*system for logistics enterprises that would automate routing processes, taking into account current challenges such as the pandemic and military operations in Ukraine, has been emphasized. The impact of innovative technologies on the efficiency of logistics activities has been examined.*

*The use of modern software solutions, such as TMS systems (Transport Management System) and cloud services (e.g., ANT-Logistics), which provide multi-factor route optimization, integration with other platforms, and analytical tools, has been proposed. Foreign software products (Upper, Oracle NetSuite ERP, PTV Route Optimizer) that offer ample opportunities for optimizing traffic flows and reducing costs have been considered.*

*Particular attention has been paid to the adaptation of logistics processes to modern conditions: change of warehouses due to military operations, shortage of drivers and transport, as well as complication of operations due to curfews and checkpoints. The importance of automation and the introduction of intelligent systems to improve logistics efficiency has been emphasized.*

***Keywords:*** *analysis, logistics processes, route optimization, GPS-trackers, geo-coordinates, cost minimization.*

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# ASSESSING THE LEVEL OF DIGITALIZATION OF ENTERPRISES BASED ON SURVEY DATA

***Abstract.*** *This paper conducts a comprehensive evaluation of the level of digitalization among enterprises in Azerbaijan, utilizing extensive survey data to draw meaningful conclusions. The primary objective of the study is to identify not only the key challenges but also the significant opportunities that are associated with the*

*process of digital transformation, particularly within the context of small and medium-sized enterprises (SMEs). Through a detailed analysis, the findings shed light on the current state of digital adoption in these enterprises, highlighting the various factors that influence their digital capabilities. Furthermore, the paper offers strategic recommendations aimed at enhancing these capabilities, thereby fostering a more robust digital ecosystem. The insights gained from this research are crucial for understanding the economic impact of digitalization in Azerbaijan and for developing effective policies that support the growth and competitiveness of SMEs in the digital age.*

**Keywords:** *digital transformation, SMEs, Azerbaijan, digitalization, survey, economic impact, digital skills, barriers, opportunities.*

### INTRODUCTION

Digital transformation has become a critical factor for business growth and competitiveness in the modern economy. The integration of digital technologies into business processes can lead to significant improvements in efficiency, innovation, and market reach. However, the adoption of digital technologies varies widely among enterprises, particularly in developing economies.

This study focuses on assessing the digitalization level of enterprises in Azerbaijan, highlighting the challenges and opportunities faced by SMEs in this process. The research aims to provide a comprehensive understanding of the current state of digital adoption and its economic implications. By identifying the barriers to digital transformation and proposing solutions, this study seeks to contribute to the ongoing efforts to enhance digital capabilities in Azerbaijan.

### LITERATURE REVIEW

The literature review covers the following key areas.

#### Digital Transformation in SMEs

Digital transformation involves the integration of digital technologies into all areas of a business, fundamentally changing how businesses operate and deliver value to customers [1]. SMEs, due to their size and resource constraints, often face unique challenges in adopting digital technologies. Sagala and Őri [2] highlight the importance of digital transformation for SMEs, noting that it can lead to increased efficiency, better customer engagement, and new business opportunities.

#### Barriers to Digital Transformation

Several studies have identified common barriers to digital transformation in SMEs. Kallmuenzer et al. [3] discuss financial constraints, lack of digital skills, and resistance to change as significant obstacles. Omowole et al. further elaborate on these barriers, emphasizing the need for supportive policies and training programs to facilitate digital adoption [4; 5].

#### Economic Impact of Digitalization

The economic impact of digitalization on SMEs is profound. Digital technologies can enhance productivity, foster innovation, and improve competitiveness. Verhoef et al. [6] explore the multifaceted benefits of digital transformation, including operational efficiency and customer satisfaction. These benefits are crucial for SMEs looking to expand their market presence and improve their financial performance.

#### Case Studies and Regional Insights

Regional studies provide valuable insights into the specific challenges and opportunities faced by SMEs in different contexts. The OECD (2022) [7] report on Azerbaijan highlights the need for improved digital infrastructure and government support to promote digitalization among SMEs. This report serves as a foundation for understanding the unique context of digital transformation in Azerbaijan.

### METHODOLOGY

The study employs a mixed-methods approach, combining quantitative and qualitative data collection techniques. A structured survey was distributed to a sample of SMEs across various sectors in Azerbaijan. The survey included questions on digital technology adoption, perceived barriers, and the impact of digitalization on business performance (**Figure 1**).

#### Survey Design

The survey was designed to capture comprehensive data on the digitalization level of SMEs. It included sections on:
- *Digital Technology Adoption.* This section aimed to identify the types of digital technologies currently being used by SMEs. Questions focused on the adoption of cloud computing, e-commerce platforms, digital marketing tools, and other relevant technologies.
- *Barriers to Digitalization.* This section sought to uncover the main obstacles that SMEs face in their digital transformation journey. Questions addressed financial constraints, lack of digital skills, resistance to change, and cybersecurity concerns.
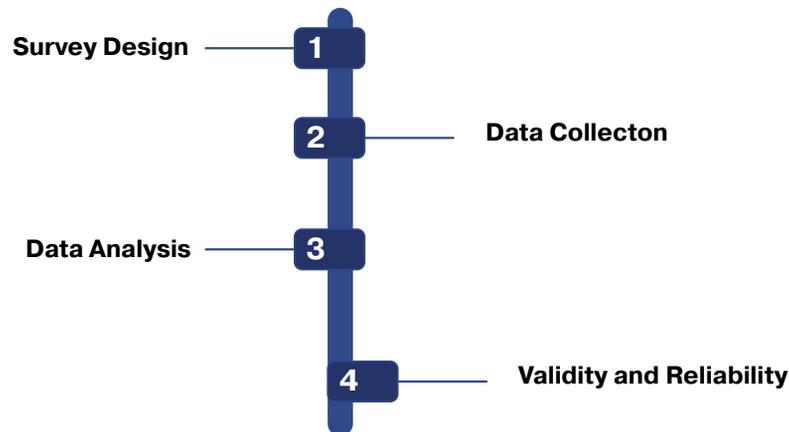
**Fig. 1.** Survey Design

- *Economic Impact.* This section evaluated the effects of digitalization on business performance. Questions explored how digital technologies have impacted productivity, customer engagement, and market expansion.

**Data Collection**

The data collection process involved both online surveys and in-person interviews to ensure a diverse and representative sample. The steps included:

- *Sampling.* A stratified random sampling method was used to select SMEs from various sectors, ensuring a balanced representation of different industries.
- *Survey Distribution.* The survey was distributed through multiple channels, including email invitations, social media, and direct outreach to business associations. In-person interviews were conducted to gather more in-depth qualitative data.
- *Response Rate.* A total of 250 SMEs participated in the survey, providing a robust dataset for analysis.

**Data Analysis**

The collected data were analyzed using a combination of statistical and qualitative methods:

- *Quantitative Analysis.* Descriptive statistics were used to summarize the survey responses, providing insights into the adoption rates of digital technologies and the prevalence of various barriers. Inferential statistics, such as chi-square tests and regression analysis, were employed to identify significant relationships and trends.
- *Qualitative Analysis.* Qualitative responses from in-person interviews were coded and analyzed thematically. This approach helped to uncover deeper insights into the challenges and opportunities associated with digital transformation. Key themes were identified and used to complement the quantitative findings.

**Validity and Reliability**

To ensure the validity and reliability of the survey, several measures were taken:

- *Pilot Testing.* The survey was pilot-tested with a small group of SMEs to identify any issues with question clarity and survey design. Feedback from the pilot test was used to refine the survey.
- *Triangulation.* The use of both quantitative and qualitative data collection methods allowed for triangulation, enhancing the credibility of the findings.
- *Consistency Checks.* Internal consistency of the survey responses was checked using Cronbach's alpha, ensuring that the survey items reliably measured the intended constructs.

By employing this comprehensive methodology, the study aimed to provide a detailed and accurate assessment of the digitalization level among SMEs in Azerbaijan, along with the associated challenges and opportunities.

**DIGITAL ADOPTION RATE**

This metric assesses the extent to which digital tools and technologies are adopted within the organization. Higher digital adoption rates can lead to improved productivity by streamlining processes and reducing manual tasks (**Figure 2**) [9].

**Practical Approaches and Tools**

SMEs often use digital tools and software to track and analyze these metrics. Tools like enterprise resource planning (ERP) systems, customer relationship management (CRM) software, and project management tools can provide real-time data and analytics to help SMEs measure and improve productivity [11].

By using these metrics and tools, SMEs can gain a comprehensive understanding of their productivity levels and identify areas for improvement.
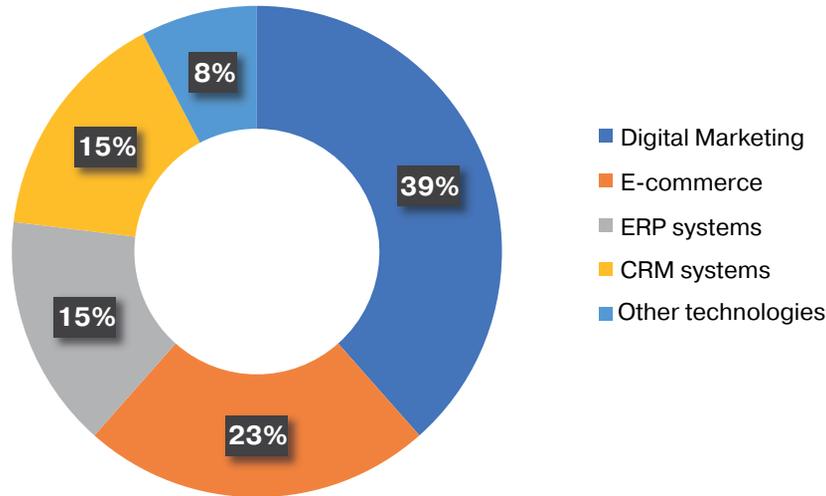
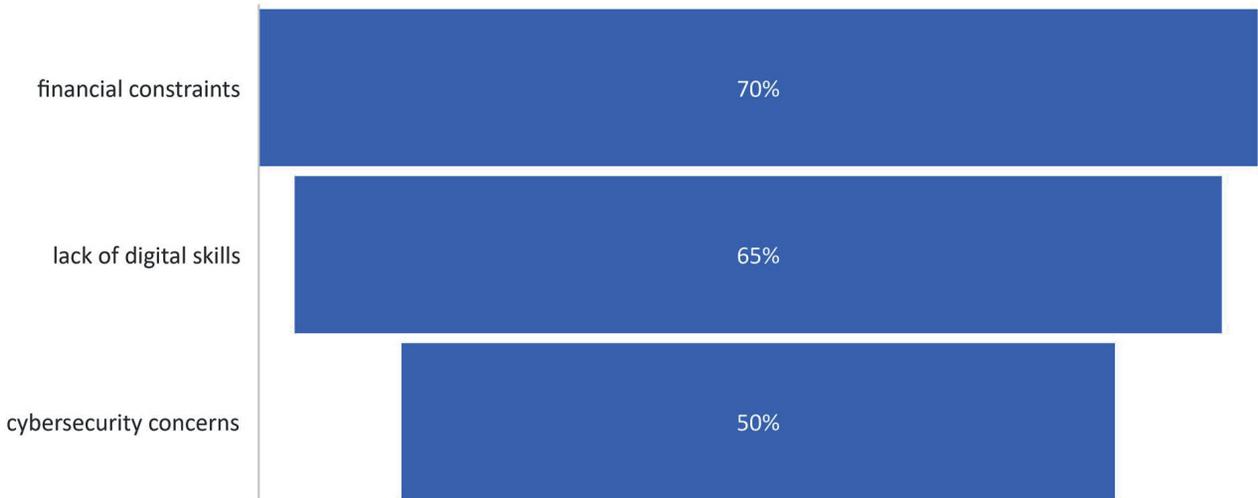**Fig. 2.** Tools

## Barriers to digitalization



**Fig. 3.** Barriers

This approach helps them to remain competitive and achieve sustainable growth.

### RESULTS

The survey results indicate varying levels of digital adoption among SMEs. Key findings include:

### Adoption Rates

The adoption rates of digital technologies among SMEs in Azerbaijan vary significantly. Approximately 60 % of surveyed SMEs reported using some form of digital technology, with cloud computing and digital marketing tools being the most commonly adopted.

### Barries

The most commonly reported barriers to digitalization include financial constraints (70 %), lack of digital skills (65 %), and cybersecurity concerns (50 %). Many SMEs also cited resistance to change and the complexity of digital technologies as significant obstacles (**Figure 3**).

### Economic Impact

Digitalization has had a positive impact on the productivity and competitiveness of SMEs. Approximately 55 % of surveyed SMEs reported increased productivity, while 45 % noted improved customer engagement and market expansion (**Figure 4**).

### DISCUSSION

The discussion section interprets the survey findings in the context of existing literature. It explores the implications of digital transformation for SMEs in Azerbaijan and provides recommendations for overcoming identified barriers (**Figure 5**).
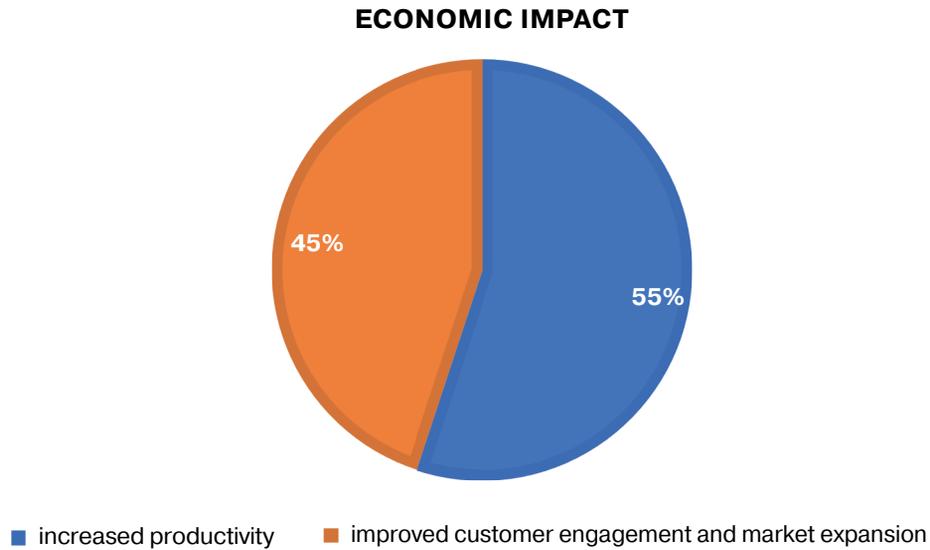
**ECONOMIC IMPACT**



■ increased productivity    ■ improved customer engagement and market expansion

**Fig. 4.** Economic impact

**Enhancing Digital Skills**

**1**

To address the lack of digital skills, it is essential to invest in training programs and educational initiatives. Collaboration between government, educational institutions, and industry can help bridge the digital skills gap.

**Financial Support**

**2**

Financial constraints are a significant barrier to digitalization. Providing access to funding and financial incentives can encourage SMEs to invest in digital technologies. Government grants, low-interest loans, and tax incentives can play a crucial role in this regard.

**Cybersecurity**

**3**

Cybersecurity concerns must be addressed to build trust in digital technologies. Implementing robust cybersecurity measures and providing training on best practices can help mitigate these concerns.

**Fostering a Digital Culture**

**4**

Creating a digital culture within SMEs is essential for successful digital transformation. Encouraging innovation, promoting a growth mindset, and providing leadership support can facilitate the adoption of digital technologies

**Fig. 5.** Recommendations for overcoming identified barriers

**CONCLUSION**

The study concludes that while digital transformation presents significant opportunities for SMEs in Azerbaijan, several barriers must be addressed to fully realize its potential. Policy recommendations and future research directions are suggested to support the ongoing digitalization efforts.

Overall, the economic impact of digitalization on SMEs in Azerbaijan has been positive, leading to increased productivity, enhanced customer engagement, market expansion, cost

| 1 | 2 |

**Policy Recommendations**

- **Digital Skills Development:** Implement training programs to enhance digital skills among SME employees

- **Financial Incentives:** Provide grants, low-interest loans, and tax incentives to support digital investments

- **Cybersecurity:** Develop and promote cybersecurity best practices to build trust in digital technologies.

- **Infrastructure Development:** Invest in digital infrastructure to ensure widespread access to high-speed internet and digital tools.

**Economic Impact Findings**

1. **Increased Productivity:** Approximately 55% of surveyed SMEs reported that digitalization has led to increased productivity. The adoption of digital technologies such as automation tools and cloud computing has streamlined business processes, reducing manual tasks and improving efficiency.

2. **Enhanced Customer Engagement:** Around 45% of SMEs noted improvements in customer engagement due to digitalization. Digital marketing tools and e-commerce platforms have enabled businesses to reach a wider audience, personalize customer interactions, and provide better customer service.

3. **Market Expansion:** Digitalization has facilitated market expansion for many SMEs. By leveraging digital channels, businesses have been able to enter new markets and attract customers beyond their traditional geographic boundaries. This has resulted in increased sales and revenue growth.

4. **Cost Reduction:** The use of digital technologies has also contributed to cost reduction. Automation and digital tools have helped businesses optimize their operations, reduce waste, and lower operational costs. This has improved overall profitability.

5. **Innovation and Competitiveness:** Digital transformation has fostered innovation within SMEs. The ability to quickly adapt to market changes and implement new ideas has enhanced the competitiveness of businesses. SMEs that have embraced digitalization are better positioned to compete with larger enterprises.

**Fig. 6.** Recommendations

reduction, and greater innovation and competitiveness.

Recommendations (**Figure 6**):
- *Enhancing Digital Skills.* Invest in training programs and educational initiatives to bridge the digital skills gap. Collaboration between government, educational institutions, and industry is essential.
- *Financial Support.* Provide access to funding and financial incentives, such as government grants, low-interest loans, and tax incentives, to encourage SMEs to invest in digital technologies.
- *Cybersecurity.* Implement robust cybersecurity measures and provide training on best practices to build trust in digital technologies.
- *Fostering a Digital Culture.* Encourage innovation, promote a growth mindset, and provide leadership support to facilitate the adoption of digital technologies.

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## ОЦІНКА РІВНЯ ЦИФРОВІЗАЦІЇ ПІДПРИЄМСТВ НА ОСНОВІ ДАНИХ ОПИТУВАНЬ

***Резюме.*** *У статті здійснено комплексну оцінку рівня цифровізації підприємств в Азербайджані з використанням обширних даних опитування з метою формулювання важливих висновків. Головною метою дослідження є визначення не лише ключових викликів, а й перспектив, які пов'язані з процесом цифрової трансформації, зокрема в контексті малих і середніх підприємств. Завдяки детальному аналізу, отримані дані проливають світло на поточний стан впровадження цифрових технологій на цих підприємствах, висвітлюючи різні фактори, які впливають на їхні цифрові можливості. Окрім того, у статті запропоновано стратегічні рекомендації, що спрямовані на розширення цих можливостей, сприяючи більш надійній цифровій екосистемі. Отримані в ході дослідження дані мають вирішальне значення для розуміння економічного впливу цифровізації в Азербайджані і розробки ефективної політики, що підтримує зростання і конкурентоспроможність малих і середніх підприємств в епоху цифровізації.*

***Ключові слова:*** *цифрова трансформація, малі та середні підприємства, Азербайджан, цифровізація, опитування, економічний вплив, цифрові навички, бар'єри, можливості.*

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