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APPLYING ANALYTIC HIERARCHY PROCESS METHODOLOGY IN DETERMINING CRITICAL CHALLENGES OF URBAN BIG DATA IN A DEVELOPING CITY: THE CASE OF TEHRAN

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ABSTRACT

Although urban big data holds significant potential for transforming the way cities are managed, harnessing this potential requires overcoming major challenges, particularly in developing countries like Iran. Obstacles like policy gaps, legal barriers, limited resources for data management and infrastructure or even the low level of community engagement and the lack of technological capabilities could backward the development of becoming a real data-driven smart city. This study aims to address the understanding of this issue, by identifying and evaluating urban big data challenges critically, and to formulate policy-related support for governmental bodies in a country considered to be a developing information society. After thorough analysis of academic publications we identified 32 urban big data challenges in Iran, which then were systematically evaluated and ranked by Analytic Hierarchy Process (AHP) methodology based on expert surveys. Outcomes confirmed that although social, educational and financial challenges have been perceived, the most important ones are of political and governmental origin.
Keywords: AHP methodology, big data, urban development, Iran
JEL codes: R58, O33

INTRODUCTION

The integration of big data in urban smart city systems brings both opportunities and challenges, having a significant impact on technological advancement and application strategy innovation. A smart city environment is meticulously structured and is under constant surveillance through the pervasive integration of information and communication technologies (ICT) (*Neirotti et al.,* 2014). Over the last two decades, the notion of smart city has progressively gained eminence within scholarly discourse and international policy frameworks (*Albino et al.,* 2015). This growing recognition can be attributed to the forward momentum the smart city concept has garnered as a strategic vision aimed at enhancing urban economies, transportation networks, environmental equilibrium, societal well-being, quality of life, and municipal administration (*Abella et al.,* 2017). The recent widespread proliferation of extensive data resources has played a pivotal role in driving the metamorphosis of smart city environments (*Bibri,* 2019*; Rabari & Storper,* 2014). The term "big data" often signifies huge and intricate databases that include the digital imprints of human activities, and its aspects might be specified in terms of quantity or volume, analytical approaches, or organizational consequences (*Lim et al.,*

2018). Also, according to De Mauro et al. (2015) "Big Data is the information asset characterized by such a high volume, speed, and variety to require specific technology and analytical methods for its transformation into value" (*De Mauro et al.,* 2015, p. 102).

Urban Big Data, encompassing diverse datasets from urban environments, provides valuable insights into transportation patterns, environmental conditions, and social interactions. This information aids city planners, policymakers, and researchers in making informed decisions to enhance urban infrastructure and tackle challenges associated with urbanization. In the context of Iran, the utilization of urban big data comes with its set of challenges. Ensuring the quality and integration of data from disparate sources is pivotal. Addressing data requires compatibility across information from government agencies, private entities, and various sources. Furthermore, privacy concerns occur because of the collecting of personal information via urban big data. Finding a balance between collecting insights and protecting individual privacy requires considerable consideration and the construction of strong legal frameworks. The limited technological infrastructure and sanction in Iran pose obstacles to the efficient collection, storage, and processing of large volumes of urban big data. Therefore, overcoming these challenges requires significant investments in advanced technologies and data management systems.

Access to relevant urban big data in Iran may be restricted due to proprietary concerns or a lack of data-sharing mechanisms. Encouraging open data initiatives and developing policies to facilitate data sharing can foster transparency and collaboration among stakeholders. Furthermore, capacity building seems to be crucial for local professionals, government officials, and researchers to develop skills in data analytics and interpretation. Also, training programs and educational initiatives play a significant role in leveraging the potential of urban big data. Clear and robust regulatory frameworks are essential to govern the collection, storage, and usage of urban big data, while developing and enforcing policies that balance innovation with ethical considerations could help building public trust and ensuring the responsible use of data. On the other hand, understanding cultural and social factors influencing data generation and usage are also vital for effective urban planning in Iran. Tailoring strategies to the local context and considering community perspectives can enhance the relevance and acceptance of data-driven initiatives. Addressing these challenges is critical for Iran to fully harness the potential of urban big data, contributing to the creation of sustainable, efficient, and liveable urban environments.

The aim of our study is therefore to identify, understand and evaluate urban big data challenges critically and to formulate policy-related support for governmental bodies in a country considered to be a developing information society. The research aims to rely on expert inputs, offering a comprehensive overview of the issues, while it also aims to develop a prioritization framework for assessing the significance and prevalence of the identified challenges in Tehran and in a broader regional context.

MATERIALS AND METHODS

Our study applies an exploratory technique to investigate the obstacles of utilizing urban big data in Iran, a topic that remains underexplored in regional scientific? discussions of Iran to date. When a phenomenon is underexplored or poorly

understood, exploratory research is especially useful, since it identifies major problems and challenges by asking "why" and "how" questions (*Creswell,* 2014). This methodology aligns with the study's goal of finding key concerns in urban big data without relying on predefined theoretical frameworks.

As indicated on the website of Numbeo, Tehran is the fifth city that wastes time in traffic jams. According to this website, Iran is the worst in the world. Tehran is the 218th city that loses the most time in traffic congestion out of 222. The neglect of vital issues, such as dynamic pricing based on pollution levels, the absence of infrastructure in that nation, and people's disobedient nature, aggravates this problem. The challenges mentioned above suggest that urban big data is essential for traffic management and city planning; thus, effective measures and data-backed solutions are required to combat these issues (*Bahrami et al.,* 2021).

To ensure the inclusion of people with pertinent experience in urban big data, a deliberate sampling methodology was used. For qualitative research that seeks to collect specific and relevant data from informed participants, purposeful sampling seems perfect (*Palinkas et al.,* 2015). By applying such expert choosing technique, our research could have identified the most important urban big data challenges and provided a thorough summary of those, as well as attempted to create a framework for prioritization to determine the importance and frequency of such issues in Tehran. Altogether 20 specialists were selected based on their expertise in areas such as urban geography, data collection, -storage, -analysis, -visualization and consultancy services. To guarantee a diverse range of viewpoints that encompass the multiple industries advancing urban big data in Iran, participants were selected from academic institutions, research parks, smart transportation systems, startups, and venture-backed projects (*Bahrami et al.,* 2021).

In the initial stages, just before performing the expert survey, our preparatory research identified 32 urban big data challenges in Iran, that were compiled after a thorough analysis of academic publications on urban big data and smart cities, as well as by studying of reports and documents from the Tehran Municipality and other pertinent institutions. Each of the 32 challenges was supported by references to relevant literature to maintain scientific rigor and to minimize subjectivity by explaining prior research approaches and confirming why it should be included in our study.

Once the 32 challenges had been identified, a survey was conducted with experts in the field to measure the relative importance of each challenge. Crucially, the procedure did not presume a set quantity of high-priority challenges. Instead, the issues that stood out in terms of urgency and relevance were identified by analyzing expert comments and the questionary. This assessment led to the identification of 17 difficulties as the most important ones in Tehran's urban big data setting.

To customize the ranking, our study applied *Analytic Hierarchy Process (AHP)* methodology, which is ideal for complicated decision-making and multi-criteria evaluation (*Boyd & Crawford,* 2012). The AHP method was implemented by structuring the problem (step 1), where the ultimate purpose was to prioritize urban big data concerns in Tehran. Out of 32 possible difficulties, based on expert inputs, only the 17 most important challenges, which served as alternatives, were chosen for further investigation. Prioritization factors, such as economic impact, policy relevance, and feasibility, were organized hierarchically to guide the review. Following that, experts

were asked to conduct pairwise comparisons (step 2) of the 17 challenges using a nine-point scale, evaluating their relative importance concerning the criteria. Each comparison involved evaluating the relative significance of one difficulty against another, with numerical values representing varying degrees of importance. Then, the calculation of priority weights was done (step 3), for which a pairwise comparison matrix (A) was constructed, with each element (a_{ij}) showing the relative importance of challenge i compared to challenge j. For example, if $a_{ij}=3$, it means that challenge i is moderately (namely three times) more important than challenge j. Moreover, priority weights (w_i) are calculated by normalizing the matrix and solving for the eigenvector corresponding to the largest eigenvalue (λ_{max}). This eigenvector provides the relative priority of each challenge in the set. The consistency ratio (CR) indicates reasonable consistency and is computed as $CR=CI/RI$, where CI is the consistency index, where $CI=(\lambda_{max} - n)/(n - 1)$, with n being the matrix size, and RI is the Random Index, based on the size of the matrix (e.g., for n=10, RI=1.49). A CR value lower than 0.1 indicated acceptable consistency, confirming that the evaluations were reliable. The final prioritization ranks the challenges in order of importance and assists decision makers improve urban management and use big data (*Selmi et al.,* 2016).

For final prioritization and categorization of difficulties the ranked list of the 17 most important challenges was created by adding the weighted values for each criterion. Following that, these difficulties were categorized into four groups: socio-cultural, educational, political, and economic. Although our initial perception of the underlying nature of the challenges led to this categorization, it has now been further improved through a review of pertinent literature. As per these models, every dimension denotes unique yet connected elements that significantly impact the incorporation of technology and data in urban management systems. The economic dimension encompasses issues such as resource allocation, investment adequacy, cost-benefit efficiency, and overall financial sustainability, which determine whether cities possess the necessary resources to develop, maintain, and scale big data infrastructures (*Thakuriah et al.,* 2017). In parallel, the political dimension involves governance, policymaking, regulatory frameworks, and inter-agency coordination; research indicates that unclear policies and insufficient political will can obstruct the deployment of even the most advanced technical solutions (*Razavian et al.,* 2024). Moreover, the socio-cultural and educational dimensions focus on public attitudes, community engagement, cultural readiness, and trust in data-driven governance, underscoring that the success of urban data initiatives depends not only on technological capabilities but also on the willingness of citizens and stakeholders to embrace a data-centric approach (*Kitchin & Lauriault,* 2018).

This four-group approach is supported by empirical and comparative evidence from a variety of interdisciplinary research and policy evaluations. Complex policy models, such as those created by *Alkin & Christie* (2004), demonstrate the inextricable link between economic, political, and social aspects, with sociocultural and political challenges frequently having a bigger impact on the success of urban data efforts than technical issues alone. Case studies evaluating urban policy challenges - such as those examining five-year development plans in Iran - reveal that governance and cultural barriers frequently receive higher priority over purely technical issues, highlighting the need for targeted interventions that address these critical areas (*Razavian et al.,* 2024).

This comprehensive framework not only facilitates a nuanced analysis of the obstacles to effective big data integration but also informs the development of strategic, context-specific policies that can enhance the sustainability and efficiency of urban management systems (*Jiang et al.,* 2020).

RESULTS AND DISCUSSION

Table 1 presents 32 key challenges associated with the implementation and management of urban big data in Iran, based on library studies. These challenges cross several dimensions, including legal, technical, economic, and socio-cultural factors. Among the most outstanding challenges are legal constraints, the lack of a strategic urban planning framework, and limited resources for data management and infrastructure. Moreover, the challenges of data complexity, competition with large companies, and a lack of mentorship highlight the structural and operational barriers within the ecosystem. The coverage of sanctions, government policies, and social attitudes toward technology further underscores the intricate interplay between external pressures and internal capabilities in the urban big data landscape of Iran (*Govindan et al.,* 2015).

Table 1: Identified urban big data challenges in Iran

Challenge	Description	Reference
Legal issues	Lack of clear, consistent laws governing big data usage	Neirotti et al. (2014) Supreme Council of Cyberspace (Iran) (2018) European Commission (2020)
Lack of supportive government policies, government policies	Inadequate strategic frameworks to promote big data initiatives	Albino et al. (2015) Supreme Council of Cyberspace (Iran) (2018) European Commission (2020)
Insufficient data privacy laws	Outdated or weak privacy rules that hinder data sharing	European Union Agency for Fundamental Rights (FRA) (2018) Kitchin (2016)
Data security concerns	Risks related to unauthorized access and data breaches	Kitchin (2016) European Commission (2020)
Lack of interoperability standards	Difficulties in integrating diverse systems and data formats	Shadroo & Rahmani (2018)
Lack of data digitization	Insufficient conversion of analogue records into digital formats	World Bank (2017)
Fragmented data sources	Data stored in isolated silos with little integration	Janssen et al. (2012)
Data quality issues	Inconsistent, incomplete, or inaccurate data that hinders analysis	Keyvanpour & Moradi (2014)
Absence of online big data and their free sharing	Absence of centralized systems for integrating and analyzing data	Keyvanpour & Moradi (2014)
Limited resources for data management and infrastructures	Insufficient hardware, networks, and computational capacities to support big data	Keyvanpour & Moradi (2014) Kitchin (2014) Neirotti et al. (2014) Bolici & Mora (2015)
Insufficient skilled personnel	A shortage of professionals trained in big data analytics and management.	Shadroo & Rahmani (2018) McAfee & Brynjolfsson (2012)
Lack of urban big data professional training	Limited educational initiatives to build big data expertise	McAfee & Brynjolfsson (2012)

Lack of knowledge about urban big data improvement potentials in government services	Stakeholders' limited understanding of the advantages of big data	Janssen et al. (2012) McAfee & Brynjolfsson (2012)
Low culture of organizations in recognizing big data importance and sharing knowledge	Organizational inertia and reluctance to adopt new technologies	Davenport (2014)
Economic and funding obstacles	Limited funding for big data projects and innovation	Davenport (2014) McAfee & Brynjolfsson (2012) Neirotti et al. (2014)
Lack of tax incentives	Insufficient funding mechanisms and support for startups and innovation	Davenport (2014)
Lack of a strategic and urban planning plan	Inadequate policies and procedures for managing data quality, ownership, and usage	Janssen et al. (2012) European Commission (2020) Albino et al. (2015) Bibri (2019) Bolici & Mora (2015)
Lack of data digitalization in some data generation resources and failing to aggregate them	Challenges in merging heterogeneous data from diverse sources	Keyvanpour & Moradi (2014) Kitchin (2014)
Insufficient data analytics tools	Lack of advanced platforms for processing and analyzing data	Shadroo & Rahmani (2018)
Complex and heterogeneous data types	Managing varied data formats (structured and unstructured) increases complexity.	Kitchin (2014)
Inadequate sensor and IoT infrastructure	Limited deployment of sensors and IoT devices needed for comprehensive data collection	Keyvanpour & Moradi (2014)
Lack of international relations in the urban big data context	Weak cooperation among government, industry, and academia	Neirotti et al. (2014) Cardullo & Kitchin (2019)
Lack of technical context for developing open data	Insufficient collaboration across different sectors for integrated solutions	Neirotti et al. (2014) Bolici & Mora (2015)
Insufficient public-private collaboration	Limited joint initiatives between government agencies and private companies.	Neirotti et al. (2014)
Poor citizen engagement	Low levels of public participation in big data and smart city projects	Cardullo & Kitchin (2019)
Limited trust in data initiatives	Skepticism from citizens and organizations regarding data use and protection	Cardullo & Kitchin (2019)
Social and cultural attitudes toward technology	Societal or organizational norms that discourage open data exchange.	Janssen et al. (2012) Cardullo & Kitchin (2019)
Privacy and confidentiality concerns	Challenges in protecting personal and sensitive information.	European Union Agency for Fundamental Rights (FRA) (2018) Kitchin (2016)
Sanctions	Concerns about fairness, bias, and discrimination in algorithmic decision making	Katzman (2020).
Lack of market for urban big data supply and demand	Sanctions significantly hinder Iran's urban big data ecosystem by restricting access to advanced technologies, international investments, and collaborative research.	Davenport (2014) Bibri (2019)
Inadequate benchmarking and performance metrics	Lack of standardized measures to evaluate the success of big data initiatives	Neirotti et al. (2014) Albino et al. (2015)
Limited scalability of big data solutions	Challenges in scaling systems as data volume and complexity grow	Shadroo & Rahmani (2018) Keyvanpour & Moradi (2014)

As mentioned above, expert interviews have identified 17 difficulties out of the complete list as most important ones. The AHP analysis highlighted significant barriers such as the lack of market for urban big data supply and demand, insufficient professional training, and inadequate knowledge about urban big data applications in government services (*Han et al.*, 2019). The analysis also emphasized economic and funding obstacles, alongside government policy gaps and legal issues, as key impediments to progress. Notably, cultural attitudes toward technology and the absence of collaborative knowledge sharing further compounded these challenges. The findings from the AHP analysis outlined a framework for addressing these barriers through targeted policy interventions, enhanced training programs, and fostering an environment conducive to open data sharing and innovation in urban big data initiatives (*Janssen et al.,* 2017).

The most important challenges identified through the AHP model were categorized into four groups based on thematic analysis (*Table 2*). Each category reflects a distinct domain of influence. Financial and economic challenges include issues related to resource allocation and economic policies, while political and governmental challenges focus on governance and legal barriers. Educational challenges highlight the lack of knowledge and training, while social and cultural challenges address societal attitudes and organizational practices. This grouping simplifies the analysis of challenges by grouping them into coherent domains of impact.

Table 2: Classification of the most important big data challenges in Iran

Categories	17 Challenges
Financial and economic challenges (priority level = 0.222)	- Lack of tax incentives - Economic and funding obstacles - Lack of market for urban big data supply and demand - Unsupportive policies for urban big data development
Political and governmental challenges (priority level = 0.675)	- Government policies - Sanctions - Legal issues - Lack of international relations in the urban big data context - Lack of a strategic and urban planning plan - Lack of technical context for developing open data - Lack of data digitalization in some data generation resources and failing to aggregate them - Limited resources for data management and infrastructures - Absence of online big data and free sharing
Educational challenges (priority level = 0.058)	- Lack of urban big data professional training and mentors - Lack of knowledge about urban big data improvement potentials in government services
Social and cultural challenges (priority level = 0.044)	- Social and cultural attitudes toward technology - Low culture of organizations in recognizing and understanding the importance of big data - Low culture of sharing big data knowledge among experts in the field

The AHP analysis highlighted significant barriers such as the lack of market for urban big data supply and demand, insufficient professional training, and inadequate

knowledge about urban big data applications in government services. Economic and funding obstacles, government policy gaps, and legal issues were also identified as key impediments to progress. Additionally, cultural attitudes toward technology and the absence of collaborative knowledge-sharing further compound these challenges. Such findings underline the importance of a clear framework for addressing these barriers through targeted policy interventions, enhanced training programs, and fostering an environment conducive to open data sharing and innovation in urban big data initiatives (*Velasquez & Hester,* 2013) among others.

According to the expert survey responses the outcomes clearly indicated that political and governmental challenges are by far the most significant barriers to the successful implementation and development of urban big data initiatives in Iran. With a priority level of 0.675, this category far surpasses the other domains in terms of impact. Key issues under this category include government policies, sanctions, and a lack of international relations within the urban big data context. The prominence of this category suggests that addressing governmental policies and enhancing international cooperation are crucial steps toward mitigating these challenges.

The financial and economic domain is the second most significant category, with a priority level of 0.222. This reflects the considerable challenges related to funding, market dynamics, and economic policies that hinder the growth and adoption of big data technologies in urban settings. Issues such as the lack of market for big data supply and demand, as well as economic and funding obstacles, are particularly noteworthy. The moderate priority of this category underscores the importance of economic reforms and financial incentives to support big data initiatives.

Educational challenges form the third most significant group, with a priority level of 0.058. This category includes the need for professional training, mentoring, and increased knowledge about the potential benefits of big data in government services. While less critical than political or economic challenges, the educational aspect is still important for ensuring that the workforce is adequately prepared to manage and utilize big data effectively.

Finally, the social and cultural domain ranks as the least significant category, with a priority level of 0.044. This reflects the challenges related to societal attitudes toward technology and the organizational culture within the country. Although this category has the lowest impact, we believe that addressing social and cultural attitudes remains essential for fostering a supportive environment for big data initiatives in the long term.

CONCLUSIONS

Our analysis revealed that political and governmental challenges, such as policy gaps, legal barriers, and limited international cooperation, play a dominant role in the obstacles to the development of urban big data in Iran. These issues, prioritized through the AHP model, highlighted the urgent need for reforms to establish a supportive regulatory environment and foster data-driven innovation (*Davarazar & Lotfollahi,* 2020). Alongside these political barriers, financial challenges, including insufficient funding mechanisms and a lack of market incentives, further exacerbate

the barriers to progress. Addressing these economic issues is vital to ensure the sustainability and scalability of big data initiatives (*Selmi et al., 2016*).

According to our analytical outcomes educational and cultural challenges are equally important, such as the lack of professional training programs, insufficient knowledge about big data applications, and resistance to technology adoption. These obstacles underscore the need for capacity-building efforts to bridge skill gaps and promote a culture of collaboration and knowledge-sharing among stakeholders Strengthening education and fostering public-private partnerships could create a foundation for innovation and enhance the integration of big data technologies into urban planning and management (*Davarazar & Lotfollahi,* 2020*)*).

By tackling these interconnected challenges through targeted policy interventions, strategic investments, and capacity-building programs, Iran can pave the way for a more effective and innovative urban big data ecosystem. This approach will address immediate barriers and lay the groundwork for sustainable urban development, empowering cities to leverage big data for smarter decision-making and improved quality of life.

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The Impact of the Input-Output Price Ratio on the Profitability of Hungarian Agricultural Enterprises Between 2007 and 2021

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ABSTRACT

This research focuses on the link between the input-output price ratio and agricultural profitability. Analyzing agricultural profitability is a key issue for the development of the sector, with one of its most important components being the evolution of the agricultural price index. This research presents an analysis of the agricultural price ratio in the recent period, with a focus on the correlations between production direction and profits. The study analyses Hungarian agricultural enterprises on the basis of the agricultural price indices of the Hungarian Central Statistical Office (HCSO) and uses data from the agricultural price index and the agricultural database of the Test Farm Information System operated by the Agricultural Economics Research Institute. The analysis works with statistically validated data from 2007 to 2021. Based on our results, changes in input-output prices are a good predictor of the profitability rate of farmers in the current and future years. This provides an opportunity to optimally allocate agricultural subsidies and to strengthen the loss-compensation effect.
Keywords: prices, agricultural profitability, subsidy
JEL codes: Z29

INTRODUCTION

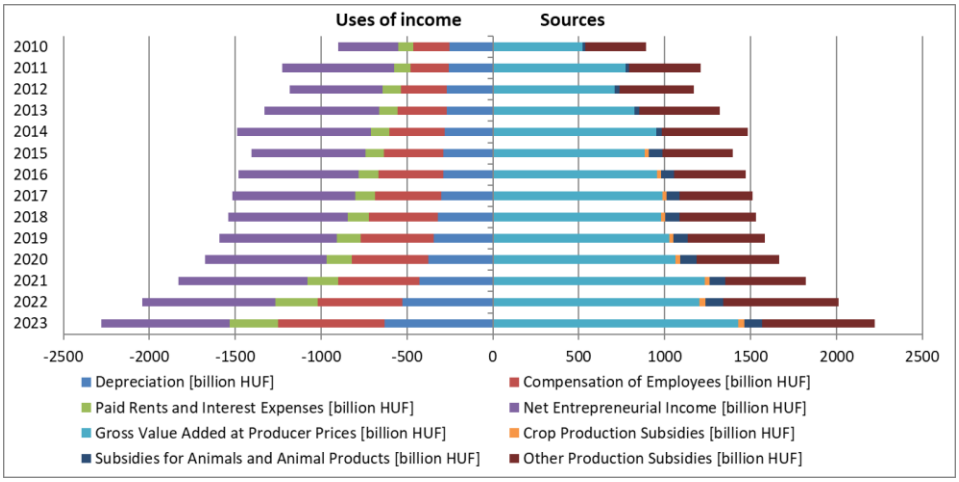
The profitability of agriculture is influenced by a multitude of factors. Empirical evidence highlights that climate change, fluctuations in oil prices, the liberalization of trade and of international financial markets, the conversion of food commodities into biofuels, and the escalation of global risks amplify food price volatility, thereby impacting farmers' profitability (*Wheeler & Braun*, 2013; *Zmami & Ben-Salha*, 2023; *Chen et al.*, 2020; *Frimpong et al.*, 2021; *Szerb et al.*, 2022). Additionally, geopolitical risks significantly affect both prices and profitability (*Hudecová et al.*, 2023; *Perekhozhuk & Glauben*, 2017).

Following Hungary's accession to the European Union, the share of product-based subsidies steadily declined, whereas the proportion of non-product-based subsidies progressively increased. Subsidies are directly linked to changes in entrepreneurial income, with their share in agricultural entrepreneurs' income

showing a marked increase. However, fluctuations in income are also significantly driven by production variability, largely attributed to weather conditions.

In terms of income composition, gross value added does not cover depreciation, employee compensation, rental payments, and interest expenses. Net entrepreneurial income is derived almost exclusively from subsidies (*Figure 1*), leading to the conclusion that, without subsidies, agriculture would be unsustainable.

Figure 1: Sources and uses of income 2010-2020 (billion HUF)



Source: Based on *HCSO* (2020, 2023) data

The development of agricultural digitization, the rise of precision farming, the asymmetry between producers and buyers, and the extent of market concentration also play critical roles in shaping agricultural price dynamics (*Milics et al.*, 2021). Due to sticky prices, price variations in this sector demand particular attention.

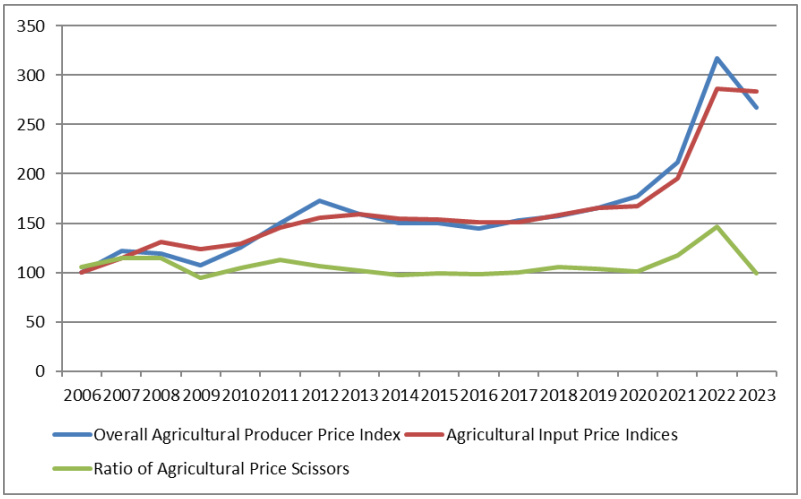
On the supply side, increasing emphasis is placed on understanding and managing the impact of input prices – especially energy, feed, and agricultural raw material costs. These commodities are crucial for profitability, as shown in our results. It is also important to note that fluctuations in international oil prices and exchange rates influence both input and output prices (*Gardebroek et al.*, 2016; *Sensoy et al.*, 2015; *Chen et al.*, 2014; *Koirala et al.*, 2015; *Rafiq & Bloch*, 2016; *Zhang et al.*, 2015; *Pourroy et al.*, 2016), thereby indirectly affecting agricultural profitability through pricing mechanisms.

An additional reason for closely monitoring agricultural raw material prices closely is their pivotal role in the production process. Consequently, any increase in their costs may contribute to inflationary pressure (*Esposti & Listorti*, 2013; *Bakucs et al.*, 2014). Most agricultural raw materials exhibit low price elasticity of demand, meaning that even small changes in demand can lead to significant price fluctuations (*Moses et al.*, 2019). Price volatility represents a substantial risk within the agricultural sector, as profit margins in many production areas remain close to break-even, leaving little room for error (*Bareith & Csonka*, 2022).

This study aims to explore how input costs and output prices influence agricultural profitability, focusing on changes in product prices and agricultural inputs. The agricultural terms of trade (or price ratio) are defined as the index of agricultural producer prices divided by the price index of inputs used in agriculture.

The output price index of agricultural products reflects price fluctuations paid to producers for goods intended for resale or processing**,** as well as for those sold directly to households. However, it does not include price changes of breeding animals traded between farmers. These indices are calculated using the Laspeyres formula, with weights based on the value ratio of sales outside the agricultural sector. The domestic trajectory of the agricultural price index is shown in *Figure 2*.

Figure 2: Agricultural Prices in Hungary, 2007–2023 (Percentage, 2006 = 100)



Source: *HCSO*, 2024

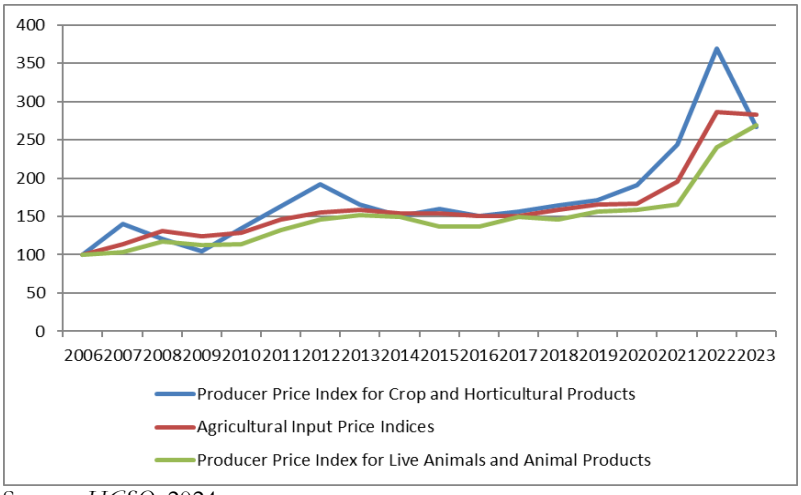
Figure 2 may be somewhat misleading, as it suggests a fixed agricultural price ratio (terms of trade) in 2006. In reality, the terms of trade in agriculture have remained persistently open over an extended period, with only occasional counter-trends before 2006, as input prices (costs) tended to grow faster than output (sales) prices. Nevertheless, the analyzed period – excluding 2008 and 2009 – was generally favorable for Hungarian producers, as no further deterioration in the price ratio occurred.

Subsequently, the output price index of agricultural products is disaggregated (*Figure 3*). Aggregate analysis obscures important differences between crop production and livestock farming. Therefore, it is necessary to examine input-output price ratio trends across production sectors separately.

The agricultural producer price index is divided into two components: the „Crop and Horticultural Producer Price Index" – covering cereals, industrial crops, vegetables, and fruits-– and the "Producer Price Index for Livestock and Animal Products." *Figure 3* clearly illustrates the dynamic and favorable trend in crop and

horticultural product prices. Over the examined period, the growth rate of industrial product prices used in agricultural production was slower than the growth in crop sales prices.

Figure 3: Development of Agricultural Prices by Production Sector in Hungary, 2007–2023 (Percentage, 2006 = 100)



Source: *HCSO*, 2024

Conversely, producer prices for livestock and animal products increased more modestly compared to the rise in agricultural input prices. This creates a mixed scenario in which certain Hungarian farmers, particularly in livestock, are disadvantaged by the input-output price ratio, while crop producers may benefit from its favorable evolution. Consequently, it is essential to assess these divergent impacts across sectors more thoroughly.

MATERIALS AND METHODS

The methodological framework of this study was designed to explore the relationship between agricultural profitability and the input-output price ratio across crop and livestock sectors. The chosen time frame (2007–2021) ensures the use of statistically validated data, minimizing the distortions caused by provisional figures or short-term anomalies.

To capture sector-specific dynamics, agricultural profitability was proxied using Return on Equity (ROE) derived from the Test Farm Information System (FADN/AKI), while price dynamics were assessed using disaggregated agricultural price indices published by the Hungarian Central Statistical Office (HCSO). The input-output price ratio was operationalized by dividing the output price index (for crops or animal products) by the corresponding agricultural input price index. This ratio reflects the terms of trade faced by producers and is a widely accepted indicator in agricultural economics.

Regression analysis was employed to quantify the strength and direction of the relationship between annual changes in the input-output price ratio and sectoral profitability. A linear regression model was selected for its interpretability and robustness in identifying general trends over time. In the case of crop production, profitability was lagged by one year to reflect the delayed impact of pricing on financial outcomes due to storage, delayed sales, and seasonality. For livestock sectors, same-year profitability was modeled, capturing the relatively immediate responsiveness of these enterprises.

The regression outputs indicate varying degrees of explanatory power across sectors:

Crop production showed the strongest correlation, with an R^2 of 0.6752, indicating that nearly 68% of the variability in profitability can be explained by changes in the price ratio ($p < 0.001$).

Pig farming revealed a moderate relationship ($R^2 = 0.5144$), also statistically significant ($p < 0.01$).

Dairy farming exhibited a weaker but still meaningful correlation ($R^2 = 0.3349$), significant at the 5% level ($p \approx 0.024$).

These models are relevant because they highlight the predictive utility of input-output price ratios for anticipating sectoral performance. However, they do not claim causality and must be interpreted within the context of broader market and policy variables. The regression coefficients suggest practical implications: for example, a one-unit improvement in the crop price ratio corresponds to a measurable increase in ROE the following year.

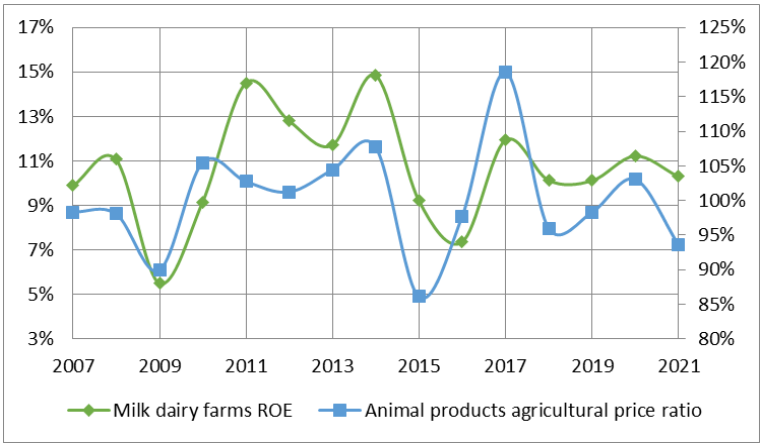
While the models simplify the complexity of agricultural systems, they serve as valuable tools for both policymakers and producers by enabling early detection of profitability trends and better-informed subsidy allocation strategies.

RESULTS AND DISCUSSION

One sector where a high correlation was observed between the sectoral price index for animal products (milk) and profitability is the dairy cow sector (*Figure 4*). Between 2010 and 2014, milk prices experienced consistent growth due to rising global demand. However, in 2015, milk prices dropped by 20%, while the agricultural input price indices remained relatively stable (*HCSO*, 2020). As a result, the return on equity for producers fell from 15% to 7–9% during 2015 and the subsequent year.

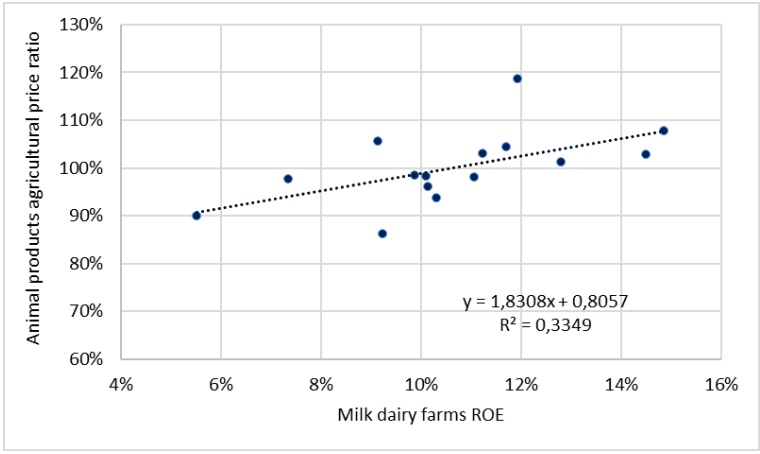
Figure 5 graphically represents the vertical axis for input-output price ratios and the horizontal axis for profitability, with the data points corresponding to individual years. In this context, the emphasis lies not on time series trends but on the relationship between the two variables. A linear relationship between profitability and input-output price ratios can be observed. Cases of positive correlation exhibit an upward linear trendline. Specifically, in the dairy sector, a moderate positive relationship exists between annual changes in the agricultural input-output price ratio and profitability within a given year. This effect is visually represented in the linear regression line and its formula in *Figure 5* (regression table in *Annex 1*).

Figure 4: Return on Equity of dairy cow sector (ROE, left axis in %) and trend in the agricultural price index on animal products (right axis in %, base=previous year) of domestic dairy farms in Hungary 2007-2021



Source: Based on data from *HCSO*(2024) and *AKI*(2024)

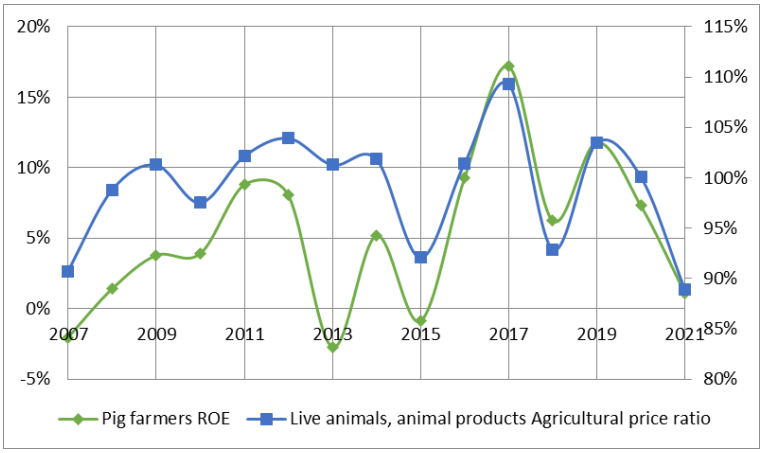
Figure 5: Regression: Return on Equity (ROE, left axis, %) of dairy cow sector, and the Animal products agricultural price ratio (right axis, %, base = previous year), 2007–2021.



Source: Based on data from *HCSO*(2024) and *AKI*(2024)

The profitability of pork enterprises is also positively related to the agricultural price shows a moderately strong positive relationship**.** For example, in the pig line of production, the producer price of domestically produced slaughter pigs was six and a half percent lower in 2015 than in 2014. At the same time, the average profitability of enterprises in this production direction fell from 4% to below 0% in 2015.

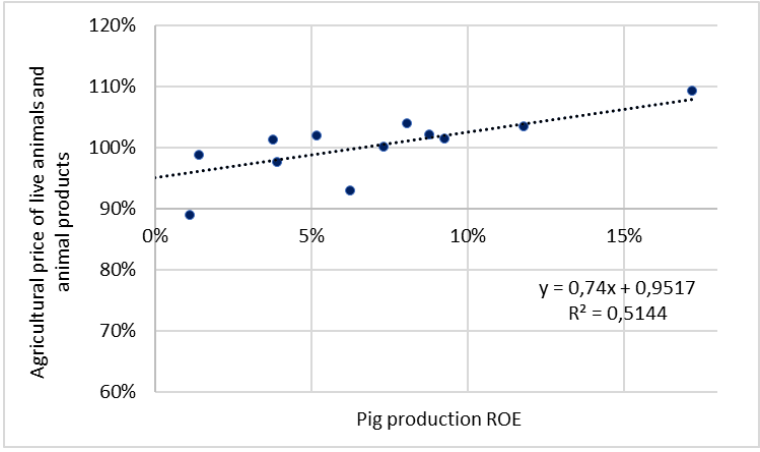
Figure 6: Return on Equity of pig production (ROE, left axis in %) and trend in the Live animals agricultural price ratio (right axis in %, base=previous year) in Hungary 2007- 2021



Source: Based on data from *HCSO*(2024) and *AKI*(2024)

This effect can be seen from the linear regression line in *Figure 7* and its formula in *Annex 2*.

Figure 7: Regression: Return on Equity (ROE, left axis, %) of pig production sector, and the Animal products agricultural price ratio (right axis, %, base = previous year), 2007–2021



Source: Based on data from *HCSO*(2024) and *AKI*(2024)

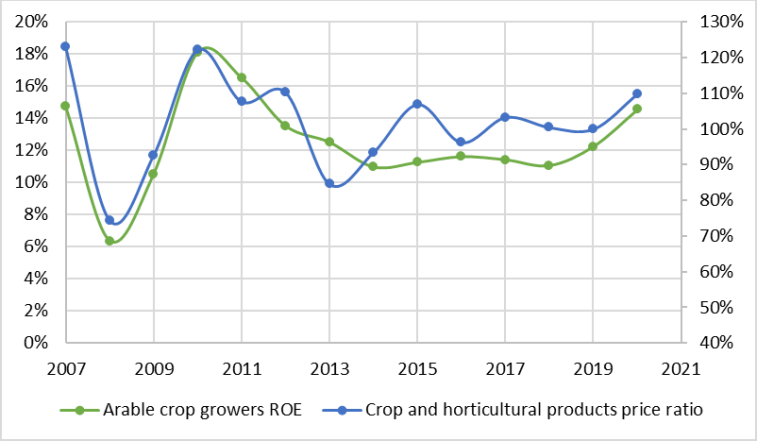
(See exact interpretation on coefficients of the linear formula, significance level of the model and confidence interval in *Annex 2*) For livestock farmers, a stronger positive correlation was found between annual changes in the agricultural input-output price ratio and profitability within a given year. This correlation indicates that

improvements in price ratios are closely tied to profitability. Conversely, when input costs rise more rapidly than output prices, this is strongly associated with a decline in profitability.

For crop farms, the relationship appears with a time lag compared to livestock farms due to factors like drying periods, storage, and futures price agreements. Therefore, sectoral price indices were compared with profitability in the following year.

For instance, in field crop production, a strong positive correlation exists between changes in the agricultural input-output price ratio and the profitability in the subsequent year.

Figure 8: Return on Equity of Crop Production farms (ROE, left axis in %) and trend in the Agricultural Crop and Horticultural Products price ratio (right axis in %, base=previous year) in Hungary 2007- 2021



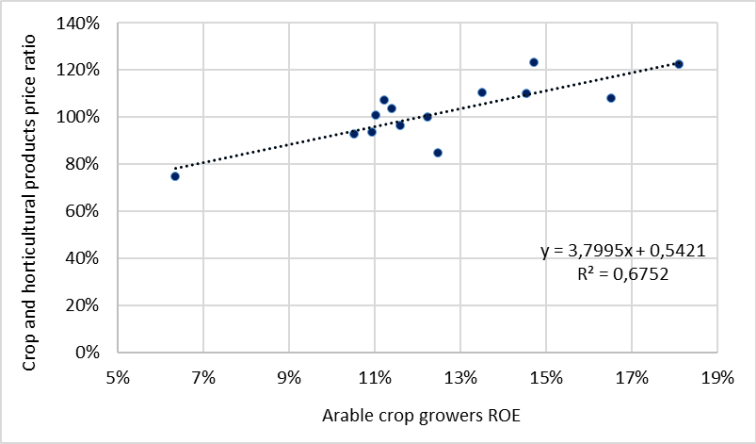
Source: Based on data from *HCSO*(2024) and *AKI*(2024)

Figures 8 reveal that declining price ratios in 2008 and 2013 negatively impacted profitability in subsequent years. Changes in input-output prices effectively forecast farmers' profitability rates in the current and following years.

Figures 9 illustrate the strong positive relationship between the input-output price ratio for crop and horticultural products and the return on equity (ROE) of crop farms in the following year. The regression analysis in *Annex 3* confirms this relationship with a high explanatory power ($R^2 = 0.6752$) and strong statistical significance ($p < 0.001$). This indicates that nearly 68% of the variability in profitability can be explained by changes in the price ratio, underlining its predictive value for crop sector performance. The study demonstrates that the input-output price ratio is a significant determinant of profitability in Hungarian agriculture. The analysis revealed that while crop producers generally benefited from favorable price trends, livestock farmers were more vulnerable to adverse input-output price dynamics. The findings show a strong correlation between profitability and changes in agricultural price ratios, particularly in crop farming with a one-year delay, and

more immediately in livestock sectors such as dairy and pig farming. These findings underline the need for sector-specific support mechanisms that consider the differing sensitivities to price changes. Furthermore, the continued reliance on subsidies highlights the structural fragility of the agricultural sector. In light of global challenges such as climate change and geopolitical instability, the incorporation of price ratio forecasts into agricultural policy and subsidy planning is not only advisable but essential for long-term sustainability and resilience.

Figure 9: Return on Equity (ROE, horizontal axis, %) of Crop Production farms and Agricultural Crop and Horticultural Products price ratio (vertical axis, %, base = previous year), by Year.



Source: Based on data from *HCSO*(2024) and *AKI*(2024)

The Hungarian findings align with broader international research that highlights the critical role of price transmission and input-output price dynamics in shaping agricultural profitability. Several European-level studies, such as those by *Bakucs et al.* (2014), have examined how market structures and policy environments influence the degree and speed of price transmission across the agro-food chain. In line with our results, these studies suggest that producers in less integrated or less competitive markets – such as Hungary and several neighboring Central and Eastern European (CEE) countries – often face weaker bargaining positions, particularly in livestock sectors, where price transmission is more asymmetric and delayed. Moreover, *Esposti and Listorti* (2013) emphasize that during periods of market volatility, price signals become distorted, leading to greater uncertainty and reduced profitability, a trend observed in our livestock sector analysis as well.

Compared to Western European economies with more diversified farm structures and risk mitigation tools, CEE countries are generally more vulnerable to unfavorable price movements due to their higher reliance on subsidies and input cost sensitivity. By empirically confirming a strong correlation between price ratios and profitability, especially in crop production with delayed effects, our study contributes to a growing

body of evidence underscoring the importance of responsive policy frameworks – such as early warning systems and flexible subsidy schemes – across the EU.

CONCLUSIONS

The variation in correlation strength and timing across agricultural sectors can be attributed to both biological production constraints and structural market characteristics. Livestock producers typically respond more rapidly to changes in input-output price ratios due to shorter production cycles, especially in pig and poultry farming. Moreover, the perishable nature of animal products and higher working capital intensity prompt quicker economic responses. Market structure also plays a role: contract farming, vertically integrated supply chains, and cooperative arrangements can either buffer or amplify producers' exposure to price fluctuations. These mechanisms are more prevalent in the livestock sector, enabling more direct and rapid transmission of price signals.

In contrast, crop producers often experience a lagged profitability effect due to seasonal production cycles, storage capacity, and the use of futures contracts which decouple current market prices from immediate financial outcomes. This delayed response, reflected in our one-year shift analysis, supports the idea that price ratio changes are still predictive but unfold over a longer horizon in arable farming.

While our findings demonstrate statistically significant relationships, it is important to acknowledge external confounding variables that may influence profitability independently of price dynamics. Weather anomalies, particularly droughts and floods, significantly impact yields and input efficiency. Geopolitical events – such as regional conflicts or trade restrictions – can disrupt supply chains and cause sharp commodity price volatility. Additionally, currency fluctuations affect both input costs (often denominated in euros or USD) and export competitiveness. These factors, while beyond the scope of the current model, represent important areas for future research and underline the need for multifactorial risk assessment in agricultural economic forecasting. While the study provides valuable insights into the relationship between input-output price ratios and agricultural profitability, it is not without limitations. First, the analysis is based on aggregated national data and does not account for farm-level heterogeneity or regional differences in production conditions, cost structures, and market access. Second, external shocks such as climate anomalies or policy changes are not directly modeled, despite their potential to distort price and profitability relationships.

Despite these limitations, the research makes a significant contribution to the current body of knowledge by quantifying the predictive relationship between agricultural price ratios and profitability in a Central European context. It highlights the sector-specific effects of price dynamics and offers a data-driven foundation for designing more responsive and targeted agricultural support policies. By emphasizing the delayed effect in crop production and the immediate response in livestock sectors, the study provides practical insights for policymakers aiming to improve income stability in agriculture.

The lessons of our publication suggest that the agrarian input-output price ratio should be understood from a broader perspective. The findings of this study indicate that the agricultural input-output price ratio significantly influences sector profitability. While aggregate agricultural price ratios for the entire sector showed positive trends over the past decade for crop farmers, the livestock sectors experienced substantial negative impacts due to agricultural price trends.

It is crucial to note that, without government support, the profitability of the agricultural sector remains modest compared to other economic sectors. The continuous rise in costs poses a significant challenge to Hungarian agriculture, further exacerbated by climate change and global conflicts.

Given the strong correlation identified between agricultural prices and the profitability of the agricultural economy, it is recommended that predictive changes in input-output prices be utilized when designing support systems for the sector**,** based on Hungarian agricultural data.

Annex 1

Regression: Return on Equity of dairy cow sector, and the Animal products agricultural price ratio, 2007–2021

Regression Statistics	
Multiple R	0,5787
R Square	0,3349
Adjusted R Square	0,2837
Standard Error	0,0653
Observations	15

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0,0279	0,0279	6,5461	0,0238
Residual	13	0,0555	0,0043		
Total	14	0,0834			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0,8057	0,0781	10,3163	0,0000	0,6370	0,9744	0,6370	0,9744
Milk dairy farms ROE	1,8308	0,7156	2,5585	0,0238	0,2849	3,3767	0,2849	3,3767

Annex 2

Regression: Return on Equity of pig production and Live animals agricultural price ratio, 2007–2021

Regression Statistics	
Multiple R	0,7172
R Square	0,5144
Adjusted R Square	0,4770
Standard Error	0,0407
Observations	15

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0,0228	0,0228	13,769	0,0026
Residual	13	0,0216	0,0017		
Total	14	0,0444			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0,9517	0,0148	64,2846	0,0000	0,9197	0,9837	0,9197	0,9837
Pig farmers ROE	0,7400	0,1994	3,7108	0,0026	0,3092	1,1708	0,3092	1,1708

Annex 3

Regression: Return on Equity of Crop Production farms and Agricultural Crop and horticultural Products price ratio (base = previous year), 2007–2021

Regression Statistics	
Multiple R	0,8217
R Square	0,6752
Adjusted R Square	0,6481
Standard Error	0,0171
Observations	14

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0,0073	0,0073	24,944	0,0003
Residual	12	0,0035	0,0003		
Total	13	0,0108			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0,0556	0,0365	-1,5239	0,1534	-0,1352	0,0239	-0,1352	0,0239
Crop and horticultural products price ratio	0,1777	0,0356	4,9944	0,0003	0,1002	0,2552	0,1002	0,2552

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„SUCCESS IS A KIND OF FAITH IN DOING SOMETHING CORRECTLY". CASES OF SUBJECTIVE SUCCESS IN PERIPHERAL AREAS OF HUNGARY

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ABSTRACT

In the life of each municipality, settlement leadership is always a key factor of success. The study demonstrates that stable loyalty and confidence in municipal leadership is felt not only toward the figure of the leader but also his entourage, i.e., the administrative staff and the representative body. The primary data collection in the framework of the research conducted by the Institute for Regional Studies enabled us to examine a specific layer of local elites in peripheral areas from various perspectives. The study reviews the composition, role, and functions of the representative body during the successive local government election cycles in Baranya County in Hungary, with a view to examining the subjective determinants of settlement success.
Keywords: periphery, mayor, success, local government, Hungary
JEL codes: O18

INTRODUCTION: THE STABILITY OF THE HUNGARIAN LOCAL GOVERNMENT SYSTEM AND ITS ELEMENTS

The complexity of self-government arises from the fact that it is not simply a local entity, but a legally recognised framework for the exercise of autonomy. Local government is a voluntarily elected authority, regulating and managing local public affairs through its own responsibilities and in the interests of its residents, within the limits of the law (*Zongor,* 2021). Both the 1990 and the 2011 Local Government Acts (*Act LXV of 1990 on Local Governments* (Ötv); *Act CLXXXIX of 2011 on the Local Governments of Hungary* (Mötv)) emphasise that "the member of the local community is also the subject of local government". Thus, local government extends to all individuals who work together to promote the interests of a municipality and a particular territorial unit or minority group or community. In addition, the definition of local government includes the budgetary institutions run by a municipality. In Hungary, the newly emerging system of local government post-1990 was facing significant challenges. Safeguarding the principles of municipal autonomy, freedom and local democracy were the main priorities during the creation and development of the system. With the adoption of the 1990 Local Government Act, the tasks of local governments were defined, their economic foundations were established and a resource-based approach to financing was introduced. A key aspect of the

interpretation of the concept is the status of local government as a legal entity. Pursuant to the 2011 and 1990 Acts, the mayor is responsible for the body of representatives. At the same time, the office of representative has facilitated participation for a wide range of people in local public affairs and the legal representation of local communities. However, municipalities in different geographical areas of the country have heterogenous opportunities and perspectives. The various locations can confer them different responsibilities and competencies. The Local Government Act stipulates that "local government shall act autonomously in matters of local interest within its functions and powers. ... They are connected with the local exercise of local public authority of the municipal type and the local creation of the organisational, personal and material conditions for this". It is the common aspiration of all local authorities to manage their own affairs in their own right; to establish an acceptable division of labour between central and local bodies; to prepare citizens for participation in public affairs and to introduce and apply comprehensive, uniform regulations. The local government decides for itself, within its means, which tasks it can and is able to perform. It relies heavily on the mayor, his network of contacts and the members of the council. Local government functions are performed by the body of representatives and its organs: the mayor, the committees of the body of representatives, the office of the body of representatives.

The 2011 Local Government Act has strengthened the role of the mayor, which has been further enhanced by the 2020 epidemic crisis. Mayors have been granted extra powers of autonomous decision making. The mayor is the chairman of the body of representatives as well as a representative. Local authorities have a wide range of responsibilities, as the public affairs managed at the local level are adapted to the geographical situation of a given municipality and its functions in the hierarchy of municipalities (*Csurgó & Megyesi,* 2016). Hence, the geographical location of a municipality is a key factor to reckon with. The fragmented settlement structure (*Table 1*) of the South Transdanubian region amplifies territorial and spatial disparities, making them particularly visible in relation to local government associations and regional organisations.

Table 1: Number of settlements and local governments in Baranya county by election cycle

	Settlement	County government	City with county rights	Town	'Nagyközség' Large municipality	'Község' Municipality
1990	297	1	1	4	10	282
1994	302	1	1	5	9	287
1998	301	1	1	9	6	285
2002	301	1	1	11	4	285
2006	301	1	1	11	5	284
2010	301	1	1	13	3	284
2014	301	1	1	13	3	284
2019	301	1	1	13	3	284
2024	301	1	1	13	3	284

Source: *HCSO* (2024) TEIR database

The region is inhabited by approximately 10% of the country's population, whereas nearly 20% of the municipalities are located in this county. This fragmented settlement structure is a historical legacy, having been a permanent feature of the region since Joseph II according to the 1784 census. In addition to the small village structure, the relative and absolute isolation of municipalities, the demographic characteristics and underdeveloped peripheral transport infrastructure disadvantage local authorities and are among the region's major shortcomings and pitfalls. To counter the effects of the unfavourable settlement structure, *Bujdosó* (2008) proposes a reform of the local government system, including a reduction of the size of representative bodies, the modernisation of the district administration and the mandatory participation in microregional structures for small settlements with fewer than 1000 inhabitants. The planned extension of the system of local authority associations was expected to facilitate the rationalisation of tasks and a reduction of the resource gap. There are several good examples for this in neighbouring countries, see *Klaric* (2021), *Kaźmierczak & Živanović* (2023) and *Tara* (2024). In a similar vein, *László* (1998) sees micro-regional cooperations as essential for reforming the system of local government. Co-operation is conceived based on the principles of economies of scale and efficiency, which are influenced, amongst others, by the size and composition of the population, the proportion of age groups within the population, the number of institutions and the number of people supplied. The proper management of the Council is essential for maintaining the functioning of the municipality as a whole. The body of representatives and its organs, together with the mayor, are responsible for the performance of its duties and decision-making. In *Fábián*'s (2016) view, the main task of the body is to represent the local population, but as the main decision-making body, it cannot replace the community. The members of the body of representatives are directly elected to their positions, according to the requirements of democratic legitimacy (*Varga*, 2023).

THE ROLE AND IMPACT OF MUNICIPAL LEADERS ON THE SUCCESS OF BARANYA COUNTY MUNICIPALITIES

Baranya County is part of a peripheral region - the southernmost county of Hungary, which has experienced steady decline for the past fifteen years. Despite the existence of individual success stories and competitive settlements in the region, the vast majority of the 301 settlements in the county belong to the less successful group (*MBH,* 2024; *Oláh et al.*, 2020; *Pámer et al.*, 2023; *Infostart,* 2021). The territorial structure of the county mirrors that of the country. Pécs, the central settlement of the region, shows the specific traits of the capital both in terms of its population and its role as a transport hub, cultural and industrial centre. Despite all this, Pécs and the rest of the municipalities of the county are far from being dynamic centres (*Pálné Kovács*, 2021). In Baranya County, small settlements are undergoing a process of social erosion (*Ragadics,* 2016), with a significant loss of population and a weakening of their local power base. The living standards of the majority of the population are below the national average. The tendency of intra-county migration towards central municipalities is increasingly visible in relation to small towns. The power of ageing and shrinking small towns is declining, and their capacity of interest representation is considerably eroded (*Horeczki & Póla*, 2023).

The delimitation of districts was problematic due to the small village structure of Baranya County; new aspects had to be considered during their elaboration. More districts were created in the county than originally planned; and the number of inhabitants was to be divided proportionally within the region. The *Table 2* illustrates the large number of settlements in the districts of Pécs, Siklós and Szigetvár.

Table 2: Number of Baranya County's settlements per district

District	Number of settlements		Administrative centres	Percentage of municipalities surveyed* (%)	Population density, persons/km2	Population at the end of the year, persons 2019
	Sum	Town				
Bólyi district	16	1	3	5	54,8	11.322
Komlói district	20	1	4	11	123,2	32.761
Mohácsi district	26	1	7	12	59,6	33.045
Pécsi district	40	2	12	18	304,5	175.235
Pécsváradi district	17	1	4	6	47,4	11.327
Hegyháti district	25	2	4	8	35,2	11.617
Sellyei district	38	1	6	6	28,7	13.123
Siklósi district	53	3	9	17	55,5	34.364
Szentlőrinci district	21	1	3	9	53,3	13.936
Szigetvári district	45	1	7	9	38,8	23.974
Total	301	14	53	22%	80,1	360.704

Source: Based on *HCSO* (2024)

The results of the data collection reveal that the trust surrounding the person of the mayor can be transferred to employees of the mayor's office and the representative body as well. Hence, the role of the institution, i.e. the mayor's office, which is not limited to that of an administrative authority is to provide a sense of security and a kind of subjective well-being, making it an important aspect of success: in the questionnaire survey, when asked „What do you consider to be a success in the life of the municipality?", more than half of the respondents indicated the stability of the local government and its employees as one of the elements of success. Primary data collection was carried out in the autumn of 2020 and 2021 (the monitoring of the subjective determinants of settlement success followed in the spring of 2022 and 2023). The aim of the questionnaire survey was to determine the subjective characteristics of the development trajectories of selected municipalities, as defined by the local elite, and to analyse the positive and negative aspects of peripherality. Some municipalities were identified as centres, while most municipalities within the region were identified as peripheral settlements. The municipalities identified as centres were defined in administrative terms as county seat, district seat, other town, large municipality (or "nagyközség" in Hungarian) and the seat of common municipal offices in the county. In addition, the municipalities with an administrative central function in the last 50 years were identified as former and potential centres. Our secondary aim was to demonstrate that municipalities with central functions can function as de facto centres with effective functions in the longer term. The delimitation criteria for the sample were the spatially even classification of administrative units according to their geographical distribution and the

representation of the county at the level of districts. Our secondary delimitation criterion is the proportional distribution of the size of the municipalities, corrected for the population size of each district and the over-representation of the county seat. In combining the delimitation criteria, we met the criterion for the last 5 categories of the size of settlement category by selecting the county seat, the district centres and the cities and towns. For the 10 districts, selecting the former central municipalities meant that since we effectively covered the category of settlements between 1000 and 2000 inhabitants, we had to distribute the 110 municipalities of the first four categories evenly, taking into account the size and population of the districts in these categories. A third, complementary selection criterion was the peripheral nature of the settlements. Within the county, we considered only the geographical, infrastructural and socio-economic peripheries. In order to define peripheries, we first identified the rail and road axes in the county. Fourteen municipalities were identified as railway axes. We identified 28 settlements as road axe settlements and created two categories for classifying road settlements: 10 settlements along single-digit main roads and 18 settlements along double-digit main roads.

The tertiary aspect was supplemented by additional peripheral factors, the role of administrative border changes in the development trajectories of the municipalities changing counties (46 municipalities); the role of borders in the life of municipalities: 14 municipalities are located on the national border, 24 municipalities on the county border. The following were included in our sample as extreme peripheries: the northernmost settlement in the county: Mekényes, the southernmost settlement: Kásád, the westernmost: Zadar and the easternmost: Homorúd. In addition, we analysed the 105 settlements from the county from the perspective of their trajectory towards the periphery. In the survey by questionnaire, the so-called snowball method was used to reach out to members of the local elite, i.e., we contacted a person with a public role in the municipality who recommended a person with an important position in the municipality and/or the adjacent municipalities (*Table 3*). During the definition of the sample, we identified the number of people included in our interview in each settlement category, i.e., 1 to 3 individuals in villages with less than 500 inhabitants, 3 to 4 people in villages with less than 1000 inhabitants and 5 to 8 people in small towns with above 5000 inhabitants. Discrepancies were found in some cases due to the low response rate. Almost a third of respondents failed to complete the questionnaire or did not respond to the majority of the questions.

Table 3: The public role of individuals included in the questionnaire (based on personal interviews)

Linked to the mayor's office	56
Linked to a civil society organisation	58
Linked to an institution operating in the settlement	17
Linked to an ecclesiastic organisation	3
Multiple roles	51
No self-confessed role	36
Did not respond	12
Total	233

The overrepresentation of the Pécs district (see *Table 2*) follows from the good accessibility of a large number of local elites located in the county seat. The districts of Szigetvár and Szentlőrinc were slightly underrepresented due to difficulties in contacting some subjects and the incomplete questionnaires. The 67 municipalities covered by the sample included the county seat, 13 towns, 3 large municipalities and 50 additional municipalities. A total of 233 persons were contacted, all of whom held a public role in the municipality, mostly related to the local government. The vast majority of respondents (60%) were male and over 50 years old (54%). An assessment of the socio-demographic characteristics of the respondents showed that the number of female mayors in small municipalities in Baranya exceeds the national average (48 of the respondents).

MEMBERS OF THE BODY OF REPRESENTATIVES AS ESSENTIAL UNITS OF THE LOCAL ELITE IN THE MUNICIPALITIES

When examining the role of local elites, we encountered a range of different views. Researchers' definition of elites is both characterised with "inherent uncertainty" (*Pareto*, 1966) and "total determination" (*Lengyel*, 2006). The concept of "elite" is associated with the best, the biggest, the people with the most power. In terms of the conceptualisations of local elites, we adhere to the descriptive approach (*Dogan &Higley,* 1998; *Higley & Lengyel*, 2000; *Kolosi & Róna-Tas*, 1992). Elites belong to the upper third layer of the political, economic and social hierarchy; they are individuals involved regularly and over a longer period of time in decision-making processes. Such individuals are usually opinion leaders, capable of influencing the local population by virtue of their role in the social structure or network. Thus, the local elite is the stratum of society which has the human and/or material capital to hold positions through capital elements. The local elite is not a homogeneous entity within the country or even within a region or municipality (*Szilágyi*, 2012). The influence of the local elite does not necessarily lie in personal skills or other capabilities. This is particularly characteristic of the small villages of Baranya, where the figure of the mayor and the representative body are more influential factors than the level of education or social class.

Factors used to classify political elites (*Bibó*, 1986; *Lengyel*, 2006; *Kristóf,* 2019) are effectiveness, performance, good governance, predictability, good conceptualisation, and social sense. Their tasks are similar to those responsible for local public affairs: coordination of local political life, administration, organisation and provision of public services, and involvement in local economic development (*Pálné Kovács*, 2017 and 2023). The fifth field of activity allows some elements of the political elite to be linked to the activities and the daily life of municipalities as elements of the economic elite. The early studies of elite research in Hungary (*Püski*, 2000; *Gergely*, 1992; *Szakály*, 1987) were mainly limited to the study of economic elites, as well as military and ecclesiastical elites in historiography. The focus increasingly shifted towards the study of political elites over the past decade (*Kovách*, 2011). In this research, we used the reputational technique (*Pálné Kovács*, 1990) to identify the local political elite, not only in terms of their actual influence, but also formal authority. Using a questionnaire

survey, we identified the "influential actors"[1] in each municipality over the past 30 years. We received 498 valid responses to the question. On average, each respondent mentioned at least two persons with a decision-making position or formal influence in the municipality. The same names were mentioned on multiple occasions in the region; 82 persons were named at least twice and 23 at least three times (*Table 4*). The most frequently mentioned names were those of the mayor of the two small towns with the largest population. They were followed by the mayors of the most tourist-friendly municipalities, with 7-7 mentions each. In one-tenth of the questionnaires, no specific names were mentioned, only the highly visible position of a person who were either an elected MP, a former chairman of a given party, a local entrepreneur, a hospital director, a parish priest, a school director, etc.

Among the names featuring in the responses, we were able to distinguish five major groups (*Table 5*). The first was comprised of people linked to the municipality: mayor, representative; the second category covered the head of a specific institution (state or municipal: e.g. hospital, kindergarten, community centre, etc.), the third category included economic actors: company managers, entrepreneurs or other economic operators; the fourth category was defined by occupation: intellectuals who do not hold a managerial position; the last category included persons with an active life and who are respected members of the community: e.g. village caretaker, medical assistant, nurse, postman, etc. The characteristics of individuals identified as representatives of the first category are presented in the remainder of the analysis.

Table 4: Number of powerful people by frequency of occurrence

Question 14	The same person is mentioned at least twice		The same person is mentioned at least three times	
	Settlements	Persons	Settlements	Persons
Below 1000 inhabitants	10	23	4	4
Above 1000 inhabitants	22	59	12	19
Total	32	82	16	23

Table 5: Categories of people considered influential

	Below 1000 inhabitants	Above 1000 inhabitants	Total
Linked to local government	23.3%	76.7%	202
Head of institution	24.8%	75.2%	101
Economic actor	23.6%	76.4%	106
Intellectual	25.6%	74.4%	43
Other	39.4%	60.6%	33

[1] Question 14 of the questionnaire: in your opinion, who are the most influential people in the municipality at the moment, and what positions do they hold in the municipality? If you can, please mention more than one person. If you can tell us if you know the names of up to 6 people in the municipality and the positions they hold, please tell us if you know the names of the most important people in the municipality and the positions they hold. In addition, we asked whether the person who has played a strong role in the municipality has lived in the municipality in the last 30 years.

Among the influential/powerful people named as representatives, 100% live or have lived in the municipality where the survey was conducted. In the case of these individuals, we also asked how the respondent viewed their influence in the municipality.[2] In addition to the categories offered, 72 respondents also used the open text response option. Contrary to our expectations, the role of party relations was downplayed. The majority of small-town mayors run and win elections as independent candidates, and our impression was that this was over-represented - at this level - based on the questionnaire data. Personal skills and moral factors played a decisive role. Based on the proportion of responses, good local connections and trustworthiness were the most influential factors in the case of those affiliated to the local government. In some cases, trust and confidence in the municipal administration appeared to be unstable (based on a similar survey by questionnaire conducted in 2016-17 among leaders of small villages with less than 1000 inhabitants in Baranya County[3]). According to the mayors of Baranya County, the trust received from their local constituents is a key factor of the development of the municipality, in the absence of strong and stable trust in municipal leaders, the municipality cannot build a properly functioning economic and business environment. And in the absence of an adequate business environment, companies capable of absorbing the local workforce will not be attracted to the settlement. With respect to the influence and reliability of municipal leaders – who are themselves members of the representative body – a key analytical aspect was the evolution of the number of mayoral candidates in the respective municipalities. In 10% of the Baranya County municipalities with less than 1000 inhabitants, 1 candidate ran for mayor between 2004 and 2019. A general observation is the remarkable stability of the body of representatives in relation to the family members of the body of representatives, former or future mayors. In the case of 31 villages in the county, no contest took place in the elections. On the other hand, there were 28 villages where four or more mayoral candidates ran during each election. Four villages had 6-6 candidates in the past two elections, and one village ran 7 candidates for the post. One possible explanation for the large number of candidates is the retirement of the mayor (in many cases due to long-term illness or death), resulting in a loss of confidence among members of the community. This phenomenon is partly highlighted by the dissertation of *Ragadics* (2016), focusing on small villages in Ormánság (a special geographical area of Baranya country). Skills and hard work were identified as secondary factors of success of particular importance. The survey of municipal leaders also included data on educational attainment. 6% of the managers surveyed did not have secondary education; 16% had secondary education but no school leaving certificate (apprenticeship, vocational training). Among the managers without a school leaving certificate, one had higher education qualification and participated in postgraduate training, which also pointed to the diligence of the person. The vast majority of mayors, deputy mayors and notaries interviewed completed postgraduate training. They mentioned training programmes related to legal, economic and digital skills. 33% of those surveyed had a school leaving certificate and 40% of this group also had higher education

[2] Question 16 of the questionnaire: regarding the persons mentioned above, to what extent do the following factors explain their influence/power? In addition to eight pre-defined response options, respondents were offered other options.

[3] Read more about the research and methodology: *Bodor et al.*, 2019.

qualification. 35.9% of respondents had tertiary education, 20% of them attended multiple courses, holding several degrees; one of them also had an academic degree. The officers with higher qualification according to the questionnaire have a greater insight and a more diversified confidence rating compared to their less qualified counterparts. On the other hand, the size of the network of relationships determined by qualifications may also be influenced by age, entrepreneurial attitudes and party preferences. This was also confirmed by the results of the 2021 survey. The research broadened the scope of the respondents, with the survey of local elites indicating that 94% of elites have at least a high school diploma, and amongst them, 76.8% have a university degree. This result corroborates the idea that the elite, whether rural or urban, are constituted by the most outstanding members of society.

The role of the local level and its increasingly valorised function is reflected in the weakening role of the national level and the weakness of party preferences. Respondents living in smaller villages (mainly those living in settlements with less than 200 inhabitants) only rated the role of the local level positively, with neither the county nor the national level emerging on their mental maps when asked about local economic development, local development and influential people.

In the other category, the influence of the members of the body of representatives (*Table 6*) was most often described in terms of honesty and integrity, reliability, dedication and commitment (in line with the analysis of *Bódi & Bőhm*, 2000). This description echoes the definition of a "democratic, professional" elite. Responses associating honesty and integrity also referred to the age of the local elite. Those named and described using such words were predominantly in the 55+ age group. 63.7% of our respondents were over 50 and a further 29.2% were over 40 years of age. This type of overview of local elites is also thought-provoking, as in many other areas, in local government and in representative bodies, generational change has become a priority issue. In some cases, we find that this is seamless, for instance, in the two municipalities in Baranya where the mayor is 30 years old and receives all possible help from the outgoing, retiring mayor. This type of local elite is the building block of local society, striving for internal cohesion and cooperation. Exploring the parallels between the resource absorption capacity of municipalities and population retention could be a useful area of investigation beyond the scope of this study.

Table 6: Percentage of factors explaining the influence of employees in the local government sector

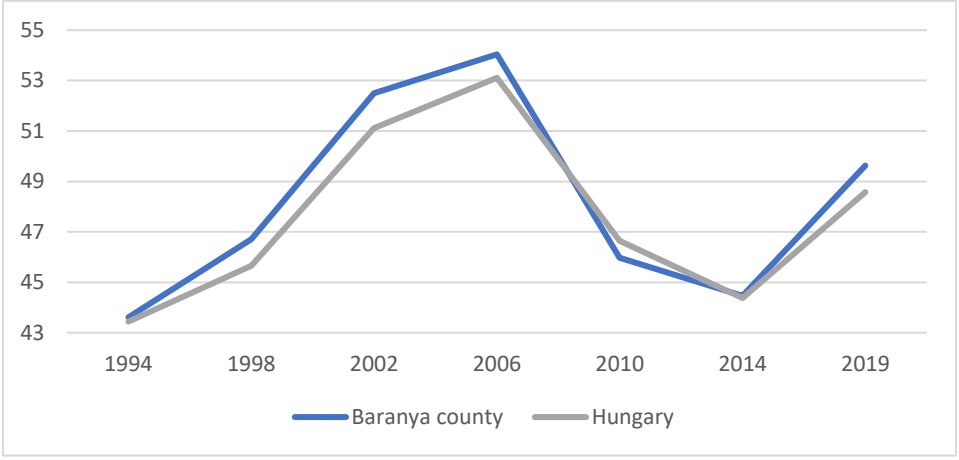
Answers for question 16	Not explained (%)	Slightly explained (%)	Significantly explained (%)
A good local network	0.5	5.6	94.0
Reliability	1.4	8.1	90.5
Skills	0.5	12.7	86.8
Diligence	1.4	13.3	85.3
A good network of contacts	9.7	25.1	65.2
Good contacts at national level	22.9	36.1	41.0
Position held elsewhere	36.3	34.3	29.4
Influential parties behind them	64.7	18.8	16.4

RESULTS AND DISCUSSION: REPRESENTATION OF PARTICIPATION IN BARANYA COUNTY

The number of municipalities in Baranya County has remained stable since the 1998 elections. There are shifts, however, at different levels of the hierarchy of municipalities. Currently, there are 13 towns and 3 large municipalities in the county, excluding the cities with county rights (see *Table 1*). The number of municipalities has been drastically reduced since the 2010 elections. This has further undermined the capacity of small municipalities to assert their interests. Electoral turnout in the county has exceeded the national average in all of the years under review, except in the cities, where it has reflected the national average. In 2019, the electoral turnout in Baranya (49.6%) was the third highest in the Transdanubian region, with only Vas (55.4%) and Somogy (50.5%) counties having superior outcomes.

In terms of turnout, the 2006 municipal election had the highest turnout in recent election cycles, both countywide and nationally. The county has an asymmetric distribution of municipal turnout (*Figure 1*). The number of municipalities with turnout rates below 40% is very low (16); and there is a relatively high number (73) of municipalities with outstanding turnout rates above 75%. The county outperforms the national average with these rates, and the national participation rates (outstandingly low-high) can be considered balanced (11.1-11.6%).

Figure 1. Change in turnout rate in Baranya County*, % (1994-2019)



Source: Based on *Nemzeti Választási Iroda* (n.d.)

In 2019, the participation rate was 62.4% in settlements with less than 1,000 inhabitants and 52% in settlements with between 1,000 and 2,000 inhabitants, which was 2.2% and 2.8% superior to the national average. The issue of re-election is a decisive factor for both the body of representatives and the mayor. The number of re-elected and cyclically re-elected mayors in the county is particularly high. The analyses carried out so far tend to focus on the partisan orientation of the body of representatives in the county capitals, presumably due to the difficulty of accessing

information and its time-consuming nature, while no such analyses have been carried out for smaller towns or smaller municipalities. The municipal office showed outstanding activity. There was a significant over-subscription of candidates for MPs, with more than 30,000 candidates running in 2019. Among cities with more than 10,000 inhabitants, three cities in the county had 11 seats each.

The over-registration of candidates for the single-member constituency elections, including compensatory list candidates, was 173 in Baranya County and 6,639 nationally. On this basis, the average oversubscription was three and a half times higher per constituency and per seat obtained. This figure shows a decrease compared to previous elections, with 6-7 times higher electoral turnout observed before 2014.

Competition in the county was also visible among the candidates for the Council of Representatives. At least two candidates ran in 19% of the municipalities, while the remaining 81% had 3-5 candidates in municipalities with less than 10,000 inhabitants. Despite the over-subscription generated by the distribution of votes, the majority (67%) of elected and re-elected representatives in each municipality come from the same family. A slightly higher proportion of candidates ran in the larger municipalities. In the small town category, the 3.6-fold oversubscription in Baranya was unique in the country, but there was also an exceptionally high proportion of candidates in villages, with Alsószentmárton's 7.7-fold oversubscription being the second highest in the country after Kunágota (8.2) in Békés county. In these settlements with a large number of candidates, it was easier to obtain seats in the representative body with low support, in several places therefore some candidates won seats with less than 20% of votes. At the other extreme – a minimum number of candidates – we have also found several examples: in 158 municipalities, including 21 in Baranya, the number of candidates was equivalent to that of seats, the election of representatives in these places was thus practically uncontested.

No reliable data was available on the measurement of trust in the board of representatives. The questionnaire survey did not include a specific question on this aspect. *Kullmann* (2009) introduced the concept of cumulative lack of trust in depressed areas, where municipal leaders are dissatisfied with the current government measures and the financial backing of catch-up programmes. A similar view is presented by *Bőhm* (1992), who defines depressed zones by examining the social and societal characteristics of each area. *Utasi* (2009) describing the weakening of social integration and the lack of confidence in small communities, identifies loss of confidence as one of the main causes of the crisis.

The analysis of the questionnaire and the interviews indicate that the county is full of municipalities that regard themselves as successful and perceive themselves as centres[4]. Based on the survey responses, we were able to identify a number of subjectively successful municipalities in the county. It is worth noting that a significant number of successful municipalities along subjective dimensions are located within the same micro-region, often being adjacent municipalities. It is also worth noting that only two questionees mentioned the county capital specifically. A comparison of the list of objective and subjective determinants of success (*Table 7*) has demonstrated that some

[4] In the questionnaire, we asked respondents 4) to define their settlement as a center or a periphery, and we also asked them 5) to explain why they considered it to be so. 7) To how much does the role of centre/periphery influence the perception of the municipality?

overlapping municipalities can be considered truly successful (both in terms of internal factors and statistical indicators) in this peripheral area.

Table 7: Successful settlements based on subjective judgements and objective measures

Statistics show they are successful	
1.	*Kozármisleny*
2.	Pécsvárad
3.	*Bóly*
4.	Nagykozár
5.	*Harkány*
6.	*Siklós*
7.	Pellérd
8.	Magyarszék
9.	*Mecseknádasd*
10.	Bicsérd

Subjectively successful	
1.	*Bóly*
2.	Villány
3.	*Kozármisleny*
4.	Mohács
5.	Alsómocsolád
6.	*Harkány*
7.	Hosszúhetény
8.	*Siklós*
9.	Palkonya
10.	*Mecseknádasd*

Regarding the subjective perceptions of success, it is worth noting that relatively few municipalities can be considered successful according to the local respondents. Mohács, on the contrary, appears to be a successful municipality along objective dimensions as well. In addition, a further 13 municipalities were mentioned by the locals. It is not only the high number of mentions that confer Bóly the status of a successful municipality in the region. The best practices of this small town make it a role model for other towns as well, largely thanks to its coherent and conscious urban development and settlement management practices. When examining the factors of success, the composition of the representative bodies of the five most frequently mentioned municipalities was also studied in detail. The five municipalities included four small towns and one village, Alsómocsolád. Each municipality forms a jewel in the crown of this peripheral county, showing a degree of stability and permanence – hardly quantifiable statistically – that contribute to their success in the perception of the local and county population.

Even though Alsómocsolád was ranked fifth in the county in our survey of settlement success, this peripheral settlement of 300 inhabitants turned out to be the most successful among the villages. This result is interesting given the extreme peripherality of the village, situated at a distance of 45 km and an hour's drive from the county seat and 17 km from the nearest district seat, Dombóvár. The population of the village has been steadily declining, with a programme to attract young people to the village showing moderate success, making the age structure appear more favourable compared to similar settlements in the area. The village has a picturesque landscape, being situated on the northern slope of the Mecsek, in the vicinity of fish ponds, and despite not being qualified as a tourist destination, its tranquillity and well-ordered physiognomy are attractive for those who desire to visit the countryside, making it a popular destination for Dutch settlers as well (as indicated by the high number of second homes). This small, isolated village owes its success to its highly engaged, developmentalist mayor, currently in his ninth term in office, who is capable of involving and mobilising the civil population in development projects. It is worth

noting that over the past year, the general assembly was composed entirely of women. Another key factor of success is the strong, cohesive community that has managed to reach a consensus on key issues throughout decades. Naturally, the major prerequisite for success is the availability of an economic base, with luck being a non-negligible factor. Two major meat processing plants operate on the outskirts of the municipality.

The small town of Villány with a population of 2,000, lying in the southern part of Baranya, owes its national and European reputation to the famous Villány wine brand. Despite the fact that viticulture and wine tourism provide the economic base of the town, its population has declined by almost twenty percent over the past ten years. In spite of the good accessibility of the M6 and M60 motorways, the connecting road infrastructure requires major upgrading. The county capital is at a distance of 40km, and can be reached by rail as well, but its accessibility is poor compared to its touristic significance. The settlement is home to a significant German ethnic minority (over 20%). The distance from the district seat is 15km, conferring the town the status of micro-regional centre. The development of wineries gained growing momentum around the period of the regime change. During the preceding decades, large-scale, cooperative structures tended to dominate wine production, but by the turn of the millennium small family wineries had experienced a significant upsurge, and the visibility and popularity of the wine region was considerably enhanced by its well-managed wine-tour programme launched in the 1990s, as well as the emergence of foreign investors in Villány and the adjacent villages. Nowadays, a large number of wineries have outgrown their family frameworks as a result of substantial investments and public subsidies, making them major employers in the small town's labour market, both in the wine production and hospitality sectors. Villány also owes its success to its active and successful tendering activities as well as its political relations. Several renowned wineries are reported to maintain good relations not only with the region's MP, but also with ministers and the Prime Minister. In addition, it is common for several proprietors of wineries to obtain seats in the town assembly.

The small town of Bóly (population 3,700) in southern Baranya is located in an area with significant agricultural assets, within the Economic Development Zone of the South Transdanubian Region, the Pécs-Mohács Economic Development Centre which also belongs to the agglomeration of Pécs (*Terra Studió Kft.*, 2023). Thanks to its educational and social facilities, it fulfils the role of a de facto regional centre. The economy of Bóly, relying primarily on manufacturing industry, performs well compared to the surrounding settlements, not least due to the conscious economic development strategy implemented since the early 1990s, generating large scale industrial park and energy development projects. The municipality's international relations, as also reflected in foreign direct capital investments, are heavily German-oriented: German serfs were settled in the historical manorial centre under the reign of Maria Theresa, whose descendants still live in the municipality, hence the proportion of those with a German nationality makes up a quarter of the local population.

In general, Bóly is considered to be a successful municipality, with the figure of the mayor ranked as a major factor of success (an independent municipal leader with an engineering background, leading the town through five terms over 34 years and strongly supported by the local society), alongside conscious and highly effective

municipal management. In addition, the presence of industrial enterprises and the results of well-planned infrastructural and industrial development projects are also mentioned as major factors of success, alongside tendering activities, a good community and the diligence of the Swabians. Uncontestably, the building of the geothermal energy system, the conscious and consistent approaches to development have borne their fruits. In the case of Bóly, (as noted above), the mayor remained in office between 1990 and 2024. One member has served 7 terms and two have served 5 terms in the representative body. The composition of the body can be regarded as stable, showing an even gender balance (*Table 8*).

Table 8: Percentage of continuity in the composition of the five most successful municipalities (along subjective dimensions), holding seats in the previous body (%)

	2006/2002	2006/2010	2010/2014	2014/2019	2019/2024
Bóly	91	50	50	83	66
Kozármisleny	73	75	38	25	63
Mohács	41	88	55	82	45
Villány	44	17	67	33	50
Alsómocsolád	60	75	75	75	25

Source: Based on *Nemzeti Választási Iroda* (n.d.)

In Kozármisleny, a new mayor was elected after one serving two terms, serving four terms and replaced by a new mayor serving two terms without being re-elected. Only one member in the body has served five terms. In Mohács, a new mayor was elected after two terms post-regime change and became a strong leader with significant powers. He served as an outstanding lobbyist for the city until his premature death in 2019. The composition of the body is characterised by stability. The current mayor has served seven terms in the assembly. In Villány, the same mayor served six consecutive terms. The representative body has undergone considerable changes. It is typical for two or three renown local winemakers to be permanent members of the assembly. In Alsómocsolád, the mayor has remained in office since 1990. Whereas the small board has periodically replaced one or two of its members, most recently, only one member has kept their seat from the previous body. Interestingly, there are only female representatives in the village besides the male mayor (*Table 9*).

Table 9: Gender composition of the five most successful municipal assemblies (along subjective dimensions) (male-female, %)

men/women	**2002**	**2006**	**2010**	**2014**	**2019**	**2024**
Bóly	82-18	73-27	66-33	50-50	50-50	50-50
Kozármisleny	92-8	87-13	62-38	62-38	62-38	62-38
Mohács	66-33	65-35	63-27	55-45	64-36	55-45
Villány	89-11	78-22	100-0	100-0	83-17	83-17
Alsómocsolád	80-20	80-20	75-25	75-25	75-25	0-100

Source: Based on *Nemzeti Választási Iroda* (n.d.)

CONCLUSIONS

The majority of the territory of Hungary is considered less developed according to NUTS2 regional classification, and most border regions are peripheral. Over the recent years, population loss has affected the majority of rural regions alongside the peripheralization of various micro-regions, and there has been a drastic decline in the population-retention capacity of settlements, endangering the cultural characteristics of the countryside. To reverse these processes, more emphasis should be placed on the valorisation of local assets, the exploration of survival strategies, and detecting potential sources of funding, whereas a more effective communication and cooperation between small settlements could significantly promote their catching-up processes. The role of an influential stakeholder with adequate innovative potential and undertaking developments that serve not only their own interests but also those of the community and more importantly, who enjoys the trust of local residents is also quintessential. All the above factors are necessary to ensure the survival of rural settlements. However, there is no universal methodology applicable to small settlements to guarantee their success; opportunities need to be tailored to local circumstances in every case. The results of our empirical survey indicate that in settlements regarded as peripheral from certain geographical or power aspects, the decisive factor of success (as well as population-retention) is the figure of the settlement leader.

The subjective factors of success are invariably connected to municipal leadership. Our analyses have shown that where confidence in a person has been stable since the change of regime, the composition of the supporting staff, i.e. the body of representatives, is also stable. Generally, the figure of the mayor is perceived by many as an essential component of settlement success (their activities, preparedness, organisation), while the role of their entourage is equally significant. Additional determining factors include social and human capital (local residents' skills, activity, their willingness and ability to cooperate) in a given municipality. If a municipality is located in a disadvantaged district or micro-region, with its population experiencing permanent and drastic decline, and public safety and living conditions deteriorating, this can undermine the stability of its representative body. In the case of such municipalities, stability is the prerogative of the more successful settlements. This particularly applies to small towns. Among the municipalities studied, stability has emerged as a basic pre-requisite for success, not only in relation to the figure of the mayor, but the local elite and members of the representative body and their supportive staff.

A key objective of our research was to identify the factors ensuring the success of settlements despite their peripheral status, as well as the conditions that allow them to mobilise their endogenous assets and local resources in favour of (at least partially) restoring their economic base. In recent times, the emphasis of development policy has shifted to complex - integrated - settlement development. The stock of settlements is characterised by high complexity; in many cases, direct intervention in the determining factors of success is not even possible. Instead, the resources determining organic growth and the direction of development should be mapped. Only then can the appropriate goals and instruments of implementation be elaborated.

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DIGITAL TRANSFORMATION IN HUMAN RESOURCE MANAGEMENT AND ITS IMPLICATION FOR YOUTH UNEMPLOYMENT IN ETHIOPIA: A LITERATURE REVIEW

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ABSTRACT

The Fourth Industrial Revolution integrates advanced technologies that significantly enhance organisational efficiency and productivity. While this transition has the potential to boost GDP, elevate productivity, and expand employment in developing economies, it may also intensify income inequality, displace workers, and exacerbate youth unemployment. This paper presents a comprehensive literature review on the digital transformation of Human Resource Management (HRM) and its implications for youth unemployment in the Ethiopian context. It explores both the positive and adverse effects of digitalisation on HRM practices and how these shape employment prospects for young people. Findings suggest that Ethiopia's digital economy holds vast untapped potential to increase export, raise incomes, and generate jobs – especially for the youth. However, key impediments to effective digitalisation include inadequate ICT infrastructure, low digital literacy, limited financial capacity, and a shortage of skilled professionals. In addition, weak institutional commitment, complex regulatory environment, and resistance to organisational change constrain further progress. To harness the benefits of digital transformation, policymakers should prioritise strategic initiatives focused on strengthening ICT infrastructure, enhancing the digital competencies of youth, and promoting retraining of workforce to ensure the successful integration of emerging technologies into Ethiopia's evolving labour landscape.
Keywords: Digital Transformation, Human Resource Management, Youth, Unemployment, Ethiopia
JEL codes : O33, J64, J21, M54

INTRODUCTION

In the 21st century, digitalisation has emerged as a profoundly transformative force, reshaping industries, organisations, and societies across the globe. As digital technologies permeate nearly every aspect of economic and social life, establishing a robust digital presence has become a strategic imperative for contemporary organisations (*Bongiorno et al.*, 2018). Human Resource Management (HRM) has not been immune to these changes. The digital revolution has driven substantial shifts in the design and delivery of HR functions, culminating in the emergence of electronic Human Resource Management (e-HRM). This model integrates digital tools into workforce management to address

contemporary challenges such as hybrid work models, virtual collaboration, and process automation (*Faraboschi et al.*, 2023). Such advancements are also instrumental in advancing international development agendas, including the United Nations Sustainable Development Goals (SDGs) *(Daniels et al.*, 2022).

Nevertheless, the pace and impact of digital transformation vary significantly across countries. While industrialised nations have largely benefited from the adoption of digital technologies, low- and middle-income countries – such as Ethiopia – continue to face structural and institutional constraints that hinder effective implementation. One of the most pressing socio-economic issues in these contexts is youth unemployment. Ethiopia's labour market is characterised by a persistent mismatch between available job opportunities and the digital skills of young job seekers.

Digital transformation may offer a pathway to reduce these disparities by fostering job creation, enhancing labour market flexibility, and aligning workforce competencies with modern economic demands. Despite the global discourse on the intersection of digitalization and labour market, existing empirical literature remains heavily concentrated on developed economies. As a result, there is limited scholarly insight into how digital transformation affects employment dynamics in an under-researched country such as Ethiopia.

This study seeks to address this research gap by examining the evolving role of digital transformation in HRM and its implications for youth unemployment in Ethiopia. The country's young population constitutes a large share of the total workforce, and addressing employment challenges is not only a matter of social equity but also a prerequisite for sustainable economic growth. By understanding how digital innovation can support human capital development, the study contributes to both national and international conversations on inclusive digital transformation.

MATERIAL AND METHODS

This study aims to synthesise existing research on the relationship between digital transformation and Human Resource Management (HRM), with a particular focus on its implications for youth unemployment in Ethiopia. An initial pool of 372 academic sources was retrieved from the Scopus database, using the search query: All („Digital Transformation" OR „HR Digitalisation") AND („Human Resource Management" OR „HRM") AND („Youth Unemployment" OR „Labour Market" OR „Employment Challenges") AND („Ethiopia" OR „Developing Countries") within the time frame of 2005 to 2025.

A multi-stage screening process was applied to ensure the relevance and quality of the dataset. In the first step, documents were filtered by publication status, reducing the count to 356 documents. Subsequent filtering by document type yielded 355 records, followed by language-based screening, which further narrowed the dataset to 354 documents.

Additional manual screening was conducted using Microsoft Excel to eliminate items with missing metadata or those unrelated to the research focus. This final step resulted in 64 studies being retained for detailed review. The selection methodology adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (*Page et al.*, 2021).

Figure 1: Systematic process for selection of documents from the database

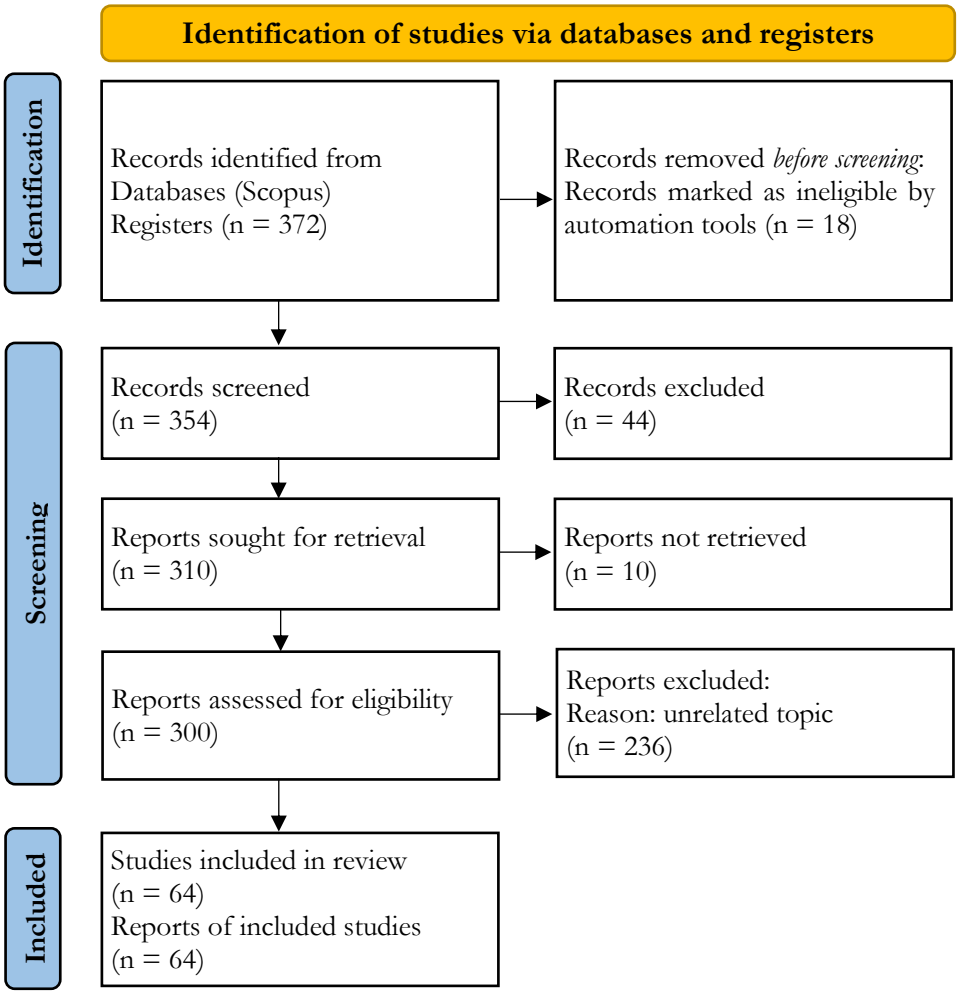

Figure 1 presents the systematic selection process undertaken to identify the most relevant documents from the initial database search. The inclusion and exclusion criteria were based on publication year, language, document type, and publication stage. Specifically, only documents published in English and classified as journal articles, books, book chapters, conference papers, or review papers were retained. In contrast, other document types and articles categorized as "in press" were excluded from the final dataset.

LITERATURE REVIEW

Digital Transformation

Digital transformation is widely recognised as a fundamental driver of structural change across industries, profoundly reshaping how organisations operate and

compete. It is generally defined as the strategic integration of digital technologies into core organisational processes. This shift encompasses a broad spectrum of technological innovations, including artificial intelligence, the Internet of Things (IoT), cloud computing, and big data analytics (*Guinan et al.*, 2019).

The primary objective of digital transformation is to optimise value creation, modernise business models, and enhance operational agility. These technologies enable firms to pursue new revenue streams, improve decision-making, and respond more effectively to market demands (*Verina & Titko*, 2019). Scholars such as *Blanka et al.* (2022) have underscored the role of the COVID-19 pandemic in accelerating digital transformation, turning it into a central component of organisational strategy in an increasingly interconnected world. This shift is particularly significant in industrial sector, where the emergence of the Industrial Internet of Things has allowed real-time data sharing and improved process synchronisation across value chains (*Ghosh et al.*, 2022). *Faraboschi et al.* (2023) conceptualise digital transformation along four primary dimensions: technological integration, value generation, organisational restructuring, and financial impact. These dimensions collectively determine the extent to which digital initiatives contribute to long-term competitiveness. Importantly, digital transformation extends beyond the mere adoption of new tools. It requires a holistic reconfiguration of business processes, including supply chain optimisation, IT architecture, and strategic reorientation (*Caputo et al.*, 2023).

Phases of Digital Transformation

The academic literature commonly distinguishes digital transformation as a multi-phase process. According to *Faraboschi et al.* (2023), the initial phase is digitization, which involves converting analogue data into digital form – enhancing storage, traceability, and computational potential (*Warner & Wäger*, 2019). The second phase, known as digitalization, refers to the broader societal and organisational changes that result from the application of digital technologies to existing processes (*Trittin-Ulbrich et al.*, 2021). This stage focuses on process automation, connectivity, and enhanced decision-making capacities. The final phase, digital transformation, represents a paradigm shift whereby advanced digital technologies are integrated holistically into every aspect of the organisation. This phase goes beyond tools and workflows; it entails a redefinition of value creation, operational models, and organisational structures (*Ulas*, 2019). Together, these stages illustrate the evolution from basic digital capability to a fully transformed, technology-driven enterprise.

Drivers of digital transformation

Various researchers have identified distinct drivers of digital transformation in the literature. For example, *Mergel et al.* (2019) categorized these drivers into external factors and internal factors. Similarly, *Kim et al.* (2023) identify internal triggers, such as declining productivity and the necessity to modernise legacy systems, alongside external motivators like shifting customer expectations and intensified global competition. *Verhoef et al.* (2021) point to digital technology proliferation, evolving consumer behaviour, and increasing digital competition as fundamental forces pushing organisations for digital transformation. *Chen et al.* (2024) groups these into

technical**,** organisational, and environmental domains, reinforcing the idea that transformation is rarely driven by a single factor. Other researchers, such as *Ferrari et al.* (2022), highlight economic and regulatory pressures, such as cost-efficiency demands and the growing need for compliance with digital governance standards. Similarly, *Mihu et al.* (2023) emphasise customer-centric innovation**,** technological advancements, and the necessity for agile organisational structures as prominent enablers of digital progress.

Digital Transformation in HRM and Key Technologies

In the domain of Human Resource Management (HRM), digital transformation has prompted significant structural and functional change. It has enabled organisations to adopt innovative approaches to talent acquisition, workforce development, and employee engagement. Consequently, there has been a surge in scholarly interest in related concepts such as digitization, digitalization, and digital disruption within HRM (*Strohmeier*, 2020). Contemporary HR professionals are increasingly expected to lead and manage digital adaptation. *Bano* (2021), emphasises that HR managers must embrace strategic, tech-enabled practices to remain relevant in a rapidly evolving labour market. Leadership plays a pivotal role in this transition. Transformational leaders foster digital culture by cultivating a sense of urgency, building strategic coalitions, and building emotional bonds with employees *(Aya Hamza et al.*, 2024). Moreover, the managers with high emotional intelligence are better in leading diverse teams in the digital age (*Garamvölgyi & Rudnák*, 2023).

Digital HRM tools support a wide range of strategic functions – from e-recruitment and e-training to digital performance management systems – thus reshaping the way organisations manage human capital (*Zhang & Chen*, 2023). These tools provide real-time access to HR platforms for internal and external stakeholders, enhancing organisational agility and decision-making (*Syarief et al.*, 2022). Digitalization also contributes to broader organisational outcomes, including resource optimisation and process efficiency (*Ronaghi*, 2023). For example, electronic performance appraisal systems improve employee effectiveness, while digital career development platforms foster proactive, extra-role behaviour (*Haque & Nishat*, 2022). Furthermore, HRM digitalization affects core organisational processes such as project tracking, leave management, and punctuality monitoring (*Al-Rwaidan et al.*, 2023).

The digital workplace, as described by *Javaid et al.* (2022), creates greater flexibility, enabling hybrid working and decentralised collaboration. These developments indicate a growing demand for employees with both technical and soft skills, with a growing emphasise on collaboration and relationship building *(Galanti et al.*, 2023).

This movement underscores the transformative role of digital technologies in reshaping HRM and organizational dynamics.

Key Technologies of Driving HRM Transformation

The digital transformation of HRM is underpinned by three core technologies: cloud computing, big data analytics, and robotic process automation (RPA). Each contributes uniquely to the evolution of HRM by enhancing scalability, transparency, and evidence-based decision-making. Cloud computing facilitates the delivery of integrated HR services by enabling remote access, real-time updates, and system-wide coordination. It

encompasses technologies such as distributed computing, parallel processing, and network storage (*Wang et al.*, 2016). Cloud-based Human Resource Information Systems (HRIS) streamline data management, reduce operational costs, and improve administrative efficiency (*Lv et al.*, 2018; *Porkodi & Raman*, 2025) These platforms support functions like employee onboarding, payroll processing, and workforce planning.

Big data analytics is a transformative tool for evidence-based strategic HR decision-making. By collecting and analysing vast amounts of data from internal workflows and external interactions, HR departments can uncover patterns, anticipate trends, and optimise resource allocation – thereby providing organizations with a competitive advantage (*George & Paul*, 2019; *Singh & El-Kassar*, 2019). Big data tools are revolutionising HRM by providing a paradigm shift in practice and fostering breakthroughs in data-driven decision-making (*Ali et al.*, 2020; *Zhu*, 2024).

Robotic Process Automation (RPA) enhances HR efficiency by automating repetitive, rules-based tasks such as employee onboarding, payroll processing and compliance management (*Balasundaram & Venkatagiri*, 2020). These digital agents emulate human interaction with software systems, allowing HR professionals to redirect their focus towards strategic, value-adding activities (*Mohamed et al.*, 2022; *Parker & Appel*, 2021). RPA adoption has been shown to reduce administrative costs by up to 50% and deliver rapid returns on investment (*Zhai et al.*, 2024). Together, these technologies elevate HRM from a transactional function to a data-driven strategic partner, aligned with broader organisational transformation goals.

DIGITAL TRANSFORMATION IN ETHIOPIAN CONTEXT

Ethiopia, with a population exceeding 131.2 million in 2024, is Africa's second most populous country after Nigeria. Ethiopia is one of the region's fastest-growing economies, with an expected 8.1% growth in FY2023/24. However, it is still one among the lowest, with a per capita gross national income of $1,020. (*World Bank GroupS*, 2025). Digital readiness – the capacity to create enabling environments and equip citizens with the tools and skills to utilise digital technologies – is increasingly recognised as a catalyst for inclusive economic growth (*Tamene & Ashenafi*, 2022). In Ethiopia, digitalization represents both an opportunity and a risk. While it has the potential to increase productivity, stimulate employment, and modernise service delivery, it also poses risks such as job displacement, increased income inequality, and a widening digital divide (*Aly*, 2022).

Although still in its early stages, digitalization in Ethiopia has already shown macroeconomic benefits. For example, a modest 10% increase in digital penetration has been associated with a 0.5% rise in GDP, and up to 0.8% growth in the service sector (*Alemayehu*, 2022). With the right policies and coordinated implementation, Ethiopia's digital economy could become a key driver of national productivity and development (*Tekleselassie*, 2021).

Ethiopia's untapped digital economy offers promising opportunities for export growth, income enhancement, and job creation, particularly for women and youth. The country aims to emulate China's digital transformation model to fast-track its own growth trajectory (*Tesfachew*, 2022). Government-led initiatives are currently underway

in various sectors. The Ministry of Innovation and Technology (MinT) has spearheaded efforts to modernise the WoredaNet government communications platform. The Ethiopian Investment Commission (EIC) has introduced online licensing services, while the Ministry of Transportation (MoT) is developing digital fleet management systems. The National Bank of Ethiopia (NBE) has launched e-payment platforms, and the Ministry of Peace (MoP) is piloting digital identification systems.

Although these programmes represent important milestones, their overall effectiveness depends on the coordinated, multi-sectoral collaboration. Without institutional alignment and sustained investment, the broader impact of these initiatives will remain limited (*Ethiopian Legal Information Portal*, 2019). Ethiopia's transition to digitalization, though still emerging, highlights its potential to drive inclusive growth and create opportunities in an increasingly digital global economy.

CHALLENGES OF DIGITAL TRANSFORMATION IN ETHIOPIA

Despite early progress, Ethiopia continues to face several challenges associated with the implementation of digital transformation across public and private sectors. These challenges are especially pronounced in areas such as healthcare, higher education, and public administration.

Empirical research identifies a wide range of constraints, summarized in *Table 1*.

Table 1: challenges of digital transformation in Ethiopia

Author/s/	Focus area	Identified challenges
Dilu et al. (2017)	HRIS implementation in health sector	- Poor logistic supply - Lack of competency - Poor commitment - Shortage of finance
Jonathan et al. (2021)	Federal government digital transformation	- Lack of cohesive IT strategy - Inadequate organizational structures - Poor communication - Weak information security awareness - Skill gaps - Lack of digital culture
W. A. Ajebo et al. (2024)	General digital transformation	- Limited financial resources - Low digital literacy - Inadequate awareness - Shortage of skilled IT professionals - Infrastructure deficits - Outdated regulations - Data privacy and cybersecurity gaps
Adamu (2024)	Higher education digitalization	- Poor internet connection - Inadequate ICT infrastructure - Lack of skilled human resources
Toma Bilate & Zou (2022)	General national digitalization	- Lack of expertise - Weak commitment

DIGITAL TRANSFORMATION AND YOUTH UNEMPLOYMENT

Youth Unemployment in Context

Youth unemployment remains a critical socio-economic challenge worldwide (*Yoon*, 2018). Globally, individuals aged 15 to 24 constitute approximately 15.5% of the population – amounting to 1.21 billion people (*United Nations*, 2020). This demographic group represents vital human capital essential for achieving sustainable development and resilient societies (*Lalitha*, 2023).

Nevertheless, young people continue to face disproportionately high unemployment rates affecting countries worldwide (*Rodin & Lore*, 2013). In 2022, the global youth unemployment rate stood at roughly 14%, meaning that over 69 million young people were actively seeking work but unable to secure employment (*International Labour Organization*, 2023). In Ethiopia, the problem is even more pronounced. The urban youth unemployment rate reached 25.3% in 2018 – significantly higher than the national average (*Berhe*, 2021). Multiple structural factors contribute to this trend, including demographic pressures, mismatches between education and labour market needs, curriculum limitations, teaching methodologies, and insufficient graduate preparedness. These are further compounded by broader economic constraints and the evolving demands of globalized labour markets (*Demissie et al.*, 2021).

Technology-Induced Change in Labour Demand

Technological advancement has substantially altered the composition of labour demand. Firms are increasingly prioritising new skill sets to remain competitive in data-driven, automated work environments. Consequently, the demand for different professional profiles in the job market has evolved to align with these changing employer requirements (*Goulart et al.*, 2022). Since the advent of the digital age, scholars have debated whether technological progress ultimately leads to net job creation or destruction. While digital transformation can improve productivity and streamline operations, it also poses a risk of displacing routine and low-skilled roles (*Abbasabadi & Soleimani*, 2021).

Positive Labour Market Impacts

The impact of digital transformation on unemployment is complex and subject to varied perspectives. While some argue that it creates job opportunities, others contend that it leads to unemployment. Some studies suggest that digitalization enhances job accessibility and promotes labour market inclusion as illustrated in *Table 2*.

As mentioned below in *Table 3*, the technological change is responsible for a large proportion of job losses in low-paid and low-skilled occupations (*Autor*, 2015; *Torosyan et al.*, 2023). The displacement of traditionally executed activities appears to be a definite outcome of digital transformation (*Strohmeier*, 2007). *Table 3* summarizes the negative effects of digital transformation on the labour market.

Table 2: Positive impacts of digital transformation on the labour market

Author/s/	Impact	Description
Bokhari & Awuni (2023)	Job opportunity access	-Enhances access to job listings, networks, and markets -Remote work
Azu et al. (2021); *Başol et al.* (2023); *Liệu et al.* (2022); *Metu et al.* (2020)	Reduce unemployment and youth unemployment	-Digital inclusion enhances employment and overall well-being -Unemployment decreases due to digital transformation trends -ICT development significantly reduces youth unemployment
Kropp & Dengler (2019), *Su et al.* (2022)	New job creation	-Due to digital transformation several new jobs will be created

Table 3: Negative impacts of digital transformation on the labour market

Author/s/	Impact	Description
Lindsay (2005), *Xia & Pei* (2021)	Digital divide	-Inequitable access to digital tools and internet leads to inequality in labour access -Inadequate digital skills and capacities
Autor (2015); *Torosyan et al.* (2023); *Zemtsov* (2020)	Job destruction	-Digital transformation displaces low-paid and low-skilled jobs -Displacement of traditionally executed activities

THE EFFECT OF DIGITAL TRANSFORMATION ON DIFFERENT AGE GROUP

Digital transformation affects different age groups in different ways. For example, while older workers often struggle with challenges due to their limited digital skills and difficulty adapting to the job market, whereas the younger generation embraces technological improvements in search of a fast career progress and freedom. These contrasting experiences emphasize that different age groups would be affected by digitalization differently. *Table 4* summarizes the impacts of digital transformation in these age groups.

Table 4: Effects of digital transformation on youth and older workers

Aspect	Youth workers	Older workers
Adaptability to change	-High adaptability due to familiarity digital tools	-Limited adaptability, less exposure to digital tools
Skill development	-Actively engage in skill development through education and training	-Lack opportunity for reskilling and upskilling
Job security	-Less vulnerability to job displacement	-Greater vulnerability to job displacement due to limited digital skills

DISCUSSION

To achieve its long-term development ambitions, Ethiopia must strategically leverage its growing youth population. With over 2 million young people entering the labour market each year, demographic pressure is intensifying. Unless addressed through systemic interventions, youth unemployment is already high and is likely to escalate. Projections suggest that the number of young people aged 15–29 will increase from 34 million in 2020 to nearly 54 million by 2050 (*Ministry of Labor and Skill*, 2023).

In this context, digital transformation offers both opportunities and challenges. The transition from traditional to technology-driven HR systems represents a profound paradigm shift in how organisations manage human capital. Globally, digitalisation is reshaping industries, streamlining administrative workflows, enhancing talent acquisition and retention, and strengthening employee engagement.

For Ethiopia, the strategic implementation of digital technologies in HRM can play a catalytic role in mitigating youth unemployment. Digital tools can improve labour market intermediation, better align education with labour demand, and expand access to job opportunities. For example, platforms for online recruitment, e-learning, and AI-based job matching can bridge information gaps between employers and job seekers, increase transparency, and support evidence-based workforce planning. These tools can create more efficient job-matching mechanisms and enable real-time labour market data analytics. This improves workforce planning and reduces frictional unemployment. Furthermore, as digital technologies increasingly operate as public goods, providing equitable access to them can promote inclusive development, provided that the necessary policy frameworks and enabling environments are in place.

However, these benefits are conditional upon addressing key structural barriers. First, digital literacy remains critically low among Ethiopia's youth, despite the increasing proliferation of mobile phones and internet access. Generational differences in digital proficiency exacerbate labour market segmentation and reduce internal organisational cohesion (Imran, 2023)

Addressing these issues requires a multidimensional response. Educational institutions must integrate digital competencies, critical thinking, and lifelong learning skills at all levels – from primary to tertiary education, including technical and vocational training (TVET) (*Sá et al.*, 2021). Targeted programmes such as internships, apprenticeships, and short-term technical courses can help unemployed and underemployed youth acquire market-relevant skills.

Within organisations, HR departments must adopt forward-looking policies that promote continuous learning, inclusive workplace practices, and knowledge transfer. Mentoring schemes between experienced and younger staff can foster intergenerational collaboration and mitigate digital skill gaps.

While digital transformation can generate employment in emerging sectors, it also poses a risk of job displacement – particularly in roles that are routine and easily automated. Clerical, retail, and low-skilled manufacturing jobs are especially vulnerable. To minimise these risks, continuous reskilling and upskilling initiatives are essential. A national workforce development strategy aligned with digital transformation objectives is needed to ensure equitable adaptation.

Ethiopia also faces deep-rooted systemic barriers, including:

- Inadequate digital infrastructure, particularly in rural areas
- A shortage of skilled IT professionals
- Weak institutional commitment and fragmented digital governance
- Regulatory gaps and outdated data protection laws
- Low public awareness and resistance to change

Addressing these constraints requires leadership at both national and sectoral levels. Investments in broadband connectivity and infrastructure must be prioritised by the government to ensure equitable access across urban and rural areas. Policy frameworks should promote regulatory coherence, institutional capacity-building, and the formal integration of digital governance mechanisms.

The private sector must also be engaged. Businesses can drive innovation, form partnerships with academic institutions, and support demand-driven skills development. International development agencies and donors should continue to offer technical assistance and funding to accelerate Ethiopia's digital agenda.

In summary, digital transformation holds considerable promise for addressing youth unemployment and building a future-ready economy. But this promise can only be fulfilled through coordinated action, inclusive planning, and long-term investment in human capital. Ethiopia can create a resilient, future-ready workforce and unlock the full benefits of its demographic dividend in the digital age by closing this digital skill gap, promoting digital inclusion, and fostering innovation.

CONCLUSIONS

This study examined the relationship between digital transformation in Human Resource Management (HRM) and youth unemployment in Ethiopia. Through a comprehensive literature review, it was found that technologies such as cloud computing, big data analytics, and robotic process automation (RPA) can significantly enhance HR processes – improving operational efficiency, optimising recruitment strategies, and enabling evidence-based performance management.

While developed economies have already embraced digital HRM, Ethiopia continues to face structural barriers that limit the full-scale adoption of such technologies. These include poor digital infrastructure, inadequate internet penetration, a shortage of digitally skilled professionals, and limited institutional readiness. Such challenges significantly constrain the ability of institutions to fully leverage digital tools for workforce development and employment creation.

Nevertheless, Ethiopia's digital economy holds untapped potential to drive employment growth and economic inclusion – especially for its youth. Realising this potential requires targeted investment in digital skills training, infrastructure development, and institutional reform. Challenges include the absence of a unified national IT strategy, fragmented institutional structures, poor interdepartmental communication, and a low level of digital literacy across key sectors.

Importantly, digitalisation is a double-edged sword: while it can foster job creation in emerging sectors, it also risks displacing workers without adequate retraining

opportunities. Thus, any digital transformation agenda must include provisions for continuous learning and inclusive adaptation.

The findings therefore underscore the need for a multi-pronged strategy. This requires substantial investment in digital infrastructure, the integration of digital literacy and skills development into education systems, organisational reforms to foster adaptability and the implementation of inclusive policy frameworks. By focusing on the Ethiopian context, this paper contributes to broader discussions on how digital innovation intersects with labour markets in developing economies. A coherent, long-term strategy that integrates education, infrastructure, and policy reform is essential for building a digitally inclusive and socially equitable future.

POLICY IMPLICATIONS

One of the principal challenges associated with digital transformation in Ethiopia is the widespread lack of digital skills. As digital technologies reshape business operations and reconfigure labour market demands, the gap between required and available competencies continues to widen.

To ensure an inclusive transition, digital literacy and ICT education should be integrated into national curricula from early education through higher education and vocational training. This must be complemented by strategic partnerships between government agencies, educational institutions, and private sector actors to ensure that skill development aligns with market realities.

Addressing the digital divide, particularly between urban and rural populations, is equally critical. Investment in broadband infrastructure is essential to expand access to affordable, high-speed internet – without which digital transformation efforts will remain inequitable and geographically concentrated.

Furthermore, a coordinated multi-stakeholder approach is needed to promote successful digital transformation. Public institutions must develop clear and coherent digital strategies, supported by updated regulatory frameworks, enhanced data protection policies, and cybersecurity protocols.

The private sector has a key role to play. Enterprises should be encouraged to invest in digital technologies and participate in reskilling initiatives. This could include the provision of digital apprenticeships, industry-specific training programmes, and collaborations with universities and TVET institutions.

Finally, international development partners should continue to support Ethiopia's digital agenda through funding, technical expertise, and platforms for policy exchange.

These collaborations can help accelerate the adoption of best practices, facilitate institutional learning, and close existing implementation gaps.

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THE ROLE OF CORPORATE ORGANIZATIONS IN BRIDGING FINANCIAL LITERACY GAPS AMONG EMPLOYEES IN AFRICAN DEVELOPING ECONOMIES: A SYSTEMATIC REVIEW

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ABSTRACT

This study systematically examines how corporate organizations can bridge gaps in employees' financial literacy in African developing regions. Guided by four research questions, the study evaluates current financial literacy levels, existing corporate financial literacy initiatives, barriers to effective implementation, and potential solutions. Using a systematic approach and the PRISMA framework, data was extracted from peer-reviewed journals, corporate documents, and grey literature. Findings indicate persistently low financial literacy among employees, with notable deficiencies across industries. The study highlights that financial education can significantly enhance financial decision- making, reduce employee stress, and contribute to economic development. Key recommendations include integrating financial literacy into corporate governance, leveraging online technological platforms, aligning financial literacy initiatives with corporate social responsibility strategies, and conducting periodic assessments to address evolving employee needs. These insights position corporate organizations as crucial agents in mitigating financial illiteracy, promoting financial stability, and preparing the workforce for informed financial decisions.
Keywords: workplace financial education, corporate governance, employee financial well-being, financial literacy initiatives, economic empowerment

INTRODUCTION

Financial literacy which is the extent of an individual's ability to use finance skills like budgeting; personal finance; investing and others is central to individual and hence financial stability. In the African developing economic systems, financial ability is still low; a factor that earmarks challenges for the economies and financial strength of individuals. More evidence comes from *Lusardi and Mitchell* (2014) which demonstrated that a paltry 25% of the sub-Saharan Africa's population could correctly respond to the questions on basic finance. This situation requires specific and strategic efforts to help people become ready to act in a financial setting by using the appropriate knowledge.

Comparing Africa's financial literacy to other regions clearly shows that the levels are low. For instance, *Singer et al.* (2015) establish that only a third of citizens in sub-Saharan Africa has basic financial literacy as compared to the OECD countries. Such a gap calls for specific financial enunciation endeavours that seek to enhance fiscal

literacy to ensure appropriate decision-making and enhanced fiscal performance. Because these challenges relate to financial literacy, corporate organizations have a special chance to teach their staff in a systematic manner.

Statement of the Problem

Financial literacy among employees in African developing economies remains a critical challenge, significantly hindering both individual empowerment and broader economic growth. Despite advancements in financial inclusion, such as the proliferation of mobile money services, a substantial proportion of individuals still lack the fundamental financial skills needed for effective money management. The *Global Findex* (2021) highlights this concern, reporting that while mobile money has enhanced access to financial products, only 41% of adults in sub-Saharan Africa demonstrate financial resilience. This deficiency is particularly evident among employees in corporate organizations, where limited financial knowledge and skills can undermine personal financial well-being and organizational economic stability. Corporate organizations have an essential role in addressing these financial literacy gaps. Research by the *World Bank* (2014) underscores that financial literacy is a cornerstone of access to formal financial services, particularly in regions where many employees participate in informal economic activities.

This study seeks to address the urgent need for a systematic evaluation of corporate strategies to enhance financial literacy among employees in African developing economies. By analysing the effectiveness of existing initiatives, identifying implementation challenges, and offering actionable recommendations, the research aims to contribute to bridging the financial literacy gap and advancing economic empowerment in the region.

Objectives of the Study

This study is guided by the following specific objectives:

1. To evaluate the current levels of financial literacy among employees working within corporate organizations in African developing economies.
2. To analyse the financial literacy programs and initiatives implemented by corporate organizations and assess their effectiveness in enhancing employees' financial knowledge and skills.
3. To identify the key challenges and barriers corporate organizations face in designing and implementing effective financial literacy programs for their employees.
4. To propose actionable recommendations for corporate organizations to improve and strengthen their financial literacy programs based on the study's

LITERATURE REVIEW

The role of corporate organizations in bridging financial literacy gaps among employees in African developing economies is increasingly recognized as a crucial factor for both individual empowerment and broader economic development. This literature review synthesizes current research on the financial literacy levels among employees, evaluates

corporate initiatives aimed at enhancing financial knowledge, identifies barriers to effective program implementation, and proposes actionable recommendations.

Current Levels of Financial Literacy in Africa

Research indicates that financial literacy levels among employees in African developing economies are alarmingly low. A systematic review highlighted that many individuals lack basic financial knowledge, which hampers their ability to make informed financial decisions (*Matewos et al.*, 2016). Financial literacy levels in Africa remain notably low as of 2024, with significant disparities across the continent. As it can see in *Table 1* too a recent survey indicates that Botswana has the highest financial literacy rate at 51%, while Somalia has the lowest at 15% (*Lusardi et al.,* 2015). Overall, sub-Saharan Africa's average financial literacy rate is about 32%, which is considerably lower than the approximately 52% found in high-income countries (*Amana*, 2025).

Table 1: Current Levels of Financial Literacy in Africa

Country/Region	Financial Literacy Rate	Source
Botswana	51%	Future Africa, 2022
Somalia	15%	Future Africa, 2022
Sub-Saharan Africa (Average)	32%	OECD iLibrary, 2023
Kenya	38%	Kenyan Wall Street, 2023
Tanzania	40%	Kenyan Wall Street, 2023
Uganda	34%	Kenyan Wall Street, 2023
High-Income Countries (Average)	52%	OECD iLibrary, 2023

Source: *OECD iLibrary* (2023).

Corporate Financial Literacy Programs in Africa

Corporate organizations across Africa have increasingly recognized the importance of enhancing employees' financial knowledge and skills through tailored financial literacy programs. These initiatives typically include workshops, seminars, and online training modules focused on topics such as budgeting, savings, investments, and retirement planning.

In South Africa, for instance, the Financial Sector Charter mandates that financial institutions allocate a portion of their profits towards consumer education initiatives. These programs are aimed at improving the financial literacy of both employees and the broader public (*International Labour Organization*, 2016). Evaluations of corporate financial literacy initiatives across Africa have yielded mixed results.

Innovative approaches that integrate technology into financial literacy programs have proven to be particularly effective. For example, Nigeria's eNaira and Kenya's M-Pesa have leveraged mobile technology to deliver financial education that is adapted to local contexts. These platforms have enhanced participation rates by making financial literacy content more accessible, particularly in regions with limited access to traditional financial institutions (*Amana & Tamunomiegbam*, 2024).

Despite these promising developments, challenges remain in the effective implementation of financial literacy programs across the continent. Cultural barriers, economic instability, and the lack of sustainable funding can hinder the success of these initiatives. Furthermore, many programs face difficulties in reaching and engaging the broader population, especially in rural and underserved areas. Continuous evaluation and adaptation of these programs are necessary to ensure they remain relevant and effective in meeting the evolving financial needs of participants (*Amana*, 2025).

In conclusion, corporate financial literacy programs across Africa play a pivotal role in enhancing economic empowerment and stability. Initiatives in countries like Rwanda, Zambia, and Kenya, along with the efforts of mobile money operators, demonstrate the diverse and innovative approaches being taken to improve financial literacy. As these programs continue to evolve and expand, they hold the potential to significantly enhance the financial capabilities of individuals, ultimately contributing to broader economic development across the continent.

Challenges and Barriers

Despite the efforts made by corporate organizations to implement financial literacy programs across Africa (*Table 2*), several challenges impede their success. A primary barrier is the lack of resources, which includes insufficient funding and inadequate educational materials necessary for effective training (*Amana*, 2025).

Moreover, cultural factors and traditional practices often shape attitudes toward financial literacy. In many communities, informal financial practices, such as savings groups and Rotating Savings and Credit Associations (ROSCAs), are prevalent. While these practices provide essential financial support, they can also create a reluctance to engage with formal financial education initiatives (*De Beckker et al.*, 2020)

Table 2: Comparative Summary of Reviewed Studies on Corporate Financial Literacy Programs in Africa

Study	Objectives	Methodology	Participant Demographics	Program Descriptions	Outcomes
Central Bank of Kenya (2024)	To assess employee financial literacy in leading corporations (Safaricom, Equity Bank).	Survey of 600 employees	Banking & telecom employees in Kenya	Corporate-sponsored literacy training, workshops	Only 38% demonstrated good financial literacy; positive correlation between training and improved knowledge
Amana & Tamunomiegbam (2024) – Ghana	To evaluate NFIDS strategy for improving literacy across sectors	Survey of 400 employees	Banking & telecom employees in Ghana	Financial inclusion/awareness campaigns	50% basic understanding; only 20% could apply effectively; cultural perceptions influenced outcomes

Krause et al. (2015) – Tanzania	To estimate impact of workplace financial training	Survey of 500 employees	Mixed industry employees	Youth entrepreneurship and corporate training	40% literacy; participation in workplace training improved knowledge
Stanbic Bank Uganda (2024)	To examine corporate-led initiatives to improve financial resilience	Survey of 450 employees	Bank and telecom workers in Uganda	Onboarding & periodic staff training	Only 34% literate; onboarding integration proposed to boost literacy
Brownhilder Ngek (2016) – South Africa	To link SME financial literacy and business outcomes	Case study and surveys	SME owners and employees	Corporate and government SME training programs	Financial literacy linked to better SME performance; emphasized long-term benefits

Theoretical Framework

To understand the ability of the corporate organizations in improving the aspect of the financial literacy among the employees in the developing economy of Africa, one may apply the multi-theoretical in one manner, which comprises of the following theories. It is essential to present this framework that combines Social Learning Theory, Behavioural Finance Theory, and Institutional Theory.

Social Learning Theory

Social Learning theory (1977) by Bandura emphasizes the way of learning from observation and interaction in social settings. This theory states that in corporate environments employees can learn about finance through watching their colleagues and take part in group learning. The organizations that can foster such a collaborative learning environment would be able to facilitate the employee's engagement and retention of financial concepts. Basically, this is an approach that is meaningful in African contexts defined by community-oriented learning (*Pierce & Bandura*, 1977).

Behavioural Finance Theory

Behavioural Finance Theory explores how psychological factors influence individuals' financial decision-making processes (*Statman*, 2019). Understanding these behavioural aspects is essential for corporate organizations aiming to implement effective financial literacy programs. Many employees may prioritize immediate economic needs over long-term financial planning due to socio-economic pressures (*De Bruijn et al.*, 2022)

MATERIALS AND METHODOLOGY

This section outlines the methodology employed for conducting a systematic review on the role of corporate organizations in enhancing financial literacy among

employees in African developing economies. The review adhered to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure rigorous and transparent reporting (*Page et al.*, 2021)

Research Design

The systematic review design was chosen to aggregate a wide range of studies related to corporate financial literacy programs targeted at employees in African economies. The goal was to assess the effectiveness of such programs and identify challenges faced by organizations in promoting financial literacy. This approach allows for a comprehensive synthesis of available evidence to inform future practices and policies (*Matewos et al.*, 2016)

Search Strategy

Multiple databases and sources were searched in a detailed way to maximize the collection of relevant studies and grey literature. The databases and sources used in this search are listed in *Table 3*.

Table 3: Search Strategy

Source Type	Details
Academic Databases	PubMed: An international multidisciplinary database devoted to public health, economics, and other related fields.
	Scopus: Database containing primary literature on economics, business, and social sciences.
	Web of Science: An archive of high impact journals across disciplines.
	JSTOR: An educational digital library of academic journals, books and sources.
Regional Repositories	African Journals Online (AJOL): A platform offering access to scholarly journals published in Africa, especially in development and economics.
	Sabinet: A South African repository of academic literature in business, finance, and development.
Grey Literature	Reports from NGOs, corporate case studies, and conference proceedings related to financial literacy initiatives in Africa.

The search included keywords „financial literacy," „corporate organizations," „employees," „African economies," „financial education," „program challenges," and „employee financial empowerment."

Inclusion and Exclusion Criteria

The studies included in this review were selected based on specific inclusion and exclusion criteria. These criteria are summarized in (*Table 4*).

Table 4: Inclusion and Exclusion.

Criteria	Inclusion	Exclusion
Study Focus	Studies on financial literacy among employees in African developing economies.	Studies outside African contexts or not focused on employee interventions.
Research Focus	Research evaluating corporate financial literacy programs targeted at employees.	Articles without employee-focused interventions.
Publication Date	Articles published between 2010 and 2024.	Articles published before 2010.
Type of Articles	Peer-reviewed articles and high- quality grey literature (reports, case studies).	Opinion pieces, editorials, and non-peer-reviewed articles.

Data Extraction

A standardized data extraction sheet was developed to systematically collect key data from the studies included in the review. The key elements extracted from each study are outlined in (*Table 5*).

Table 5: Data Extraction

Data Element	Details
Study Objectives	The primary aim of the study, such as evaluating financial literacy levels or assessing program effectiveness.
Methodology	The design and approach of the research, including data collection methods (e.g., surveys, interviews) and analysis techniques (e.g., statistical methods, thematic analysis).
Participant Demographics	Information about the participants, such as location, occupation, age, income, and education level.
Program Descriptions	Details of the corporate financial literacy programs, including topics covered (e.g., budgeting, savings), delivery methods (e.g., workshops, online modules), and any special features.
Outcomes	The impact of the programs, including changes in financial knowledge, behaviours, and skills among participants.
Limitations	Any limitations identified in the study, such as small sample size or methodological weaknesses.

Quality Assessment

The Critical Appraisal Skills Programme (CASP) checklist was used to assess the quality of the included studies (*Brice*, 2025). This checklist helps evaluate the methodological rigor of studies across key domains (*Table 6*).

Table 6: Summarizes the key areas assessed.

Assessment Area	Details
Research Objectives	Clarity of the research questions and objectives.
Study Design	Appropriateness of the research design and methodology.
Sampling and Data Collection	The validity and reliability of the sample and data collection methods.
Data Analysis	Transparency and rigor in the data analysis process.
Interpretation of Results	How well the results were interpreted and discussed in the context of the research objectives.

Each study was independently evaluated by two reviewers using the CASP checklist to ensure consistency. Any discrepancies were resolved through discussion, ensuring that only studies meeting the required standards were included.

RESULTS AND DISCUSSION

Current levels of financial literacy among employees working within corporate organizations in African developing economies.

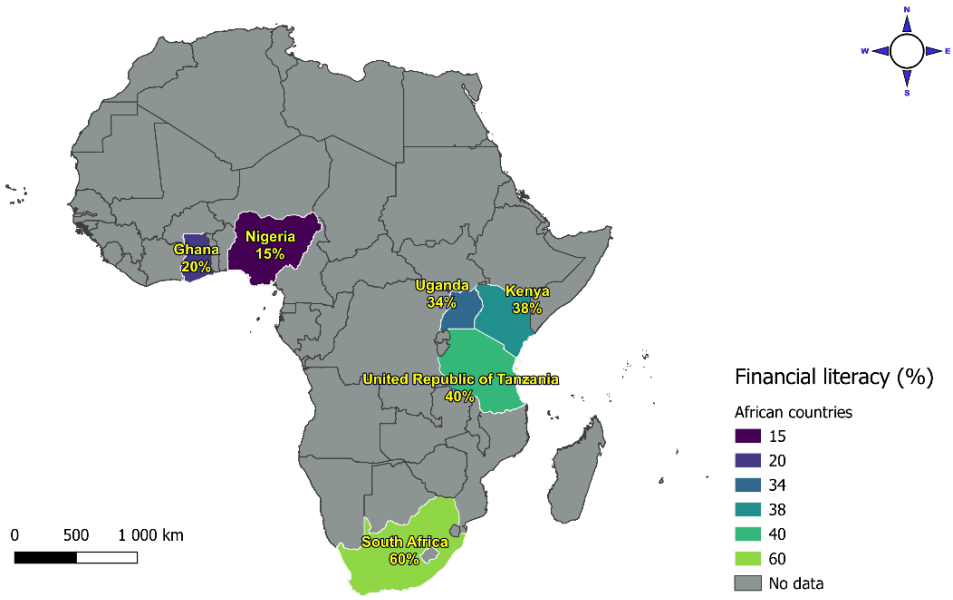
This research aimed at establishing the current levels of financial literacy in employee across different companies in various African developing economies and this shows disturbing signs of low level of financial knowledge and skills; not to mention the disparities between various organizations (*Figure 1*). In general, financial literacy remains low even higher by both individual and country, industrial sectors and employee population.

In Kenya, a survey involving 600 employees in the following companies such as Safaricom, Equity Bank among others revealed that only 38% of the respondents possessed good levels of financial literacy (*Central Bank of Kenya*, 2024).

In Ghana, the National Financial Inclusion and Development Strategy (NFIDS) aimed to improve financial literacy among employees across various sectors, including telecommunications and banking. A study involving 400 participants revealed that 50% had a basic understanding of financial products, but only 20% could apply this knowledge effectively in their personal finances (*Amana & Tamunomiegbam*, 2024). The study noted that cultural perceptions surrounding money management played a significant role in shaping financial behaviours, indicating that financial education programs need to consider local cultural contexts to be effective.

Tanzania's study involving 500 employees across various industries revealed that only 40% possessed basic financial literacy skills. However, the research showed that participation in workplace training programs was positively correlated with improved financial knowledge (*Krause et al.*, 2015). This suggests that corporate organizations have a valuable opportunity to enhance their employees' financial literacy through targeted educational programs. Finally, a study in Uganda, involving 450 employees from organizations such as MTN Uganda and Stanbic Bank, revealed that only 34% of participants were financially literate (*Stanbic Bank Uganda*, 2024).

Figure 1: Financial literacy level in different countries



Source: Based on *OECD* (2023)

The research proposed that integrating financial education into employee onboarding processes could significantly enhance financial literacy levels, offering a practical solution for improving literacy across the workforce. Overall, the review reveals a consistent pattern of low financial literacy levels among employees across several African countries, with notable variations depending on the country and sector.

The studies across these seven countries illustrate a concerning trend: despite various initiatives aimed at improving financial literacy within corporate environments, significant gaps remain. For instance: In Nigeria and Kenya, despite the presence of mobile banking solutions like M-Pesa, many employees still lack essential skills for managing personal finances.

Overall, these findings emphasize the necessity for ongoing investment in financial education programs within corporate organizations across Africa. As demonstrated by the varying percentages of literate individuals from as low as 15% in Nigeria to 60% post-training in South Africa strategies must be adapted to local contexts to ensure maximum impact on employee financial capabilities.

Financial literacy programs and initiatives implemented by corporate organizations and assess their effectiveness in enhancing employees' financial knowledge and skills. Organization within the developing economies especially the African continent has in the recent past come to realize the importance of having the employees trained on financial knowledge and how to make sound financial decisions. These are meant to combat the low financial literacy that characterizes many African nations.

In South Africa financial literacy programs have proved to be helpful especially for SMEs wannabes. *Brownhilder Ngek* (2016) pointed out that financial literacy skills are relevant to business owners as it helps them make sound financial decisions that impact on the overall development of the firms.

Finally, based on the research work carried out on the case-study, it could be ascertained that benefits of the financial literacy programs developed and operated by corporate organizations in the developing economies in Africa have enhanced the level of financial knowledge and skills possessed by the employees.

Challenges and barriers corporate organizations face in designing and implementing effective financial literacy programs for their employees.

Challenges that contribute to an ineffective implementation of appropriate financial literacy programmes in corporate organizations of developing economies include limited financial knowledge among employees, high costs associated with financial services, time constraints, psychological and cultural barriers, and the absence of standardized benchmarks. These challenges reflect deeper structural inequalities that systematically limit the impact of development programmes, a pattern also observed in regional development contexts where location-based peripheries constrain access to and effective utilization of development resources (*Horváthné Kovács et al*., 2022)

The following are some of the challenges that we have noted they include the following: The employees have poor financial literacy. *Nugroho* (2023) has shown population in developing economies including those in Africa lacks adequate financial literacy and therefore cannot effectively practice financial literacy.

In conclusion, another drawback is the absence of universally recognized indicators of the state of financial literacy, which makes it difficult for organizations monitoring the achievement of the basic goal in their targeted learned activities.

Therefore, to meet the challenges of effective financial literacy programs, policy recommendations to Nigerian corporate organizations include providing for ignorance of greatest number of employees, financial and psychological motivations to participate, culturally appropriate content that is receptive to dominant culture, and accredit program results through validated standard tests.

Actionable recommendations for corporate organizations to improve and strengthen their financial literacy programs.

New research points to the need for corporate organizations to increase efforts in their financial literacy initiatives aimed at assisting employees and bolstering organizational financial decision-making. The evidence highlights several key areas for improvement: proof that financial education and financial literacy training programs should be developed further.

Toth et al. (2022) came up with research in 2022 stated that there is a huge gap of financial literacy in the corporate world especially within the SMEs where the lack of financial know-how brings down every decision-making process and financial returns.

It also seems that the inclusion of financial literacy within CSR also generates beneficial results. According to *Singh et al.* (2021), there is a need for better alignment with CSR strategies since offering financial education empowers employees while at

the same time donating financial literacy to other people in the community. Technology has also played a critical role in nowadays financial literacy programs as well. The outbreak of COVID-19 has caused increased use of technology in education, and employees can now access financial education easily.

While the reviewed studies consistently confirm low levels of financial literacy among employees, notable variations exist across countries and program designs. For example, Kenya and Ghana demonstrate relatively higher awareness rates but weak application of knowledge, whereas South Africa's SME-focused initiatives reveal stronger links between financial training and performance outcomes. This suggests that while awareness campaigns are important, deeper, skills-oriented training yields more sustainable results.

There are also inconsistencies in reported outcomes. Some studies (e.g., *Krause et al.*, 2015) found strong correlations between corporate training and improved literacy, while others (*Amana & Tamunomiegbam*, 2024) noted that cultural perceptions significantly undermined knowledge application. This highlights the gap between theoretical knowledge and practical behavior change a gap that corporate programs must deliberately address through behavioral finance approaches.

Finally, across the literature, a recurring gap is the absence of standardized measurement frameworks. Without clear, comparable benchmarks, it is difficult to evaluate long-term impacts or compare across regions. This underscores the urgency of adopting international indicators (OECD/INFE, Global Findex) within African corporate contexts. From the author's perspective, programs that integrate CSR commitments with mobile-based delivery and standardized monitoring hold the greatest potential for scalability and sustainability.

CONCLUSION

Financial literacy continues to be a fundamental driver of employee well-being and organizational stability in African developing economies. This systematic review demonstrates that while initiatives exist across various countries, literacy levels among employees remain consistently low, averaging between 30–40% in most corporate contexts. The findings carry several implications for corporate organizations, policymakers, and stakeholders.

Best Practices and Effective Strategies: The most promising approaches include (1) embedding financial education in employee onboarding processes, (2) leveraging mobile technologies such as M-Pesa and eNaira to deliver accessible training, (3) aligning financial literacy initiatives with corporate social responsibility (CSR) frameworks, and (4) adopting blended delivery models that combine workshops, seminars, and digital learning platforms. These strategies not only increase reach but also ensure contextual adaptation to African settings.

Key Characteristics of Successful Programs: Effective programs share common features such as cultural sensitivity (adapting to local financial practices like savings groups and ROSCAs), sustainability (ensuring long-term funding and institutional support), periodic evaluation, and inclusivity (covering employees across all levels, not just management). Furthermore, integrating psychosocial and behavioral finance insights enhances engagement and improves application of knowledge.

Recognized Indicators of Financial Literacy: The review highlights the importance of standardized measures to track progress. Widely used benchmarks include the OECD/INFE survey indicators (budgeting, saving, borrowing, investing), Global Findex indicators (financial resilience, access to credit, retirement planning), and corporate-level employee well-being indices. Adoption of these metrics enables comparability across contexts and provides reliable monitoring tools.

Actionable Recommendations: Corporate organizations in Africa are encouraged to (1) institutionalize financial literacy as part of governance and HR practices, (2) provide incentives both financial and non-financial for employees to engage in training, (3) collaborate with governments, NGOs, and financial institutions to co-design impactful programs, and (4) regularly measure and publish results using internationally recognized indicators. By embedding financial education into organizational culture and CSR commitments, companies can significantly enhance employee financial resilience while contributing to economic empowerment and long-term growth.

Overall, the process of addressing the issue of financial literacy disparities should be a multi-pronged, context-oriented, and long-term endeavor. It is the special position of corporate organizations to lead this change, so that employees are not only financially prepared but also able participants in economic development.

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IMPACT OF AGRO-PROCESSING AMONG SMALL-SCALE FARMERS IN SUB-SAHARAN AFRICA: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

The potential of agro-processing among farmers in Sub-Saharan Africa (SSA) is immeasurable. Its effects range from the improvement of livelihoods to stimulating commercial agriculture. This research aimed to examine the impact of agro-processing among rural smallholder farmers in SSA, identifying specific themes based on regional influence, contemporary trends, technology and innovation, research methodologies, and existing gaps. This study is based on a Systematic Literature Review of 20 articles selected from a pool of 93 scientific documents focused on agro-processing and its impact on farmers, especially smallholder farmers in rural SSA. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodology was applied to select articles from the Web of Science database. The findings showed that in 50% of the studies reviewed, the income effect was the most significant factor, followed by market effects with varying degrees of impact, farmer groups in the form of cooperatives, and profitability as an indicator of price-driven value enhancement, all of which were prominent among smallholder farmers and along the value chains. Agribusiness and agro-processing development also benefit from complementary factors, such as technological innovation like the use of nanotechnology in the agri-food industry, training, extension services, and information sharing that directly influence product quality, shelf-life extension, food safety and security, postharvest management, and biofortification for nutritional improvement in food products. Emerging trends in commercialization, farmers' welfare, and policy reforms highlight the need for sustainable value chain activities. The impact of agro-processing spreads along the value chain stakeholders, underscoring the need for formal systems and solid market integration. Future research should be conducted on livestock products targeting individual countries in the region based on empirical analysis using mixed methods.

Keywords: agribusiness, smallholder farmers, income, value-addition, sustainable
JEL Code: Q13, Q18

INTRODUCTION

Subsistence operations dominate food systems in Sub-Saharan Africa (SSA), marked by low productivity, smallholder farmers, short supply value chains with limited agri-food processing, and minimal use of quality agricultural inputs *(Augustin & Cole,* 2022). The SSA region earns limited income from agriculture due to inadequate use of modern technology, low yields, and low-income levels, hindering the timely

attainment of United Nations Sustainable Development Goals (especially SDG 1, SDG 2, and SDG 8). SDG 1 aims to eradicate poverty through social protection, improved living standards above 1.90 dollars per day, and equitable access to economic resources, finance, and technology. SDG 2 focuses on ending global hunger through sustainable farming, eradicating malnutrition, increasing agricultural productivity, and improving nutrition and food security. SDG 8 promotes decent work and sustainable economic growth through innovation, job creation, enterprise development, and entrepreneurship in a safe environment (*Pawlak & Kołodziejczak,* 2020; *AfDB*, 2016). The region is experiencing rapid urbanization, leading to increased demand for industrialized processed agri-food products, which stimulates importation instead of local procurement (*Gutu,* 2023). Rural agro-processing has been recognized by the Food and Agriculture Organization (FAO) of the United Nations (UN) as a way to address food insecurity in SSA. The advantages of smallholder agro-processing aid in stabilizing food prices and creating employment among locals and value chain actors as a source of income in activities ranging from packaging, storage, branding, marketing, and distribution (*UNCTAD*, 2017). This research aims to determine the significance of agro-processing among smallholder farmers in SSA and the research methodologies used on related topics through a Systematic Literature Review method. Therefore, this study aims to answer the following research questions:

1. How does agro-processing impact smallholder farmers in Sub-Saharan Africa?
2. What research methodologies have been used by other authors on relevant topics?

MATERIALS AND METHODS

Preferred Reporting Items for Reviews and Meta-Analyses

The study used relevant scientific articles from the Web of Science database (WoS). Web of Science is one of the leading databases for scientific articles from leading publishers and is widely used in top-tier systematic review journals (*Christofi et al.,* 2021). The WoS database was preferred over SCOPUS as it had longer historical data. Most of the SCOPUS data were duplicates of those from WoS. The WoS initial search yielded 90 articles from 1995 to 2023, while SCOPUS had 61 documents from 2005 to 2023 for SSA countries, based on English language publications, and the specified search words and phrases. For the analysis of current trends and themes, the articles were restricted to the period 2017 to 2023. The study followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines due to its robustness in guiding researchers to gather information from various databases within the established protocol and guidelines, thus eliminating bias in their research work (*Harris et al.,* 2014; *Rethlefsen et al.,* 2021). *Miranda et al.* (2023), *Borda et al.* (2023), and *Stewart et al.* (2023), are some of the studies that used fewer than 100 documents for their analyses using the Systematic Literature Review methodology. This method is recognized for its strength in answering predefined research questions and providing comprehensive results. This study followed the latest PRISMA flow model for clarity and accurate reviews based on identification, screening, and inclusion criteria using a 27-item evidence-based checklist for

reporting (*Page et al.,* 2021). This process is straightforward and user-friendly, as illustrated in *Figure 1*.

Article Identification

Following PRISMA guidelines, the first step was to develop search criteria to strategically identify relevant research articles from the Web of Science database. Web of Science was chosen because more high-quality articles were found during a preliminary database search compared to SCOPUS. The database contained reliable articles specific to the topic and aligned with the search keywords, making the sample size sufficient to carry out the study (*Phethean et al.,* 2016*; Gusenbauer & Haddaway,* 2020). The search strings were constructed from the TS (topic – comprising the titles, abstracts, and keywords) using the advanced search option of WoS. (*Aguinis & Glavas,* 2012; *Xiao & Nicholson*, 2013; *Pisani et al.,* 2017). The Boolean 'AND' combined the study sector keywords, entry and exit level opportunities, and the underlying factors while 'OR' was used to broaden the search by including related terms and synonyms (*Pranckutė,* 2021). The first set of keywords depicted the effect and included words like („impact" OR „benefit" OR „advantages" OR „disadvantages" OR „merits" OR „demerits" OR „influence" OR „effects"). The second set of words focused on the activity and included words such as („crop processing" OR „livestock processing" OR „agricultural processing" OR „agricultural product transformation" OR „agricultural product value addition" OR „value-addition"). The last set of keywords was related to the target group and included words such as („farmers" OR „small-scale farmers" OR „smallholder farmers" OR „rural farmers").

Article Screening

The identified articles from the Web of Science database were subjected to a screening process based on the publication year (2017-2023), source type (journal), document type (articles and review articles), and language (English). The publication year was relevant to ensure coverage of all calendar years within the specified period. The first search yielded 93 publications. Upon refining articles published between 2017 and 2023, 74 documents appeared.

Inclusion and Exclusion

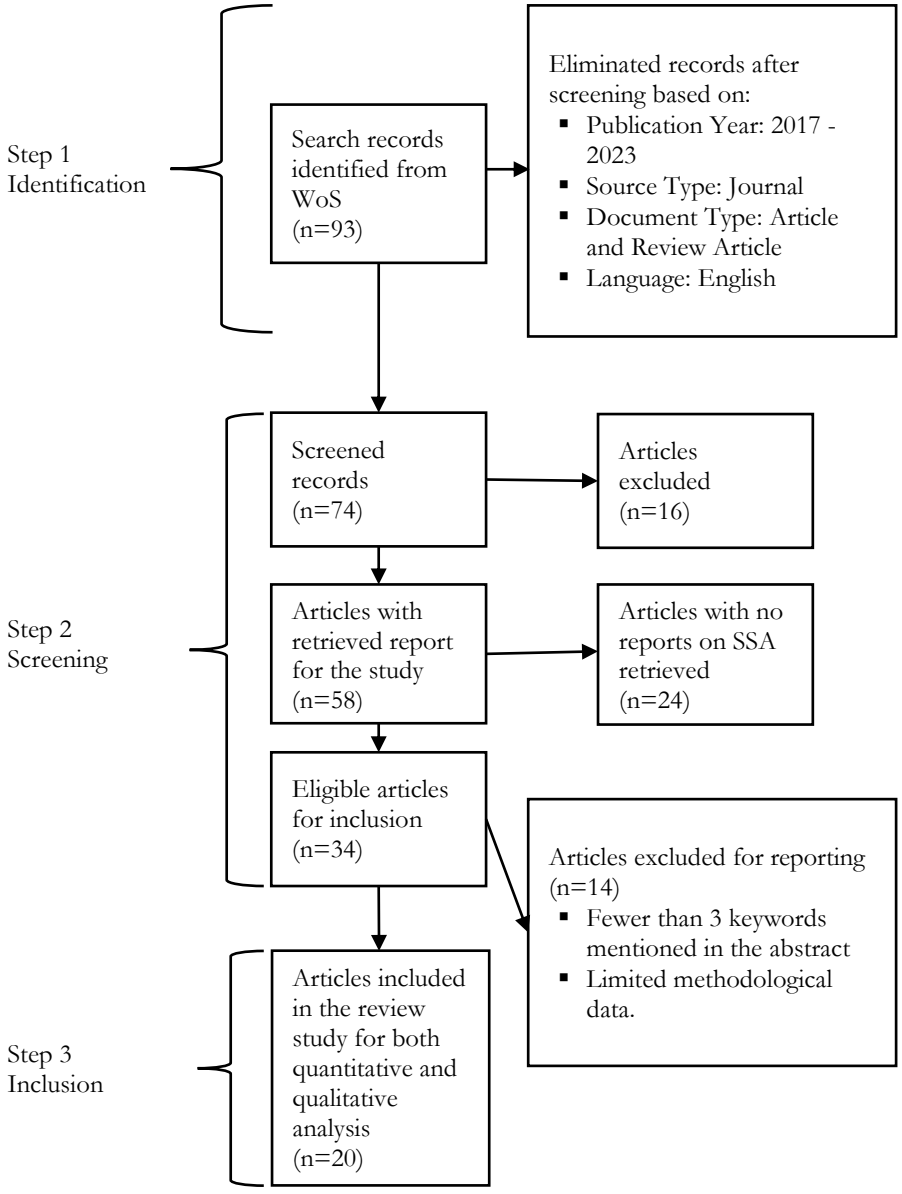
The 74 documents retained from article screening were subjected to a thorough review, excluding 16 articles with irrelevant titles and limited information in the abstracts. Further assessment of the retained 58 papers led to the exclusion of 24 articles due to limited information about the countries of interest in SSA. The remaining 34 documents were narrowed down to 20 articles after excluding 14 papers with limited methodological details. The final 20 articles were included for the study after careful and thorough reassessment.

Data Analysis

The data analysis was conducted using the retrieved documents' WoS metadata details, which included their publication year and source of the journal, and identified

the effects of agro-processing. Microsoft Excel was used to summarize data from 20 documents and systematically capture the potential effects of agro-processing on rural farmers. This study was restricted to scientific journals published between 2017 and 2023. The articles were organized in columns according to the cited references, highlighted impact, and identified broad themes for further analysis.

Figure 1: PRISMA Flowchart



Source: Based on *Page et al.* (2021)

RESULTS AND DISCUSSION

The study is based on a qualitative inquiry focusing on journals retrieved from the Web of Science, which was selected for its high-quality scientific research papers. The study focused on publications conducted from 2017 to 2023 that have an identifiable influence on agro-processing among smallholder farmers.

Descriptive Analysis

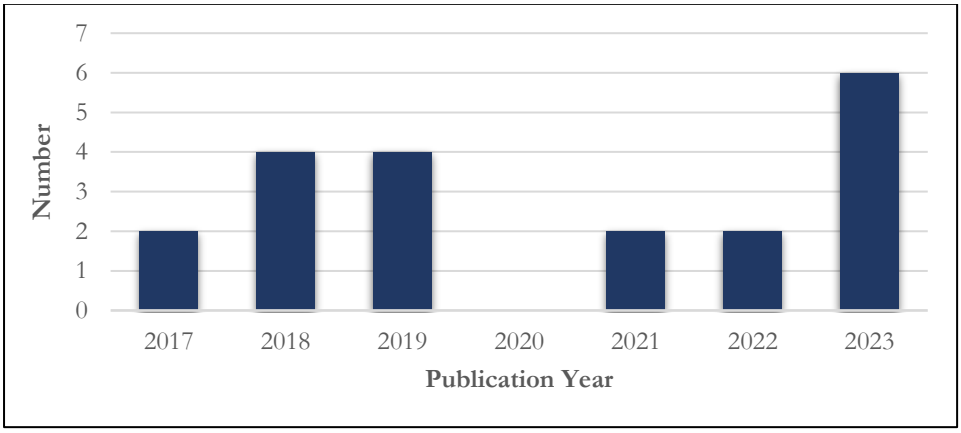
This study included 20 articles published between 2017 and 2023. The trend shows an increasing interest in agro-processing research, especially its impact on farmers. Areas of focus on the descriptive analysis included the research methodologies, journal quality, publication distribution by year, country, value chain based on product and service, and possible contemporary trends in agro-processing activities.

Research Trends

This section presents the graphical overview of the research trends from *Figure 2 to Figure 5B* of the analysed articles.

Figure 2 depicts the trends in agro-processing publications since 2017. There was a steady rise from 2017 to 2019, but a significant drop occurred in 2020, likely due to the COVID-19 pandemic. During this time, researchers shifted their focus to pandemic-related topics, including healthcare management, economic disruptions, and food supply chain issues, particularly in African nations affected by the agricultural crisis. From 2021 to 2022, publication rates remained moderate, but in 2023, interest in agro-processing surged once again.

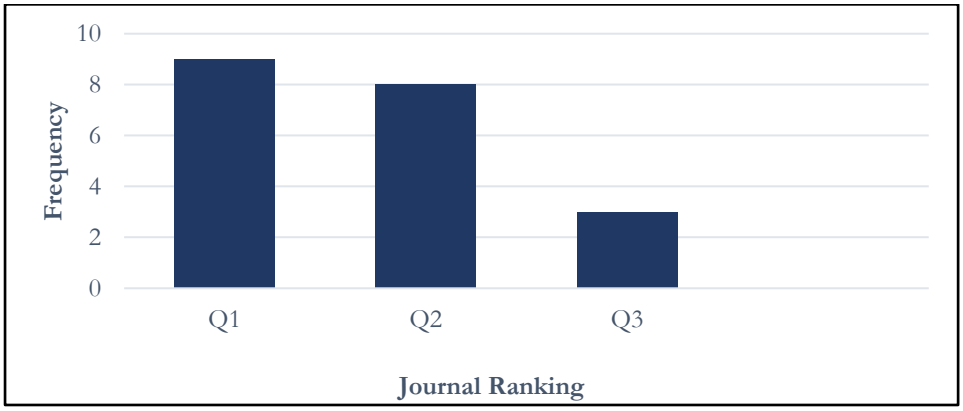
Figure 2: Number of Publications per Year



The *Figure 3* illustrates the distribution of journal quality according to Scimago Journal Rank (SJR) categories. The majority of the reviewed publications are found in Q1 and Q2 journals, reflecting a high standard of scientific research. Only three papers were published in Q3-ranked journals, reinforcing the credibility and

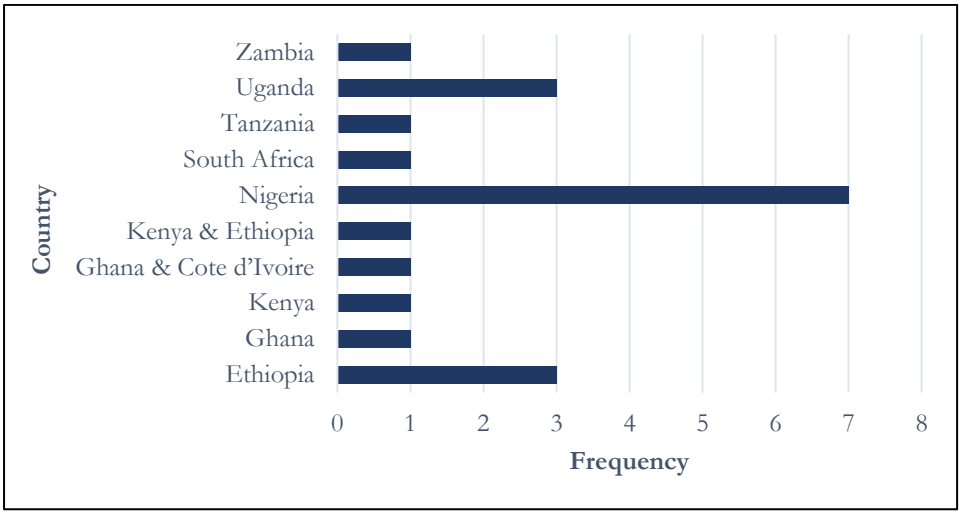
relevance of the chosen literature. This underscores the robust academic foundation that supports the study's findings.

Figure 3: Quality of Journals and Ranking



The *Figure 4* illustrates the distribution of agro-processing publications by country. Most studies originated from Nigeria, followed by Ethiopia and Uganda, while the RSA, Kenya, Ghana, Tanzania, and Zambia contributed fewer papers. This regional variation not only highlights differences in research capacity and investment but also reflects the structural characteristics of each country's agriculture. Nigeria and Ethiopia, with their diverse and commercially oriented agricultural sectors, regard value addition and agro-processing as vital to their agrarian economies. Conversely, countries with agriculture primarily focused on basic production tend to conduct less research on agro-processing activities.

Figure 4: Distribution of Articles by Country

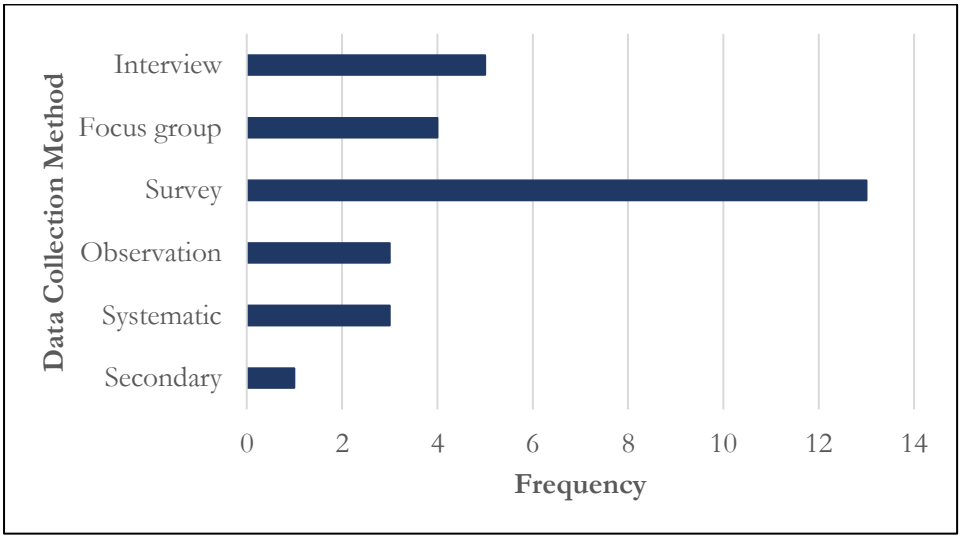


Data Collection Methodologies

Various data collection tools and methods were applied in the reviewed scientific articles. Some studies used single tools, whereas others used mixed methods. Most studies conducted structured and semi-structured surveys for data collection. The survey was used in eight articles, followed by interviews in 5 articles; 4 used focus group discussion (FGD), 3 studies used observation, and a systematic review was used in 3 studies. Lastly, secondary data modelling was done in one paper. Overall, as shown in *Figure 5A* and *Figure 5B*, most studies used a mix of data validation and reliability methodologies.

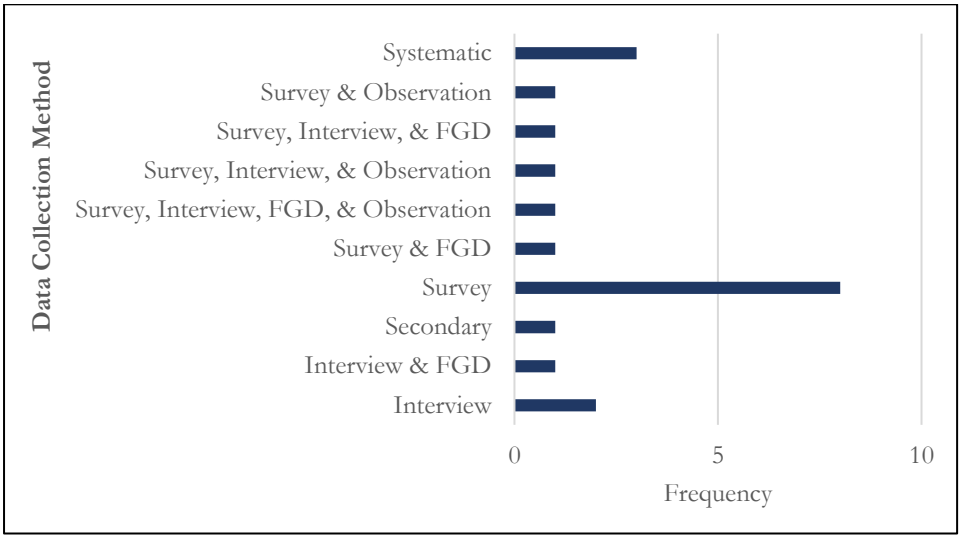
The *Figure 5A* illustrates how often different data collection methods were used in the reviewed studies. The most frequently employed methods were structured and semi-structured surveys, followed by interviews, focus group discussions, observations, and systematic reviews. This range of data collection techniques enhances the credibility of the findings by promoting data richness and methodological triangulation. Such diversity in methodology strengthens the reliability of the results.

Figure 5A: Frequency of Data Collection Method



The *Figure 5B* offers another perspective on the use of data collection methods in publications. It emphasizes that several studies utilized mixed-methods approaches, combining qualitative and quantitative techniques. This integration enhances the reliability and validity of research findings by providing a comprehensive understanding of the impact of agro-processing. Mixed methodologies also enable a deeper exploration of the complex socio-economic dynamics affecting smallholder farmers.

Figure 5B: Frequency of Data Collection Method



Thematic Analysis

The leading themes captured from the reviewed articles, focusing on the impact of agro-processing on smallholder farmers, include increased income due to value addition and improved product pricing. Value creation in agro-processed products cannot exist independently without considering markets (*Apata et al.,* 2018; *Ashiagbor et al.,* 2019; *Maduka et al.,* 2019; *Fadiji et al.,* 2022; *Kyomugisha et al.,* 2018; *Olajide et al.,* 2021; *Onuekwusi et al.,* 2017; *Tamru & Minten,* 2023). One of the primary benefits that agro-processors realize is access to premium markets resulting from the work of dedicated value chain actors driving sustainable linkages (*Bwalya & Chenjelani*, 2023; *Cheyo et al.,* 2024; *Siankwilimba et al.,* 2023; *Tamru & Minten*, 2023; *Teshale et al.,* 2017; *Wosene & Gobie*, 2022). Access to sustainable markets should be based on information sharing, through local radio or extension services during crop production to meet the required consumer tastes and preferences (*Adeyemo & Okoruwa*, 2018; *Ayetigbo et al.,* 2018; *Juma Okello et al.,* 2018; *Olajide et al.,* 2021). The continuity of sustainability depends on agricultural productivity, which determines the level and mode of agro-processing integration activities along the value chains (*Aboah et al.,* 2021; *Adeyemo & Okoruwa*, 2018). Postharvest management ensures that the quality and safety of agri-food products for consumers and smallholder farmers is achieved, and reduces wastage (*Aboah et al.,* 2021; *Adeyemo & Okoruwa*, 2018; *Aluko et al.*, 2023).

There is an emerging and growing trend in agricultural production linked to agro-processing. The rise of socioeconomic empowerment among smallholder farmers has led to the formation of cooperatives for producers to gain fair prices for their products, secure consistent buyers, and focus on local traders (*Aluko et al.,* 2023; *Cheyo et al.,* 2024; *Onuekwusi et al.,* 2017; *Tamru & Minten*, 2023). Product quality, food safety, longer shelf life, and innovation are vital to agro-processing (*Ayetigbo et al.,* 2018; *Juma Okello et al.,* 2018; *Alalade et al.,* 2019; *Olajide et al.,* 2021). The range of innovation can be as basic as the use of solar dryers to more sophisticated approaches, such as biofortification and the use of nanotechnology to improve product nutritional value and extend shelf life,

respectively (*Kumi et al.,* 2023; *Maduka et al.,* 2019; *Ayetigbo et al.,* 2018; *Juma Okello et al.,* 2018). As part of agricultural commercialization, agro-processing has provided its participants with greater profitability by supporting sustainability initiatives among small-scale rural farmers (*Aboah et al.,* 2021; *Teshale et al.,* 2017; *Wosene & Gobie*, 2022).

To support these initiatives, training and capacity building for rural farming households seem to be gaining traction among development partners, local communities, and peer farmers. Gaining more knowledge in agribusiness has stimulated the need for formal businesses, making the adoption of enterprise registration a priority among smallholder farmers (*Adeyemo & Okoruwa,* 2018; *Bwalya & Chenjelani*, 2023; *Olajide et al.,* 2021). Legal operations attract serious value chain actors in premium markets, including those involved in bulk logistics, established traders, and individuals willing to work directly with producers engaged in agro-processing (*Alalade et al.,* 2019).

CONCLUSION

Value addition through agro-processing improves the quality of agribusiness services and products. Appropriate technologies enhance productivity, improve rural agricultural production systems, and promote peer cooperation at the grassroots village level. Smallholder farmers stand to benefit from agro-processing along the agricultural value chains and at various levels of their production activities. The direct effects range from improved household livelihoods with enhanced incomes and employment opportunities, to better nutrition and food security due to increased productivity and postharvest handling, limiting food loss. Indirect impacts include information sharing crucial for product standardization, market linkages, and gaining better value for their products from off-takers and other actors along their specific productive value chain systems. The coordination of value chain participants leads to strategic alliances that unlock systemic bottlenecks that hinder the attainment of sustainable farming such as silo operations among village farmers. Authorities in SSA should formulate legislation and policies that can organize country and locally specific value chains to create cottage industries in rural areas and link them to regional and international markets. Most studies were based on crops (cassava, potato, cocoa, cashew, and maize) and poultry, with no mention of livestock, which could offer a broader view for advancing diversified value chains examination. Systematic literature review is limited in scope; hence, there is a need for quality peer-reviewed research, based on primary data, for proper policy and economic intervention in SSA. Future research should be conducted on specific agro-products with a holistic value chain analysis.

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Book Review on: 'Internationalisation of Human Resource Management: Focus on Central and Eastern Europe'

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Review

The book *"Internationalization of Human Resource Management: Focus on Central and Eastern Europe"* by József Poór, Allen D. Engle, Jana Blstakova, Ph.D and Zuzana Joniakova is a comprehensive monograph that addresses the transformation of HRM in a region that has undergone significant economic and political changes since the 1990s. The book addresses unique challenges and opportunities faced by corporations in post-socialist countries as they adapt to globalization and EU integration. It builds on the CRANET (Cranfield Network on International HRM) research, ensuring theoretical robustness and support from empirical research conducted by reputable institutions.

This book comprises 354 pages and is divided into three key sections – major impacts on internationalization on HRM, international aspects in different IHRM functions, and qualitative research results as case studies –, and presents 17 chapters with a concluding part. It ends with a bibliography and glossary.

The book is composed of three sections that systematically grouped the International HRM (IHRM) aspects into 17 chapters.

The first section, Chapters 1 to 3, contextualizes the key theme of how globalization and regional integration have influenced labour market and HR strategies in MNCs. It discusses the effects of foreign investment on the region, evolving HRM models, and the implications of cultural diversity and labour market. It explores the aspects of connectivity among HR strategy, globalization and regional intervention. Globalization has always shaped multinational corporations (MNCs) in designing, expanding, managing interconnected markets, such as those in Central and Eastern Europe. This affects HR strategy in areas such as standardization vs. localization, talent mobility, cultural diversity management, the effects of foreign investment on the region, and labor market implications.

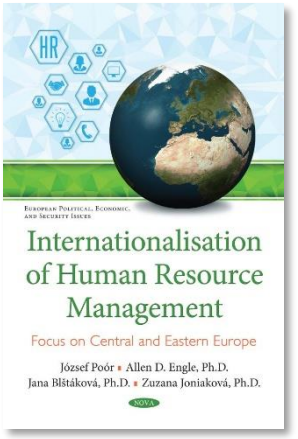
The second section, chapters 4 to 10, examines how specific HR functions such as recruitment, training, performance management, and talent management are affected by the internationalization process. The content explores the challenges of aligning global HR strategies with local practices, a common dilemma faced by MNCs operating in transitional economies. Here, the authors aim to successfully showcase the dilemmas, potentials, and challenges regarding different aspects, like international employer branding versus local talent realties, international performance metrics

versus local norms, the need for cross cultural training, retaining and priotizing local talents, and achieving global consistency while adapting to local contexts.

The final section, covering chapters 11 to 17, presents qualitative research results through case studies developed by corporations in collaboration with HR experts and scholars from both within and outside Eastern Europe, adding an applied research dimension to the text. These real-world examples show how corporations adopted HR strategies and theories into reality in CEE context. This particular section explains more specific cases of unique HR landscape in eastern and central European contexts. Here, key HR functions are analyzed through a few case studies, translating the findings into HR frameworks and guiding the process of transition from insight to impact.

The book *Internationalization of Human Resource Management* by József Poór and co-authors offers an in-depth analysis of HRM practices in the unique context of central and Eastern Europe (CEE). One of its key strengths is its focus on a detailed examination of the CEE region, which fills a significant gap in HRM literature by thoroughly examining the context. Another strength of this book is its combination of theoretical insights and empirical research to analyze the impacts of internationalization on HRM strategies and practices in multinational corporations within that particular region, enhancing the practical implications of discussed theories. With contributions from the CRANET network, the book has a strong empirical foundation, making it a credible source for understanding the HRM landscape in CEE. The book stands out with its interdisciplinary approach, highlighting how HR interacts with fields like economics, political science, and organizational behaviour, making it a well-rounded academic resource. However, its highly academic tone may limit accessibility for general readers or HR practitioners without a background in HR theory. While its regional specificity is a strength, it may also reduce its universal applicability to other emerging markets with different economic and cultural contexts.

This book is a pioneering work that provides valuable insights into the evolving landscape of HRM in a region undergoing rapid change and integration into the global economy. It is a must-read for HR professionals, business leaders, and academics seeking a deeper understanding of HRM in CEE. However, its regional specificity and specific case studies may limit their relevance and appeal to readers outside the region, reducing their broader applicability. Overall, this book serves as a valuable resource by seamlessly blending theoretical frameworks with practical applications, offering a nuanced view of how global HRM strategies are adapted to the unique socio-economic context of Central and Eastern Europe.



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