development.

In the next question, the fifth question, the experts assess the awareness of sustainable development practices among farmers and agricultural workers and suggest solutions. Based on the answers to the fifth question, the experts unanimously agree that the awareness of the concept of sustainability among those working in the agricultural sector is low, and they also emphasize that farmers are not interested in learning new knowledge. The solution to this lies in education and special training, but they note that first of all, farmers need to be encouraged to learn in this area.

The sixth question asks about the role of labor resources in sustainable agriculture and asks experts to assess the level of need for a “sustainability specialist” in enterprises and companies. In their responses to these questions, all experts agree on the importance of the role of labor resources in sustainable development and emphasize the need for at least 1 sustainability expert in companies.

In the seventh question, experts are asked to name the most pressing problems facing the agricultural sector in Azerbaijan and the role of sustainable development in solving these problems is clarified. The experts believe that various types of environmental problems can be mentioned, including drought, salinization, desertification, and reduction of arable land. Here, they recommend using irrigation methods such as drip irrigation, as the role of sustainable development, through more efficient use of water resources.

In their final questions, experts from both professional and academic fields assessed the suitability of Azerbaijan's natural climate for agriculture. The responses to this question emphasized that Azerbaijan has rich and productive climate conditions for agriculture. However, as on a global level, climate change has had its impact in Azerbaijan, causing negative consequences such as drought, which can be prevented by better irrigation and the cultivation of more productive and drought-resistant varieties of crops.

In order to clarify the sustainable development status of the companies they operate, professional experts are asked two additional questions that cover their companies' sustainability

practices and future projects, as well as the difficulties encountered during the implementation of the projects. In their answers, the experts note that some family farms do not have a specific sustainability strategy, use natural fertilizers to reduce their environmental impact, and plant more productive plant species. The main difficulty in this regard is the bureaucratic difficulties during the import of plant seeds. Companies implement sustainable development strategies, implement projects to reduce their carbon and water footprints. They also try to use new plant varieties with high tolerance to pests and diseases to increase productivity.

Experts from both groups are asked 8 identical questions, and although many of the answers are similar, there are minor differences in some answers. In order to better understand these differences and to gain a clearer understanding of the topic, the responses are analyzed and compared.

In the answers given to the questions, professionals are more knowledgeable in the field because they are in the agricultural field, while academics' knowledge is based more on scientific publications of previous researchers and statistical data shared by the government.

Experts from the academic field have more scientific knowledge such as geography, climate, and ecological problems of the country than on-the-ground practical information based on the opinions of farmers and entrepreneurs in agriculture. On the other hand, experts from the professional field observe the problems, difficulties, and opportunities on the ground because they work in this sector. Their knowledge is based on primary information based on their own experiences and real events.

Conclusions

The main objective of the study is to create a basis for further research on the country by examining the position of Azerbaijani experts on the implementation of sustainability in the agricultural sector. Several conclusions have been reached to achieve this goal.

Although the concept of sustainable development began to take shape in the past centuries, it continues to maintain its relevance today. There are three main pillars of Sustainable Development, and it is important to consider all three in order to achieve strong sustainability.

As a result of population growth, the demand for agricultural products increases, leading to an increase in their impact on the environment. Failure to implement sustainability in agriculture will lead to desertification, salinization, deforestation, excessive use of water, in short, climate change.

Agriculture has high potential in the development of the country's economy, taking into account the climatic conditions of Azerbaijan, centuries-old agricultural capabilities, and rich land resources. With about a quarter of the country's population working in this field, and the revival of agriculture in the liberated East Zangezur and Karabakh, in the future, the export of agricultural products can replace the country's exhaustible resource, oil and gas exports.

Unfortunately, the agrarian sector of Azerbaijan is not completely perfect, there are problems such as water shortage, insufficient infrastructure, outdated equipment and technologies, and a lack of qualified personnel. Water shortage is associated with the formation of Azerbaijan's water resources in neighboring countries, and old infrastructure causes water loss in irrigation canals. Old equipment and technology prevent high productivity, and low incomes reduce the interest of qualified personnel in this field, causing them to move to cities.

During the interviews conducted during the study, different approaches are observed on some issues based on the opinions of 4 academic and 4 professional experts regarding the application of sustainable development in agriculture. In particular, while academic experts have in-depth knowledge based on previous research and statistical data on many topics related to agriculture, professional experts have more experience in agriculture and production based on field experience. Thus, while academics say that the "sustainable development" specialty in

the country prepares personnel for this field, professionals note that the income in this field does not attract young and qualified personnel to work in rural areas. Academics recommend training for lack of knowledge in rural areas, on the other hand, professionals note that farmers prefer traditional methods and are not eager to learn new knowledge. Professionals are able to provide more accurate information as a result of on-site observation of problems in the agricultural sector. This creates a scientific basis for further research into the sustainability of the agricultural sector.

Appendix

Expert interview questions to understand the state of sustainability in the agricultural sector in Azerbaijan

Warm-up Questions:	**Preliminary questions:**
1. Could you please introduce yourself? Including your name, age, gender, education level, and work experience. 2. What is your current area of research or work? 3. How many years of experience do you have in your current field? 4. Can you tell me the name of your university/company? 5. What is sustainable development according to you?	6. What do you see as the main obstacles in the future implementation of sustainability in the agricultural sector of Azerbaijan, and how do you think these obstacles can be overcome? 7. Can you suggest any specific initiatives or projects related to green entrepreneurship in Azerbaijan? In your opinion, what is the reason why the concept of green entrepreneurship is not common in our country?
Specific questions (Economic):	**Specific questions (Social):**
8. Based on your experience, what are the main economic obstacles in the implementation of sustainable development practices in agricultural enterprises in Azerbaijan and how can they be overcome? 9. In your opinion, how do factors such as developed infrastructure, scientific and technical potential, investment attractiveness and resource provision affect sustainable development in Azerbaijan? Are there necessary conditions for the implementation of sustainable development in our country?	10. How do you rate awareness of sustainable development practices among farmers and agricultural workers in Azerbaijan? What do you think can be done to increase it? 11. What role do you think the level of labor resources plays in promoting sustainable development in the agricultural sector? Is there a need to open a separate task for monitoring and evaluation of sustainable development as in Europe?
Specific questions (Ecological):	**Specific questions (Professionals):**
12. In your opinion, what are the most urgent environmental problems facing the agricultural sector in Azerbaijan and how do	14. Can you describe current sustainability practices in your company, are any sustainability-related actions taken in gen-

you see the role of sustainable development in solving these environmental problems? **13.** What do you think about the natural and climatic conditions of Azerbaijan and their impact on sustainable agriculture?	eral? **15.** What do you think are the main opportunities for future sustainability implementation in your company? What do you see as the main challenges your company faces in implementing sustainable development practices?

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Streszczenie

Cel. Niniejsze badanie, oparte na założeniach zrównoważonego rozwoju, zapewnia analizę porównawczą poglądów ekspertów akademickich i zawodowych, aby przyczynić się do badań nad wdrażaniem zrównoważonego rozwoju w sektorze rolniczym Azerbejdżanu. Celem naszego badania jest sformułowanie opinii teoretycznej z poglądami ekspertów poprzez zbadanie barier i możliwości rolnictwa azerskiego. To z kolei pozwala naszym badaniom wypełnić lukę w literaturze poprzez głębsze zrozumienie poglądów ekspertów dotyczących zrównoważonego rozwoju w rolnictwie Azerbejdżanu.
Metoda. Nasze badania są prowadzone na podstawie podstaw teoretycznych, odwołując się do poprzednich badań i danych statystycznych na temat rolnictwa Azerbejdżanu oraz dogłębnych wywiadów przeprowadzonych z 4 ekspertami akademickimi i 4 profesjonalnymi. W stosunku do wyników wywiadu z ekspertem zastosowano analizę porównawczą.
Wyniki. Wyniki pokazują, że istnieją różnice w podejściu naukowców i profesjonalistów do niektórych kwestii związanych z wdrażaniem zrównoważonego rozwoju w rolnictwie. Podczas naszych badań zaobserwowano, że profesjonaliści najczęściej poruszali kwestie obserwowane w terenie, podczas gdy naukowcy najczęściej cytowali opinie oparte na statystykach i raportach dostarczanych przez państwo.

Słowa kluczowe: rolnictwo, problemy ekologiczne, zrównoważony rozwój

Klasyfikacja JEL: O13, Q11, Q15

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