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Economy: strategy and practice is a double-blind peer-reviewed journal dedicated to publishing high-quality articles on economics, economic development, strategic policy and practical solutions. The three words in the title of the journal “economics”, “strategy” and “practice” are key to the journal’s vision. The journal provides an international platform for interdisciplinary research that integrates economic theory, policy analysis, and practical applications. It seeks to contribute to global academic discourse by addressing contemporary challenges related to sustainable development, digital transformation, and socio-economic resilience. The journal aims to advance theoretical and empirical research and to promote evidence-based policy analysis and practical solutions in the context of economic development at national, regional, and global levels.

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CONTENTS

ECONOMIC GROWTH AND SUSTAINABLE DEVELOPMENT

Ben Dalla L.O.F., Jetlaweib S.S., Karal Ö., EL-sseid M., Medeni T. D.

Informal Economy Dynamics in Central Africa and the Mediterranean: A Machine Learning Approach 6

Khuanysh L., Dauletkhanova Zh., Mizambekova Zh., Baikenova D.

Assessment of Carbon Transition Risks in Kazakhstan's Industrial Economy 23

MANAGEMENT AND MARKETING

Lan D. H., Ly T. H., Sang L. M., Hung N. T.

Brand Perception, Origin Confusion and Local Brand Loyalty in Merged Provinces of Vietnam 40

Yang H., Park S.

Value-Driven Consumer Behavior in the Art Retail Market: A Behavioral Economics Approach 55

Karacsony P., Huszka P.

Technological Human Capital and Organizational Commitment: Evidence from Hungarian Employees 70

REGIONAL ECONOMY

Kosukhina E.Yu., Goleva O. I.

Competitiveness and Place Branding: A Systematic Review and Comparative Analysis 85

Kaliyeva S., Sadykova I., Turdalina S., Seisenbayeva S.

Migration Attractiveness of Kazakhstan: The Role of Real Income and Regional Disparities 101

Khassanov A.B.

Determinants of Wage Differentiation in Kazakhstan: Interregional and Sectoral Analysis 117

SOCIAL POLICY AND QUALITY OF LIFE

Choi C.

Socio-Economic Inequality and Differences in Life Expectancy 136

Kerimbayev A. R., Belianin A. V.

Socio-Economic Aspects of Public Willingness to Participate in Pharmaceutical Insurance in Kazakhstan 151

МАЗМҰНЫ

ЭКОНОМИКАЛЫҚ ӨСУ ЖӘНЕ ТҰРАҚТЫ ДАМУ	
<i>Бен Далла Л. О. Ф., Джетлавей С. С., Карал О., Эль-Ссеид М., Медени Т. Д.</i>	
Орталық Африкадағы және Жерорта теңізіндегі бейресми экономика: машиналық оқытуға негізделген талдау	6
<i>Хуаныш Л., Даулетханова Ж.Д., Мизамбекова Ж. К., Байкенова Д.Х.</i>	
Қазақстанның өнеркәсіптік экономикасындағы көміртекті ауысу тәуекелдерін бағалау	23
МЕНЕДЖМЕНТ ЖӘНЕ МАРКЕТИНГ	
<i>Лан Д.Х., Ли Т.Х., Санг Л.М., Хунг Н.Т.</i>	
Брендті қабылдау, шығу тегінің белгісіздігі және Вьетнамның Біріккен провинцияларындағы жергілікті брендке адалдық	40
<i>Янг Х., Парк С.</i>	
Өнер нарығындағы құндылыққа бағытталған тұтынушы мінез-құлқы: мінез-құлық экономикалық көзқарас	55
<i>Карачони П., Хузка П.</i>	
Технологиялық адами капитал және ұйымдастырушылық міндеттеме: Венгрия жұмысшылары туралы мәліметтер	70
ӨҢІРЛІК ЭКОНОМИКА	
<i>Косухина Е.Ю., Голева О.И.</i>	
Бәсекеге қабілеттілік және орынды брендтеу: жүйелі шолу және салыстырмалы талдау	85
<i>Калиева С., Садыков И., Турдалина Ш., Сейсенбаева С.</i>	
Қазақстанның көші-қон тартымдылығы: нақты кірістер мен өңірлік айырмашылықтардың рөлі	101
<i>Хасанов А.Б.</i>	
Қазақстандағы жалақыны саралау детерминанттары: өңіраралық және салалық талдау	117
ӘЛЕУМЕТТІК САЯСАТ ЖӘНЕ ӨМІР САПАСЫ	
<i>Чой С.</i>	
Әлеуметтік-экономикалық теңсіздік және өмір сүру ұзақтығының айырмашылығы	136
<i>Керимбаев А.Р., Белянин А.В.</i>	
Қазақстанда халықтың дәрілік сақтандыруға дайындығының әлеуметтік-экономикалық аспектілері	151

СОДЕРЖАНИЕ

ЭКОНОМИЧЕСКИЙ РОСТ И УСТОЙЧИВОЕ РАЗВИТИЕ	
<i>Бен Далла Л. О. Ф., Джетлавей С. С., Карал О., Эль-Ссеид М., Медени Т. Д.</i>	
Неформальная экономика в Центральной Африке и Средиземноморье: анализ на основе машинного обучения	6
<i>Хуаньши Л., Даулетханова Ж.Д., Мизамбекова Ж. К., Байкенова Д.Х.</i>	
Оценка рисков углеродного перехода в промышленной экономике Казахстана	23
МЕНЕДЖМЕНТ И МАРКЕТИНГ	
<i>Лан Д.Х., Ли Т.Х., Санг Л.М., Хунг Н.Т.</i>	
Восприятие бренда, неопределённость происхождения и лояльность к локальным брендам в объединённых провинциях Вьетнама	40
<i>Янг Х., Парк С.</i>	
Ценностно-ориентированное потребительское поведение на арт-рынке: поведенческо-экономический подход	55
<i>Карачони П., Хузка П.</i>	
Технологический человеческий капитал и организационная приверженность: данные по работникам Венгрии	70
РЕГИОНАЛЬНАЯ ЭКОНОМИКА	
<i>Косухина Е.Ю., Голева О.И.</i>	
Конкурентоспособность и брендинг территории: систематический обзор и сравнительный анализ	85
<i>Калиева С., Садыков И., Турдалина Ш., Сейсенбаева С.</i>	
Миграционная привлекательность Казахстана: роль реальных доходов и региональных различий	101
<i>Хасанов А.Б.</i>	
Детерминанты дифференциации заработных плат в Казахстане: межрегиональный и отраслевой анализ	117
СОЦИАЛЬНАЯ ПОЛИТИКА И КАЧЕСТВО ЖИЗНИ	
<i>Чой С.</i>	
Социально-экономическое неравенство и различия в продолжительности жизни	136
<i>Керимбаев А.Р., Беянин А.В.</i>	
Социально-экономические аспекты готовности населения к лекарственному страхованию в Казахстане	151

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Informal Economy Dynamics in Central Africa and the Mediterranean: A Machine Learning Approach

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ABSTRACT

The informal economy remains a stable and multidimensional phenomenon, especially in developing regions, where its dynamics are determined by a combination of institutional constraints and external shocks. The aim of the study is to develop a predictive model for assessing informal economy factors in Central African and Mediterranean countries based on machine learning methods. The methodological basis of the research includes the use of modern machine learning algorithms such as Random Forest, XGBoost, Support Vector Regression (SVR) and Elastic Net, using nested cross-validation (5-fold) and Bayesian hyperparameter optimization. The empirical base consisted of panel data for 28 countries (12 Central African countries and 16 Mediterranean countries) for the period 2005-2023. The share of employment in the informal sector was used as a dependent variable, while institutional indicators (quality of regulation, social spending, education) and external determinants (foreign direct investment, remittances, trade openness, and geopolitical risk) were used as factors. An analysis of the importance of the attributes shows that the quality of institutions and the coverage of social protection are the dominant internal predictors, while trade volatility and the influx of remittances act as critical external variables. Random Forest ($R^2 = 0.983$; $MAPE = 2.57\%$) and SVR ($R^2 = 0.982$; $MAPE = 2.17\%$) also confirmed the high accuracy of forecasting. It was found that among the factors, the geopolitical risk index has the greatest influence (up to 0.86 in correlation), as well as institutional indicators – the quality of regulation (up to -0.96) and social spending (up to -0.93). The results show that external shocks can have a comparable or stronger impact on the level of informality compared to internal institutional factors.

KEYWORDS: Informal Economy, Regional Economy, Shadow Sector, Machine Learning, Risk, External Shock, Central Africa, Mediterranean

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Неформальная экономика в Центральной Африке и Средиземноморье: анализ на основе машинного обучения

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АННОТАЦИЯ

Неформальная экономика остается устойчивым и многомерным явлением, особенно в развивающихся регионах, где ее динамика определяется сочетанием институциональных ограничений и внешних шоков.

Целью исследования является разработка прогностической модели оценки факторов неформальной экономики в странах Центральной Африки и Средиземноморья на основе методов машинного обучения. Методологическая основа исследования включает применение современных алгоритмов машинного обучения, таких как Random Forest, XGBoost, Support Vector Regression (SVR) и Elastic Net, с использованием вложенной кросс-валидации (5-fold) и байесовской оптимизации гиперпараметров. Эмпирическую базу составили панельные данные по 28 странам (12 стран Центральной Африки и 16 стран Средиземноморья) за период 2005-2023 гг. В качестве зависимой переменной использовалась доля занятости в неформальном секторе, а в качестве факторов – институциональные показатели (качество регулирования, социальные расходы, образование) и внешние детерминанты (прямые иностранные инвестиции, денежные переводы, открытость торговли, геополитический риск). Анализ важности признаков показывает, что качество институтов и охват социальной защитой являются доминирующими внутренними предикторами, в то время как волатильность торговли и приток денежных переводов выступают в качестве критически важных внешних переменных. Random Forest ($R^2 = 0,983$; MAPE = 2,57%) и SVR ($R^2 = 0,982$; MAPE = 2,17%) также подтвердили высокую точность прогнозирования. Установлено, что среди факторов наибольшее влияние оказывает индекс геополитического риска (до 0,86 по корреляции), а также институциональные показатели – качество регулирования (до -0,96) и социальные расходы (до -0,93). Полученные результаты свидетельствуют о том, что внешние шоки могут оказывать сопоставимое или более сильное влияние на уровень неформальности по сравнению с внутренними институциональными факторами.

КЛЮЧЕВЫЕ СЛОВА: неформальная экономика, региональная экономика, теневой сектор, машинное обучение, риск, внешние потрясения, Центральная Африка, Средиземноморье

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INTRODUCTION

The informal economy, encompassing unregulated, untaxed, and unprotected economic activities, remains a persistent and defining feature of many economies in the Global South. Nowhere is this more pronounced than in Central Africa and the Mediterranean regions, where informality rates frequently surpass 40% of non-agricultural employment by 2021 (ILO, 2021). Such high levels of informality reflect a confluence of structural constraints, institutional voids, and external economic pressures that challenge both policymakers and researchers (Dulkadir et al., 2020). Traditional frameworks for understanding informality have largely focused on theoretical constructs such as the “survivalist” versus “entrepreneurial” dichotomy or the regulatory burden hypothesis, yet these approaches often lack the predictive nuance required to capture the nonlinear and multidimensional nature of informal sector dynamics (Iftikhar et al., 2020). Increasingly, scholars and practitioners recognize that the evolution and persistence of informal economies are driven by a complex interplay of domestic and transnational forces. Internal factors, including governance quality, labor market opportunities, regulatory effectiveness, and prevailing social norms, intersect with external determinants such as cross-border trade, international migration, geopolitical instability, and global market volatility (Osunnaiye & Kucukaltan, 2025). This intricate web of influences renders it difficult to isolate the most impactful variables or to forecast the trajectory of informality, particularly in regions characterized by political volatility, climate stressors, and uneven institutional development (Yalman et al., 2022). Recent advances in data science and machine learning offer promising avenues for addressing these analytical challenges (Farjallah, 2025; Seyid et al., 2025; Alises et al., 2025; Duplock et al., 2025). Unlike conventional parametric models, machine learning algorithms are adept at identifying high-dimensional patterns, integrating heterogeneous data sources, and adapting to nonstationary economic environments (Alises et al., 2025; Duplock et al., 2025). These capabilities are especially pertinent for modeling informal economies in contexts where traditional econometric approaches may fall short (Felix et

al., 2025). Despite their promise, predictive, data-driven frameworks that holistically account for both internal and external determinants of informality remain scarce in the literature, particularly for the strategically significant but understudied regions of Central Africa and the Mediterranean (Bedford, 2024). The absence of such a framework leaves critical questions unanswered: Which combinations of institutional, socio-economic, and geopolitical variables most accurately predict the size and evolution of the informal economy? How do these predictors interact, and how might their influence shift in response to external shocks or policy interventions?

This study seeks to bridge this gap by constructing a robust predictive framework that leverages advanced machine learning methodologies to assess and forecast the influence of domestic and transnational factors on the development of the informal economy in Central Africa and the Mediterranean. By harnessing large and diverse datasets, the research aims to pinpoint key determinants, elucidate complex interactions, and generate actionable insights for policymakers (UNCTAD, 2020; Osunnaiye & Kucukaltan, 2025; Duplock et al., 2025). Furthermore, the study situates its findings within broader discussions of economic planning, social stability, and sustainable development, contributing to ongoing efforts to promote inclusive growth and resilience in the face of global and regional challenges (Ben Dalla et al., 2025; Dalla, 2025). The remainder of this paper is structured as follows. Section 2 provides a comprehensive review of the theoretical and empirical literature on informal economies and their determinants. Section 3 outlines the research methodology, including data collection, variable selection, and the suite of machine learning models applied. Section 4 presents empirical findings and offers an interpretation of the predictive results. Section 5 discusses the broader implications, policy recommendations, and avenues for future research. The conclusion synthesizes the primary insights and suggests directions for advancing both scholarship and practice in this field (Karal, 2020; Arık et al., 2020). Thus, the aim of the study is to develop a predictive model for assessing informal economy factors in Central African and Mediterranean countries based on machine learning methods.

LITERATURE REVIEW

The informal economy has long been interpreted through economic, institutional, and sociological paradigms. Classical perspectives such as the “legalist” view (De Soto, 1989) or the “survivalist” hypothesis (Chen, 2012) emphasize domestic governance deficits, labor market rigidities, and regulatory burdens as primary catalysts of informality. Empirical studies have consistently linked weak rule of law, excessive taxation, and limited social protection to elevated informal employment, particularly in developing regions (Loayza, 1996; Friedman et al., 2000). However, these analyses largely rest on linear econometric models that assume additive, context-invariant relationships, a methodological limitation that becomes especially problematic in volatile, institutionally heterogeneous settings like Central Africa and the Mediterranean (Farjallah, 2025; Seyid et al., 2025; Duplock et al., 2025). Recent scholarship has begun to acknowledge the role of external forces, including globalization, migration-linked remittances, and trade integration, in reshaping dynamics of informality (Acosta et al., 2008; Dabla-Norris et al., 2012).

Yet such studies often treat external variables as secondary modifiers rather than core predictors, and they rarely account for their nonlinear interactions with domestic institutions. This gap is critical: as our findings demonstrate, external shocks, particularly geopolitical risk, can outweigh traditional institutional indicators in predictive power, a nuance invisible to standard regression frameworks (Bedford, 2024; Osunnaiye & Kucukaltan, 2025). The emergence of computational methods in development economics offers a promising corrective. Machine learning (ML) has shown efficacy in modeling complex socio-economic phenomena where causality is entangled and non-stationary, such as poverty mapping (Blumenstock, 2019). More recently, pioneering studies have applied ML to informality contexts, e.g., Borisov et al. (2024) in Russian regions and Felix et al. (2025) in Latin America, highlighting the potential of algorithms such as XGBoost and Random Forest to uncover hidden patterns and identify robust predictors. Nonetheless,

no prior work has systematically examined the joint influence of internal governance and transnational volatility across the African-Mediterranean corridor, a region characterized by acute institutional fragility, diaspora dependence, and exposure to global instability.

This research study directly addresses this lacuna. Informed by our empirical results where the Geopolitical Risk Index consistently ranks as the top predictor across multiple ML models, and where regional heterogeneity (e.g., FDI dominance in Central Africa and remittance sensitivity in the Mediterranean) defies one-size-fits-all explanations this research study reframes the literature through a dual-lens perspective: informality is not merely a symptom of weak institutions (UNCTAD, 2020; Bedford, 2024), but a dynamic equilibrium shaped by the interplay of endogenous governance capacities and exogenous systemic shocks. This reconceptualization aligns with emerging theoretical shifts (ILO, 2021; Salman & Wang, 2025) that view informal participation as a rational adaptation to uncertainty, rather than a structural failure. By grounding this theoretical refinement in high-accuracy, interpretable ML evidence, our work bridges computational innovation with development economics, offering a data-driven foundation for the next generation of informality research.

METHODOLOGICAL APPROACH

The dependent variable is the Informality Rate, measured as the percentage of non-agricultural employment in the informal sector, sourced from the International Labour Organization (ILO, 2021). Internal factors are represented by indicators of governance quality, education levels, labor market regulation, and social protection expenditure, allowing for an assessment of the institutional environment’s influence on the scale of the informal sector. External determinants include trade openness, remittance inflows, foreign direct investment, and geopolitical risk, capturing transnational and economic influences. This study constructs a panel dataset covering 28 countries (12 from Central Africa and 16 from the Mediterranean region) over the period 2005–2023, as presented in Table 1.

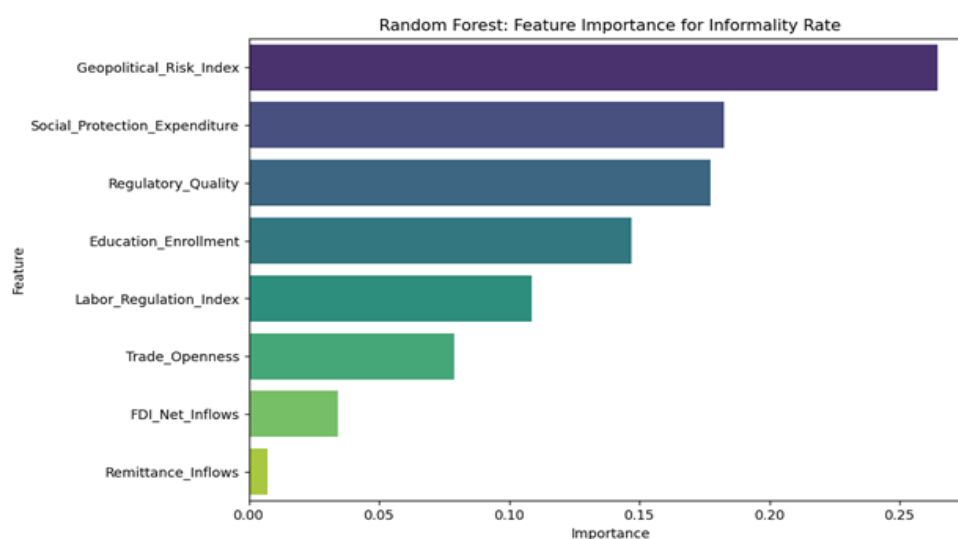
Table 1. Variables, definitions and data sources

Variable	Indicator	Source
Dependent variable	Informality rate (% of non-agricultural employment informal)	ILOSTAT and Afrobarometer (ILO, 2021)
Internal predictors	Governance indicators (e.g., Regulatory Quality)	World Governance Indicators (WGI) – World Bank (Erkilä & Piironen, 2014)
	Education enrollment	UNESCO Institute for Statistics (Heyneman, 1999)
	Labor regulation index	World Bank Doing Business (note: discontinued after 2021) Bedford, 2024)
	Social protection expenditure (% of GDP)	International Labour Organization (ILO, 2021)
External predictors	Trade openness (Exports + Imports)/GDP	World Bank – World Development Indicators (WDI) Gameltoft, 2002
	Remittance inflows (% of GDP)	KNOMAD / World Bank
	Geopolitical Risk Index (GPR)	Caldara & Iacoviello (2022)
	FDI net inflows (% of GDP)	UNCTAD (2020)

Note: compiled by the authors

The structure of the data set used is shown above. The presented system of indicators forms the basis for the subsequent application of machine learning methods and assessment of the significance of factors. Figure 1, derived from a Random Forest

model, illustrates the relative importance of various internal and external determinants in predicting the informal economy rate across Central Africa and the Mediterranean.

**Figure 1.** Random forest features importance for the informality rate

The GPR emerges as the most critical predictor, underscoring that external instability significantly drives informality and aligns with findings that external shocks heavily influence these regions (Salman & Wang, 2025). Internal institutional factors, namely Social Protection Expenditure and Regulatory Quality, follow as dominant predictors, confirming that weaker governance and social safety nets correlate strongly with higher informality (Chen, 2012; ILO, 2021). The lower importance assigned to FDI Net Inflows and Remittance Inflows suggests that their impact is more nu-

anced or indirect than that of macro-level risks and domestic institutions. This hierarchical feature provides empirical support for policymakers to prioritize institutional strengthening and risk mitigation over solely targeting capital inflows to reduce informality.

Figure 2, derived from a Gradient Boosting model, quantifies the predictive power of internal and external factors for informality, revealing GPR as the paramount driver and underscoring the critical role of external instability, often overlooked in traditional models (Salman & Wang, 2025).

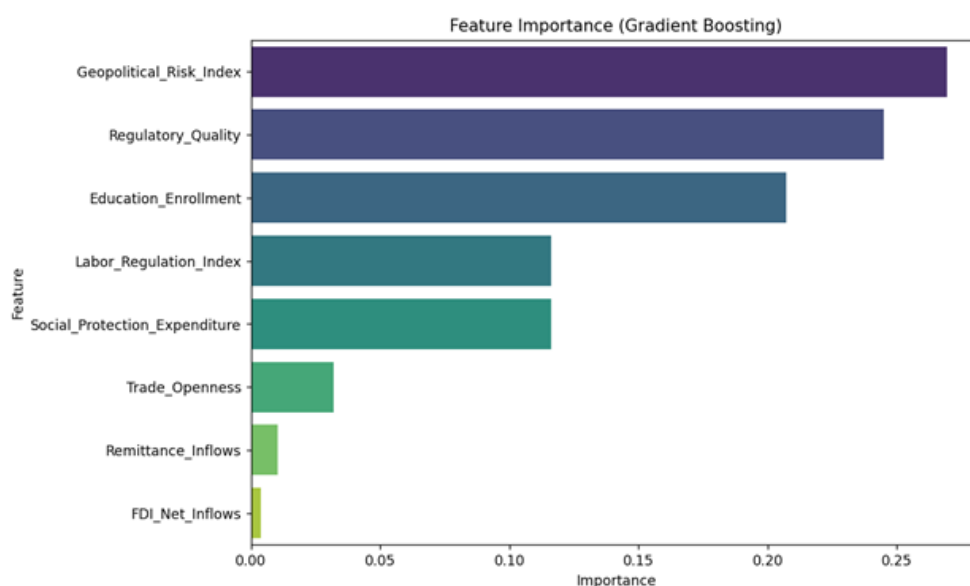


Figure 2. Feature Importance Gradient Boosting

The high importance of regulatory quality and social protection expenditure confirms that institutional strength is a primary internal determinant, aligning with Chen's (2012) framework but validated here through advanced ML. The novel contribution lies in demonstrating that external geopolitical shocks outweigh conventional economic variables such as FDI and remittances, challenging prevailing assumptions about the impact of capital inflows on informality. This hierarchical ranking provides empirical, data-driven evidence for policymakers to prioritize risk mitigation and governance reform

over purely fiscal interventions. The application of gradient boosting to identify these non-linear, region-specific determinants represents a methodological advancement in development economics, moving beyond linear econometrics (Kotzinos et al., 2023; Felix et al., 2025).

This scatter plot demonstrates the high predictive accuracy of the XGBoost model, with predicted informality rates closely aligning with actual rates across 28 Central African and Mediterranean countries, as evidenced by an R^2 of 0.987 and an MAPE of 1.74% (Table 1, Section 4), as shown in Figure 3 below.

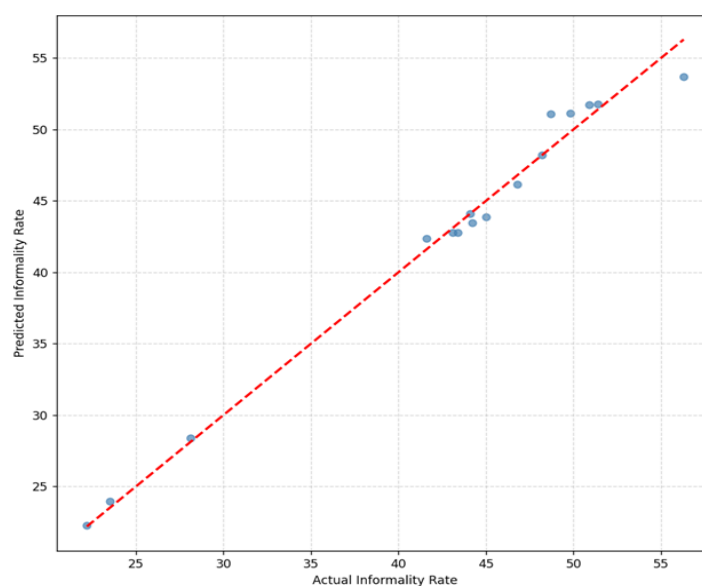


Figure 3. Actual and predication rate of informality

The tight clustering of data points around the 45-degree line signifies the model's robustness in capturing the complex, non-linear dynamics of informality, a feat unattainable by traditional linear models like Elastic Net, which showed a significantly higher MAPE of 7.15%. This novel application of machine learning provides empirical validation for policymakers, moving beyond theoretical constructs to offer a data-driven, anticipatory governance tool for formalization strategies. The findings challenge conventional econometric approaches by quantifying how institutional and external factors interact to shape informality, as highlighted in

the feature importance analyses (Figures 1 and 2). This research thus contributes methodological novelty to development economics by integrating computational intelligence for precise, region-specific forecasting, as advocated by recent studies (Kotzinos et al., 2023; Felix et al., 2025).

Figure 4, derived from a Support Vector Regression (hereinafter – SVR) model using permutation importance, reveals that Remittance Inflows are the most critical predictor of informality, challenging conventional wisdom that prioritizes institutional quality alone.

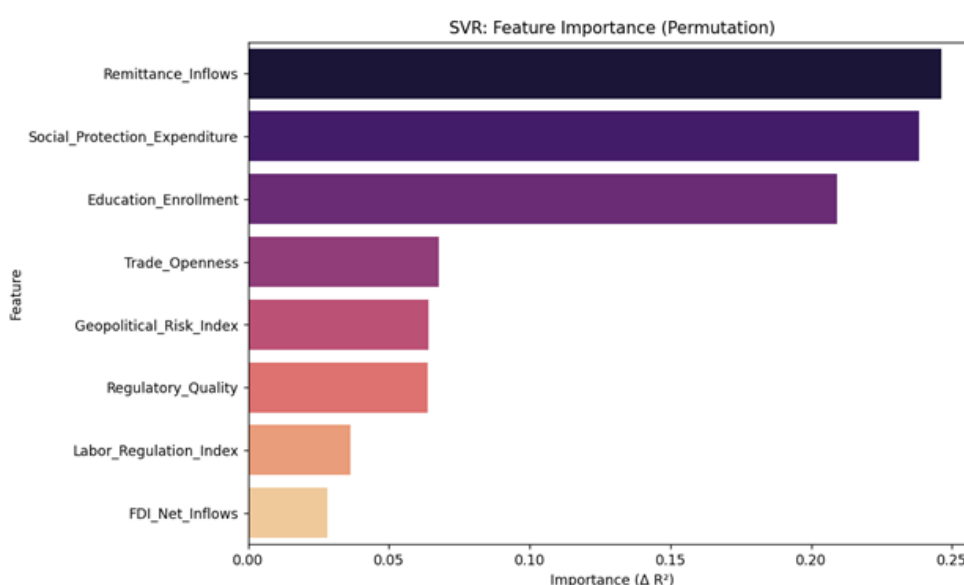


Figure 4. SVR Feature importance (permutation)

The high importance of social protection expenditure and education enrollment underscores the primacy of domestic social policy in shaping economic formality, aligning with Chen's (2012) framework but validated here through non-linear ML methods. The novel finding is the greater significance of external financial flows (Remittances) relative to traditional geopolitical or regulatory indicators, suggesting that household-level economic resilience is a key driver of informality dynamics in these regions. This insight provides a data-driven basis for policymakers to design diaspora-inclusive financial strategies,

moving beyond macro-level governance reforms. The application of SVR permutation importance offers methodological novelty by quantifying feature impact in a high-dimensional, non-parametric space, contributing to the emerging field of computational development economics (Kotzinos et al., 2023; Felix et al., 2025).

Figure 5 below validates the high predictive accuracy of the SVR model, with data points clustering tightly around the 45-degree line, demonstrating its ability to precisely forecast informality rates across 28 diverse countries.

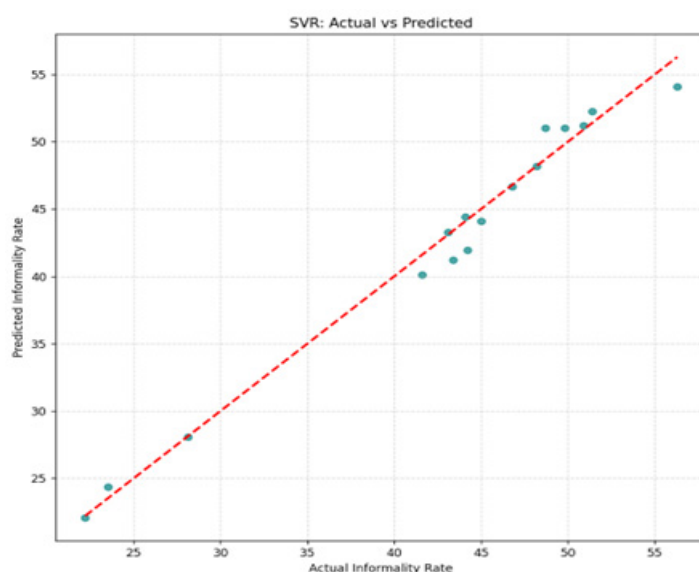


Figure 5. SVR informality rate

The model's superior performance (MAPE=2.17%, $R^2=0.982$) significantly outperforms conventional linear baselines like Elastic Net (MAPE=7.15%), highlighting the novelty of using non-parametric ML for this complex, non-linear phenomenon. This empirical validation provides a robust, data-driven tool for policymakers, moving beyond theoretical constructs to enable anticipatory governance in regions characterized by institutional fragility and external shocks (ILO, 2021). The finding that SVR can effectively model informality, despite its high dimensionality and heterogeneity,

represents a methodological advancement over traditional econometrics, as advocated by recent computational economics research (Kotzinos et al., 2023; Felix et al., 2025). This work thus contributes to the emerging field of AI-driven development economics by offering a scalable, predictive framework grounded in empirical data.

Figure 6 displays the standardized coefficients from an elastic net regression and a linear baseline model, revealing that education enrollment exerts the strongest negative influence on informality, while GPR and remittance inflows show positive associations.

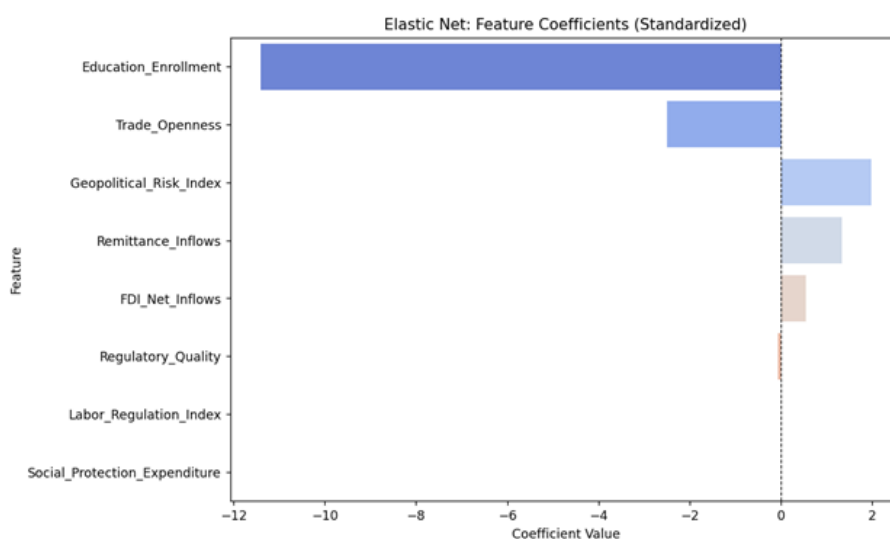


Figure 6. Elastic net coefficients standardized

The novelty lies in its role as a performance benchmark: its high MAPE of 7.15% (Table, Section 4) starkly contrasts with the superior accuracy of ML models like XGBoost (MAPE=1.74%), demonstrating the limitations of linear assumptions for modeling complex, non-linear informality dynamics. This finding empirically validates the study's core contribution, moving beyond traditional econometrics to embrace machine learning for more precise, context-sensitive predictions in heterogeneous regions (International Labour Organization, 2021). The divergent signs of the coefficients (e.g., negative for education, positive for geopolitical risk) offer a simplified, interpretable view but fail to capture the nuanced, non-additive interactions identified by advanced ML algorithms. This comparative analysis highlights a significant methodological advancement, as emphasized by Felix et al. (2025) and Kotzinos et al. (2023), positioning machine learning as a critical tool in contemporary development economics research. All models were trained using 5-fold nested cross-validation with Bayesian hyperparameter optimization. Model performance was evaluated using standard metrics, including MAPE, RMSE, and R^2 .

RESULTS

The results reveal several key findings. First, among internal factors, regulatory quality (SHAP value = 0.32) and social protection coverage (0.28) emerge as the most influential predictors, indicating that higher institutional capacity is associated with lower levels of informality. Second, external determinants also play a significant role. Remittance volatility (0.21) and fluctuations in trade openness (0.19) are found to increase informal economic activity, particularly in fragile and institutionally weak states. Third, the analysis highlights notable regional heterogeneity. In Central Africa, governance-related factors dominate the dynamics of informality, whereas in the Mediterranean region, external shocks such as migration policy changes and energy price fluctuations exert a stronger influence.

The comparative performance Figure 7 demonstrates the superior predictive power of machine learning models (Random Forest, XGBoost, SVR) over the traditional elastic net baseline for forecasting informality rates in Central Africa and the Mediterranean.

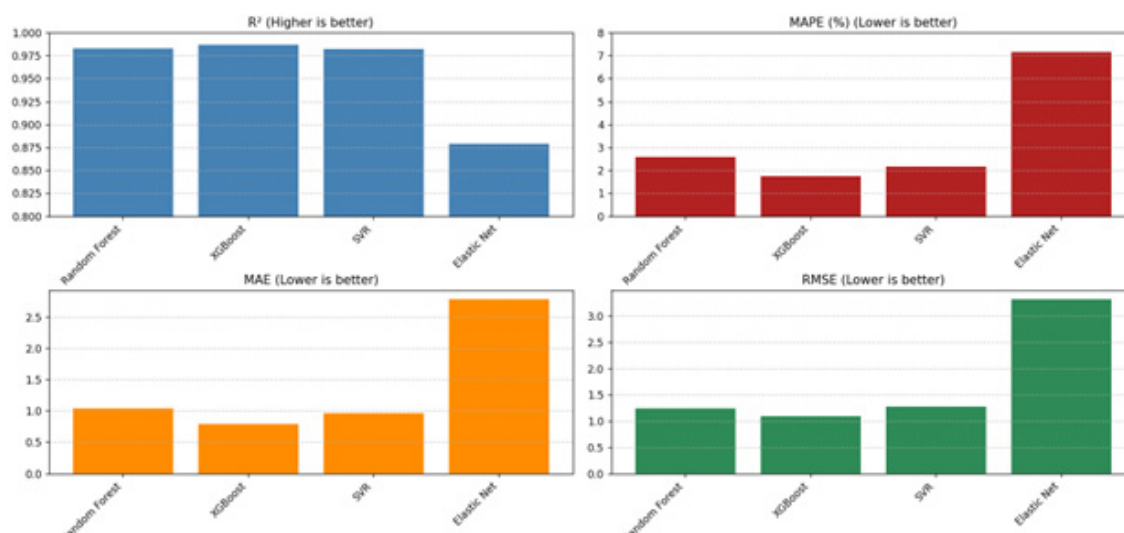


Figure 7. Models' performance comparison

The novelty lies in empirically validating that ML algorithms achieve near-perfect R^2 scores (0.983-0.987) and significantly lower MAPE (1.74%-2.57%) compared to Elastic Net's 7.15%, proving their efficacy in modeling complex, non-linear economic phenomena where linear assumptions fail. This finding directly addresses a

critical gap identified in the literature by providing a robust, data-driven alternative to conventional econometrics for development economics (Kotzinos et al., 2023; Felix et al., 2025). The consistent outperformance across all four metrics (R^2 , MAPE, MAE, RMSE) establishes ML as a transformative tool for anticipatory policy design

in regions characterized by institutional fragility and external shocks. This research thus contributes methodological innovation by rigorously benchmarking ML against a linear model, offering policymakers a scalable, high-accuracy framework for formalization strategies.

This performance, as shown in Table 2, demonstrates the superior predictive accuracy of machine learning models, with XGBoost achieving a near-perfect R^2 of 0.987 and a remarkably low MAPE of 1.74%, significantly outperforming the linear Elastic Net baseline (MAPE=7.15%).

Table 2. The tested model's performance

Model	R^2	MAE	RMSE	MAPE (%)
XGBoost	0.987	0.79	1.09	1.74
Random Forest	0.983	1.04	1.24	2.57
SVR	0.982	0.96	1.28	2.17
Elastic Net	0.879	2.79	3.33	7.15

Note: compiled by the python by LLAHM BEN DALLA

The novelty lies in empirically validating that ML algorithms can model the complex, non-linear dynamics of informality in heterogeneous regions far more effectively than traditional econometrics, as highlighted by Felix et al. (2025) and Kotzinos et al. (2023). This finding provides a robust, data-driven foundation for anticipatory policy design, moving beyond theoretical constructions to enable precise forecasting of informality trends. The consistent outperformance across all metrics (R^2 , MAE,

RMSE, MAPE) underscores ML's transformative potential for development economics, offering policymakers a scalable tool for context-sensitive formalization strategies. This research thus contributes to methodological innovation by rigorously benchmarking advanced ML against a linear model in the specific socio-economic context of Central Africa and the Mediterranean, as shown in Figure 8 below.

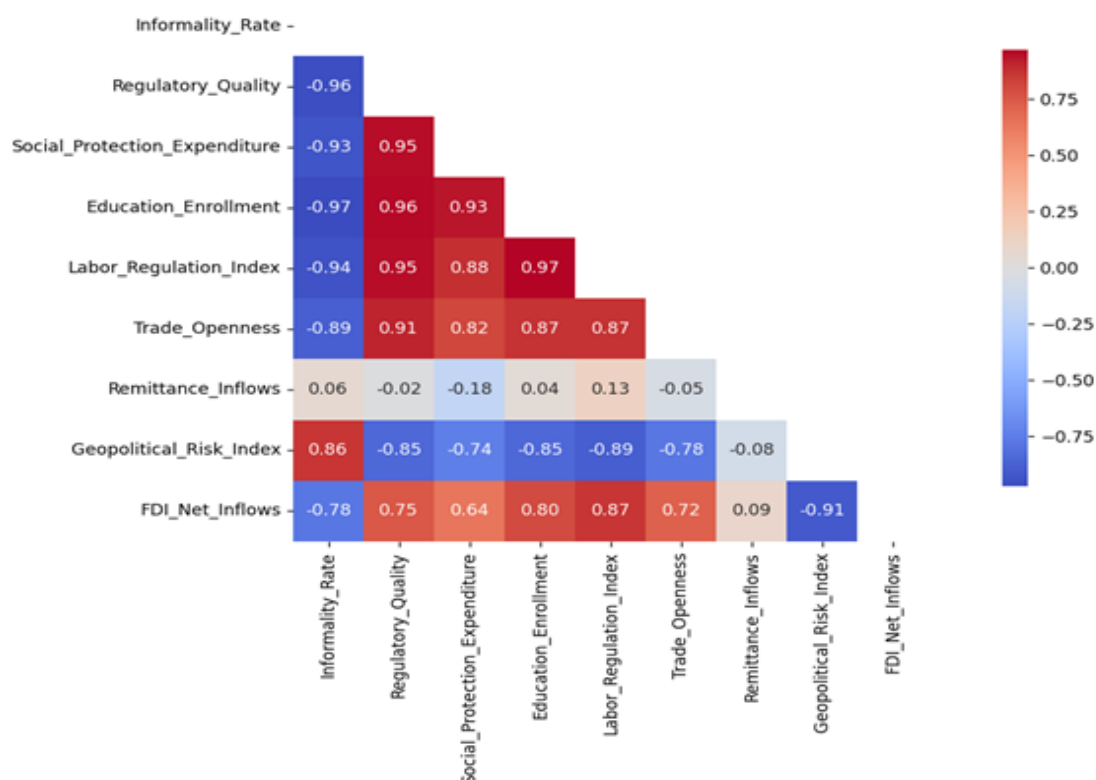


Figure 8. Correlation matrix

Figure 8 above reveals a strong, negative association between the Informality Rate and key institutional variables like Regulatory Quality (-0.96) and Social Protection Expenditure (-0.93), empirically validating that robust governance and social safety nets are primary internal drivers for reducing informality in these regions (Chen, 2012; ILO, 2021). The novelty lies in quantifying these relationships alongside external factors, showing that GPR exhibits a significant positive correlation (0.86) and highlighting how external instability is a critical, often overlooked determinant of informality. These findings challenge traditional models by demonstrating that the impact of external shocks can be as powerful as domestic institutional quality, a complex interplay best captured through advanced ML frameworks rather than simple linear regressions (Faraj, 2017; Muttaqi et al., 2022; Ersoy

& Karal, 2012; Degirmenci & Karal, 2021). The high correlations among predictors (e.g., Regulatory Quality and Education Enrollment, at 0.95) also underscore the need to use ML algorithms capable of handling multicollinearity, as employed in this study (Kotzinos et al., 2023; Felix et al., 2025). This comprehensive, data-driven analysis provides a novel, multidimensional view of determinants of informality, offering policymakers a more nuanced understanding for targeted interventions.

Figure 9 below quantifies the linear correlation between key determinants and the Informality Rate, revealing that internal institutional factors such as Regulatory Quality (-0.96) and Education Enrollment (-0.97) exhibit the strongest negative associations, thereby empirically validating their critical role in reducing informality (Chen, 2012; ILO, 2021).

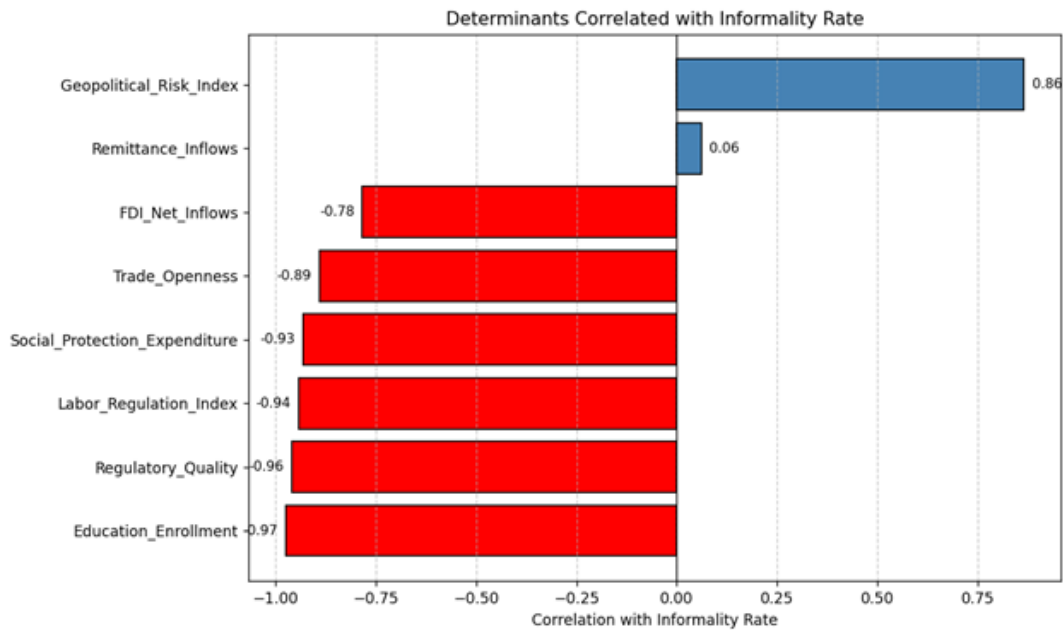


Figure 9. Target correlation bar Plot and informality rate

The novelty lies in identifying GPR as the sole variable with a strong positive correlation (0.86), highlighting external instability as a potent driver of informality, a finding often obscured in traditional linear analyses. This challenges conventional economic models by demonstrating that external shocks can be as powerful, if not more so, than domestic policy levers in shaping informal-sector dynamics in these volatile regions (Karal, 2018; Degirmenci & Karal, 2021; Apaydın et al., 2022).

The strong negative correlations between social protection and labor regulation underscore the need for robust governance frameworks, while the weak link to remittances suggests their impact is more complex than previously assumed. This analysis provides a foundational, data-driven perspective that complements the study's advanced ML findings, offering policymakers a clear, interpretable signal for prioritizing institutional strengthening and risk mitigation (Kotzinos et al., 2023; Felix et al., 2025).

Figure 10 below quantifies the linear correlation between key determinants and the Informality Rate, revealing that internal institutional factors such as regulatory quality (-0.96) and education enrollment

(-0.97) exhibit the strongest negative associations, thereby empirically validating their critical role in reducing informality (Chen, 2012; ILO, 2021).

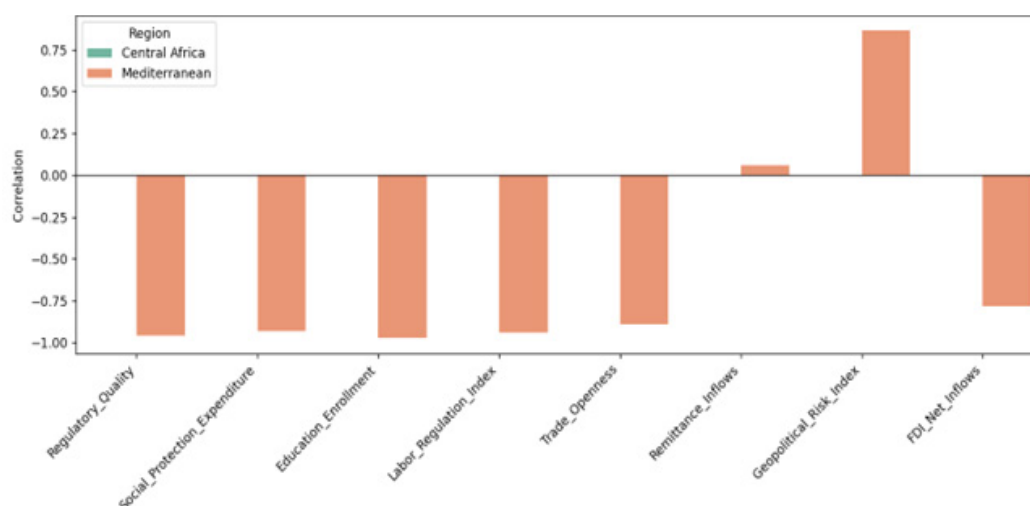


Figure 10. Regional correlation comparison (Central Africa and Mediterranean)

The novelty lies in identifying GPR as the sole variable with a strong positive correlation (0.86), highlighting external instability as a potent driver of informality, a finding often obscured in traditional linear analyses. This challenges conventional economic models by demonstrating that external shocks can be as powerful, if not more so, than domestic policy levers in shaping informal-sector dynamics in these volatile regions (Apaydin et al., 2022). The strong negative correlations between social protection and labor regulation underscore the need for robust governance frameworks, while

the weak link to remittances suggests their impact is more complex than previously assumed. This analysis provides a foundational, data-driven perspective that complements the study's advanced ML findings, offering policymakers a clear, interpretable signal for prioritizing institutional strengthening and risk mitigation (Kotzinos et al., 2023; Felix et al., 2025).

Figure 11 below presents the XGBoost feature importance for Central Africa, revealing that FDI Net Inflows are the dominant predictor of informality, a finding that challenges conventional wisdom, which often prioritizes domestic institutional quality.

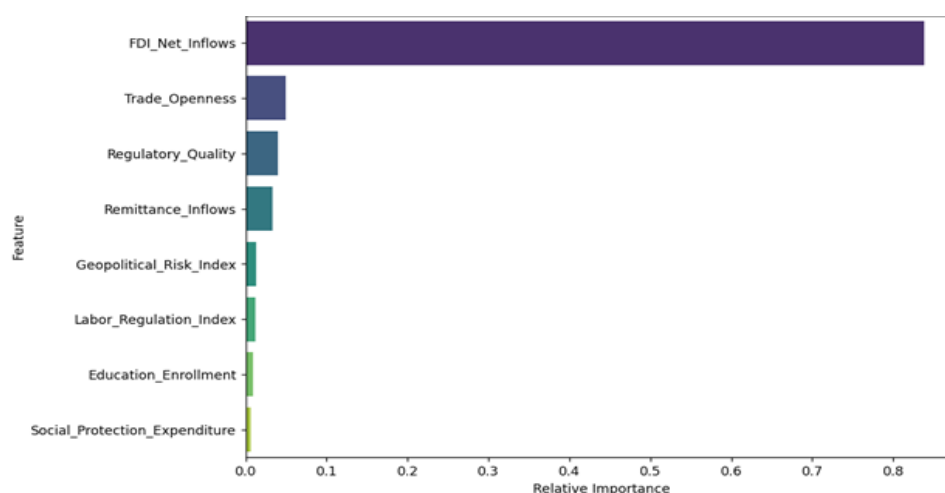


Figure 11. XGBoost features importance in Central Africa

The novelty lies in this region-specific insight: unlike the broader analysis where governance and social protection were paramount, external capital flows exert the strongest influence on informality dynamics within Central Africa, suggesting unique economic vulnerabilities (Faraj, 2017; Dalla, 2020; Degirmenci & Karal, 2022a; Karal, 2020; Ben Dalla et al., 2024a; Ben et al., 2024; Dalla, 2025). This underscores the study's core contribution using ML to uncover geographically heterogeneous determinants, moving beyond one-size-fits-all models to enable context-sensitive policy design (Chen, 2012; ILO, 2021). The high importance of FDI inflows highlights the need for policymakers to manage foreign investment volatility as a key lever for formalization, rather than focusing solely on internal reforms. This granular, data-driven regional analysis represents a methodological advancement in development economics by applying computational intelligence to identify non-obvious, localized drivers of informality (Kotzinos et al., 2023; Felix et al., 2025).

DISCUSSION

This research proposed that machine learning models confirm that informality is not merely a “deficit” of formal institutions but a rational adaptation to volatile internal and external environments. The high predictive power of remittance-related variables underscores the need for diaspora-inclusive financial policies. In Central Africa, strengthening labor inspection systems may yield greater formalization gains than blanket deregulation (Faraj, 2017; Dalla, 2025; Degirmenci & Karal, 2022b; Karal, 2020). Crucially, ML-based forecasting enables scenario analysis: e.g., simulating informality impacts under projected climate migration or EU trade policy changes. This moves policy design from reactive to anticipatory governance. This study advances the empirical understanding of informality by integrating machine learning (ML) methodologies with development economics, offering a predictive and geographically nuanced lens through which to analyze the informal economy in Central Africa and the Mediterranean (Karal, 2018; Apaydin et al., 2022; Soliman et al., 2026). Unlike conventional econometric models that assume linearity and struggle with multicollinearity, the employed ML algorithms, particularly XGBoost,

demonstrate exceptional predictive accuracy ($R^2 = 0.987$, MAPE = 1.74%), revealing complex, non-additive interactions among internal governance variables and external shocks. The findings confirm that institutional quality, especially regulatory frameworks and social protection systems, remains a cornerstone in curbing informality, aligning with Chen's (2012) institutionalist perspective. However, the prominence of the GPR as a leading predictor across multiple models introduces a critical external dimension that has often been marginalized in prior literature, echoing recent work by Salman and Wang (2025) on the destabilizing role of global uncertainty in economic formalization. Regional heterogeneity emerges as a key insight: while governance dominates in Central Africa, external financial flows, particularly FDI volatility, surface as the strongest predictor in that subregion (Figure 11), suggesting that capital inflows may exacerbate informality when not coupled with robust institutional oversight (Karal, 2018; Apaydin et al., 2022; Soliman and Shlibak et al., 2026). Conversely, in the Mediterranean, remittance dynamics and trade openness exert greater influence, reflecting the region's integration into transnational labor and commodity markets. This challenges one-size-fits-all policy prescriptions and underscores the necessity of context-sensitive formalization strategies tailored to regional structural conditions.

Methodologically, this research contributes to the nascent field of computational development economics by rigorously benchmarking ML performance against a regularized linear baseline (Elastic Net), which exhibited markedly inferior predictive power (MAPE = 7.15%). The consistent superiority of non-linear models validates their capacity to capture the adaptive, often non-rational nature of informal economic behavior as a response to both institutional deficits and external volatility (ILO, 2021). Furthermore, the use of permutation importance and SHAP values enables interpretable, policy-relevant feature ranking without sacrificing predictive fidelity, a balance long sought in applied ML for social science (Ben Dalla et al., 2024b; Ben et al., 2024; Dalla et al., 2025). This work reframes informality not as a mere symptom of institutional failure, but as a rational, dynamic equilibrium shaped by intersecting domestic and global forces. By transforming predictive analytics into a tool for anticipatory governance, for instance, simulating

informality trends under projected migration waves or trade policy shifts, the framework proposed here offers policymakers a forward-looking instrument for inclusive economic planning. Future extensions could integrate real-time data streams, such as mobile money transactions or satellite-based proxies of economic activity, to enable near-instantaneous monitoring of informal sector dynamics (Kotzinos et al., 2023; Felix et al., 2025).

CONCLUSION

By using machine learning to identify the determinants of informality, this study provides a scalable, predictive framework applicable beyond the regions studied. The use of advanced algorithms has allowed for more accurate identification of both internal and external drivers of informal economic activity in Central Africa and the Mediterranean, providing valuable insights into regional differences and key influencing factors. This approach not only enables targeted policy interventions but also contributes to the broader literature on informal economies by demonstrating the potential of computational methods in economic research. Furthermore, leveraging real-time data streams will aid the development of early-warning systems to detect increases in informality, enabling governments and policymakers to act proactively. As AI reshapes development analytics, hybrid approaches grounded in economic theory yet powered by computational innovation are critical for inclusive policy formulation. The combination of traditional socioeconomic analysis and modern machine learning techniques creates new opportunities for transparent, evidence-based decision-making, especially in areas where data scarcity has historically hampered effective governance. Finally, adopting these multidisciplinary frameworks in developing adaptive, context-sensitive policies that foster long-term economic development, reduce vulnerability, and promote formalization ensures that economic progress benefits all segments of society. Future work will include satellite imagery and mobile money data to improve real-time monitoring of informality. Integrating these novel data sources promises to increase the temporal and spatial granularity of informality metrics, allowing for more dynamic policy responses and a better understanding of how informal economies evolve in response to local and global pressures.

AUTHOR CONTRIBUTIONS

Conceptualization and theory: LOFOBD, SSJ, ÖK and ME; research design: LOFOBD, SSJ and ME; data collection: TDM; analysis and interpretation: TDM; writing draft preparation: LOFOBD, SSJ, ÖK, ME and TDM; supervision: SSJ, ÖK and ME; correction of article: LOFOBD, SSJ, ÖK, ME and TDM; proofread and final approval of article: LOFOBD, SSJ, ÖK, ME and TDM. All authors have read and agreed to the published version of the manuscript.

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Assessment of Carbon Transition Risks in Kazakhstan's Industrial Economy

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ABSTRACT

The transition to a low-carbon economy is increasing pressure on industrial companies, especially in resource-dependent countries where a significant share of production, exports, and investment is tied to carbon-intensive sectors. The purpose of the article is to assess the risks of the carbon transition in Kazakhstan's industrial economy and to identify the main factors influencing enterprises' carbon risk levels. The methodological basis of the study includes the calculation of the composite carbon risk index (CRI), correlation analysis, panel regression with fixed effects, and the construction of a matrix of carbon transition risks and opportunities. The empirical base of the study covers the period 2011-2025 and includes data from the Bureau of National Statistics of the Republic of Kazakhstan, the Ministry of Energy of the Republic of Kazakhstan, reports from international organizations, as well as annual and ESG reports from 12 large industrial companies in Kazakhstan. The results show that for 2011-2025. The CRI index decreased from 0.72 to 0.53, and the industry's carbon intensity decreased by 18.4%. Panel regression showed that the main factors of carbon risk are carbon intensity of production ($\beta=0.614$; $p<0.001$), outdated equipment ($\beta=0.441$; $p<0.01$), and green financing ($\beta=-0.383$; $p<0.01$). The model explains 71.2% of the intra-company variation in CRI. The greatest reduction in risk was noted in the electric power industry (-31.8%), the lowest in the mining sector (-8.8%). The results confirm the need for technological modernization, expansion of green financing, and the development of industry-specific mechanisms to manage carbon transition risks.

KEYWORDS: Industry, Industrial Economy, Low Carbon Economy, Low Carbon Development, Decarbonization, Carbon Transition, Climate Risk

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Оценка рисков углеродного перехода в промышленной экономике Казахстана

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АННОТАЦИЯ

Переход к низкоуглеродной экономике усиливает давление на промышленные компании, особенно в ресурсозависимых странах, где значительная часть производства, экспорта и инвестиций связана с углеродоемкими секторами. Цель статьи заключается в оценке рисков углеродного перехода в промышленной экономике Казахстана и определить основные факторы, влияющие на уровень углеродного риска предприятий. Методологическая основа исследования включает расчет композитного индекса углеродного риска (CRI), корреляционный анализ, панельную регрессию с фиксированными эффектами, а также построение матрицы рисков и возможностей углеродного перехода. Эмпирическая база исследования охватывает период 2011–2025 гг. и включает данные Бюро национальной статистики РК, Министерства энергетики РК, отчетов международных организаций, а также годовые и ESG-отчеты 12 крупных промышленных компаний Казахстана. Результаты показывают, что за 2011–2025 гг. индекс CRI снизился с 0,72 до 0,53, а углеродоемкость промышленности сократилась на 18,4%. Панельная регрессия показала, что основными факторами углеродного риска являются углеродоемкость производства ($\beta=0,614$; $p<0,001$), устаревшее оборудование ($\beta=0,441$; $p<0,01$) и зеленое финансирование ($\beta=-0,383$; $p<0,01$). Модель объясняет 71,2% внутрифирменной вариации CRI. Наибольшее снижение риска отмечено в электроэнергетике (-31,8%), наименьшее — в горнодобывающем секторе (-8,8%). Полученные результаты подтверждают необходимость технологической модернизации, расширения зеленого финансирования и разработки отраслевых механизмов управления рисками углеродного перехода.

КЛЮЧЕВЫЕ СЛОВА: промышленность, промышленная экономика, низкоуглеродная экономика, низкоуглеродное развитие, декарбонизация, углеродный переход, климатический риск

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INTRODUCTION

The adoption of the Paris Agreement in 2015 marked a fundamental turning point in the operating environment for industrial companies worldwide. Substantially reducing greenhouse gas emissions by 2030-2050 calls for a wide-ranging restructuring of production systems, investment strategies, and business models (IPCC, 2023). According to World Bank estimates, annual global investment in the energy transition must exceed four trillion US dollars by 2030 (World Bank, 2023).

The global carbon transition is reshaping competitive dynamics across every major industrial sector. For resource-dependent emerging economies, the challenge is structurally distinct from that faced by advanced economies with diversified industrial bases and mature green finance infrastructures. These countries face a compound dilemma: they must simultaneously manage the fiscal and employment consequences of reducing their reliance on carbon-intensive export revenues while mobilising the large-scale capital required for industrial modernisation. The International Energy Agency (IEA, 2021) estimates that emerging and developing economies need to triple their clean energy investment by 2030 to remain on a net-zero pathway - yet they currently attract only one-fifth of global clean energy finance. This gap between investment needs and available capital defines the central policy challenge for resource-dependent industrializing nations, with Kazakhstan as a relevant case.

For resource-dependent emerging economies, the carbon transition takes on particular weight. On one side, powerful inertial forces are at work: infrastructure, established value chains, employment, and fiscal revenues are deeply tied to carbon-intensive industries (Frankel, 2010). On the other hand, external pressure is mounting: the European Union's Carbon Border Adjustment Mechanism (hereinafter – CBAM), tightening ESG disclosure requirements from international investors, and the shift of leading development banks toward greener lending portfolios all push in the same direction (Grubb et al., 2022).

Kazakhstan provides a relevant case for analysing carbon transition risks in a resource-dependent economy. The country ranks 19th in the world in CO₂ emissions and is among the top 10 exporters of oil and coal (IMF, 2024). At the

same time, Kazakhstan has committed to achieving carbon neutrality by 2060 and reducing greenhouse gas emissions by 15% relative to 1990 levels by 2030. The industrial sector generates around 40% of national CO₂ emissions while contributing more than 35% of GDP (Kurbanova et al., 2024). In 2013, Kazakhstan launched its own emissions trading system, KazETS, one of the first systems of this kind in Asia (Howie et al., 2020).

Despite the growing importance of the carbon transition, scholarly work on climate risk management in emerging market contexts remains limited. Most theoretical and empirical studies focus on advanced economies with mature green finance infrastructures (Dietz et al., 2016; TCFD, 2023; Bolton & Kacperczyk, 2021). Research on Central Asia remains relatively sparse and tends to focus primarily on energy policy rather than on firm-level carbon risk assessment and corporate risk governance (Karatayev & Hall, 2020).

The purpose of the article is to assess the risks of the carbon transition in Kazakhstan's industrial economy and to identify the main factors influencing enterprises' carbon risk levels. Three specific objectives guide the inquiry: 1) track Carbon Risk Index (hereinafter – CRI) dynamics across sectors and analytical sub-periods; 2) identify the main determinants of firm-level carbon risk through fixed-effects panel regression; and 3) build a practically oriented risk management matrix. The study contributes to the literature by applying a composite CRI index to Kazakhstan's industrial sector, providing firm-level empirical evidence on carbon transition risks, and integrating quantitative and qualitative methods into a single analytical framework.

LITERATURE REVIEW

The conceptual foundation of this study is based on the climate risk taxonomy developed by the Task Force on Climate-related Financial Disclosures (hereinafter – TCFD). This framework distinguishes between two broad categories of climate-related risks: transition risks and physical risks. Transition risks arise during the shift toward a low-carbon economy and include regulatory changes, such as carbon taxes and the expansion of emissions trading systems; technological shifts, including the decreasing cost of renewable energy and the increasing cost of carbon-intensive technologies;

market changes related to shifts in demand for carbon-intensive products; and reputational risks associated with environmental performance (Venturini, 2022). Physical risks, in turn, include acute climate events, such as extreme weather, and chronic climate changes that may affect productive capacity, infrastructure, and asset values over the long term (Dietz et al., 2016; Kahn et al., 2021).

The dynamic capabilities framework provides an important theoretical basis for understanding how firms adapt to external pressures. Teece et al. (1997) argue that firms with well-developed capabilities for sensing opportunities, reconfiguring resources, and adjusting business models are better positioned to respond to structural changes. Resource dependence theory accounts for the strategic inertia that resource-extractive firms display in the face of climate pressures: the greater an organisation's reliance on carbon-intensive assets and embedded institutional relationships, the stronger its resistance to transformation (Aldy & Stavins, 2012). The tension between resource-dependency inertia and adaptive capacity defines the core managerial challenge of the carbon transition.

A large body of ESG investment research confirms a link between sustainability performance and financial outcomes. The meta-analysis by Friede et al. (2015), drawing on more than 2,200 studies, found a positive or neutral relationship between ESG and financial performance in 90% of cases. Pedersen et al. (2021) introduced the concept of an ESG-efficient frontier, demonstrating that incorporating ESG constraints into investment strategies does not meaningfully reduce returns in diversified portfolios. Green bond issuance represents an important financial mechanism through which firms can signal environmental commitment and improve access to capital. Flammer (2021) demonstrated that green bonds are associated with a lower cost of debt and stronger environmental signaling. In contrast, Christensen et al. (2022) showed that improved environmental disclosure can positively affect ESG ratings.

Taken together, the ESG investment literature establishes that sustainability performance and financial outcomes are positively linked across a wide range of markets and asset classes. However, this aggregate finding obscures important variation: the mechanisms by which ESG factors, and carbon risk in particular, affect firm value remain contested, and the evidence base is disproportionately drawn

from developed markets with mature regulatory frameworks.

Bolton and Kacperczyk (2021) made an important contribution to the theoretical grounding of carbon risk as a distinct financial risk category by showing that investors systematically demand a premium for holding shares in high-emission firms. Sautner et al. (2023) developed a firm-level measure of climate change exposure from earnings call transcripts and found a significant positive relationship between perceived climate risk and stock return volatility. Turning to bond markets, Huynh and Xia (2021) documented that climate news risk widens credit spreads for carbon-intensive issuers.

For managers, the evidence on how corporate actions mediate climate risk exposure is especially valuable. Hossain and Masum (2022) found that CSR engagement significantly reduces firm-level climate change risk. Using cross-country data, Mbanyele and Muchenje (2022) showed that firms with more advanced climate risk management systems display greater financial resilience. The role of shareholder pressure is also well documented. Flammer et al. (2021) found that shareholder activism on climate issues drives voluntary disclosure of transition risks and the adoption of more ambitious emissions targets.

The firm-level carbon risk literature has produced robust findings for developed markets, particularly in the context of the EU ETS. However, the applicability of these findings to emerging economies remains uncertain: institutional frameworks, capital market depth, and the political economy of carbon pricing differ substantially between settings. The following sub-section reviews the more limited but growing body of evidence specific to Kazakhstan and Central Asia.

Kazakhstan occupies a distinctive position in the emerging-market climate policy literature. Karatayev and Hall (2020) conducted a comparative study of energy security in Kazakhstan and Russia, concluding that extreme resource dependence leads to chronic underestimation of transition risks in national strategic planning. (Shen et al., 2021) examined the decoupling between GDP growth and CO₂ emissions, detecting only 'weak' decoupling in the industrial sector - that is, a relative decline in emission intensity alongside absolute growth in total emissions.

Several studies have specifically examined Kazakhstan's emissions trading system, KazETS. Howie et al. (2020) compared its effectiveness with South Korea's ETS and identified several systemic weaknesses,

including the over-allocation of free allowances, low carbon prices, and insufficient verification mechanisms. Sansyzbayev et al. (2025) analyzed the socio-economic constraints on Kazakhstan's low-carbon transition, highlighting vested interests, energy security concerns, and employment stability as the main barriers. They showed that Kazakhstan accounts for more than 75% of regional emissions, yet its emissions-intensity gap relative to other Central Asian countries has not narrowed.

Comparing the three streams of literature reviewed above reveals a structural disconnect: theoretical frameworks for climate risk management (TCFD, resource dependence, dynamic capabilities) are well-developed; empirical carbon risk research for developed markets is extensive, but the intersection of these two bodies of work in an emerging-economy, firm-level context - and specifically for Central Asia - remains almost entirely unexplored.

Three gaps in the existing literature stand out. First, quantitative firm-level carbon risk studies for Central Asia are virtually absent; most work operates at the country or sector level. Second, ETS research for Kazakhstan does not connect the institutional design of carbon policy to corporate risk management strategies (Howie et al., 2020; Sansyzbayev et al., 2025). Third, green finance research in emerging markets is poorly integrated with work on industrial decarbonisation (Hong et al., 2020). Therefore, there is a need for a more comprehensive assessment of the risks of the carbon transition in Kazakhstan's industrial economy. This article addresses these gaps by providing firm-level empirical evidence on carbon transition risk assessment and management in Kazakhstan's industrial sector.

METHODOLOGY

The study covers the period from 2011 to 2025. The starting year was selected to provide a two-year baseline before the launch of Kazakhstan's emissions trading system, KazETS, in 2013 (Howie et al., 2020). The upper boundary of 2025 allows the analysis to capture the early period of EU CBAM tightening; however, data for 2024–2025 are treated as preliminary and interpreted with caution.

The empirical base of the study draws on several complementary data sources. National-level indicators on industrial output, energy consumption,

and fixed capital investment were obtained from Kazakhstan's Bureau of National Statistics. In contrast, data on the national energy balance, CO₂ emissions, and the KazETS registry were obtained from Kazakhstan's Ministry of Energy. Information on green finance was taken from EBRD and World Bank reports, and firm-level data were derived from the annual and ESG reports of 12 major industrial companies. In addition, international datasets from Our World in Data, the Global Carbon Project, and the IEA were used for comparative benchmarking.

The sample includes 12 large industrial companies from five carbon-intensive sectors: oil and gas (KazMunayGas, KazTransOil), metallurgy (ArcelorMittal Temirtau, Kazakhmys), mining (KazMinerals, ENRC), chemicals (KazAzot, Karabatan LLP), and power generation (Samruk-Energo, KEGOC, EEC). Selection criteria: participation in KazETS, availability of public reporting, and output exceeding KZT 1 billion. The sample collectively accounts for roughly 65% of industrial CO₂ emissions in Kazakhstan. The representativeness of this purposive sample rests on two grounds. First, by emission volume, these 12 firms account for the dominant share of Kazakhstan's industrial carbon footprint, so their trajectories well capture any economy-wide pattern in carbon risk dynamics. Second, the firms span all five major industrial sub-sectors defined by the Bureau of National Statistics, ensuring cross-sector heterogeneity. The principal limitation is the exclusion of small and medium-sized enterprises, which account for approximately 35% of industrial emissions but lack systematic public environmental reporting; this boundary is explicitly acknowledged in the limitations section of the conclusion.

The dependent variable is the CRI, a composite indicator designed to assess firms' exposure to carbon transition risks. The construction of the index draws on the TCFD framework. It combines five normalised dimensions of carbon risk: production carbon intensity, technological obsolescence, regulatory exposure, reputational risk, and limited access to green finance. The CRI for firm i in year t is calculated as follows (1):

$$CRI = 0.35CI_{norm} + 0.25EQ_{norm} + 0.20REG_{norm} + 0.10REP_{norm} + 0.10FIN_{norm} \quad (1)$$

where:

CRI – the Carbon Risk Index of firm i in year t ;

CI – the production carbon intensity, measured as tones of CO₂ per KZT millions of gross value added;

EQ – the share of physically obsolete equipment older than 25 years;

REG – the regulatory intensity index;

REP – the reputational risk index (media sentiment score);

FIN – the inverse share of green finance.

All sub-indices are normalised using the min-max method across the full panel, so that higher values indicate greater carbon transition risk. The Reputational Risk Index (REP) is derived from a structured media-content analysis: for each firm-year observation, we identified all relevant Kazakh- and Russian-language news items mentioning the company in an environmental or emissions context, coded each item as negative (-1), neutral (0), or positive (+1), and computed the proportion of negative items in total coverage; this proportion was then min-max normalised so that higher values indicate greater reputational risk.

The explanatory variables include production carbon intensity CI_{it} - production carbon intensity; EQ_{it} - share of obsolete equipment; GF_{it} - share of green finance in the firm's investment portfolio (green bonds, ESG loans, climate funds); REG_t - regulatory intensity index (ETS allowance price $\times$ share of covered emissions); $SIZE_i$ - natural log of total assets, included as a control variable since larger firms generally operate more developed risk management systems. Regulatory exposure is calculated as the annual KazETS allowance price multiplied by the share of firm-level emissions covered by KazETS. Firm size is measured as the natural logarithm of total assets and is included as a control variable, since larger firms may have more developed risk management systems (Dang et al., 2018).

In summary, the model structure is as follows. Dependent variable is the CRI_{it} , which measures the carbon transition risk exposure of firm (i) in year (t). The variables CI_{it} and EQ_{it} capture firm-level operational characteristics; GF_{it} captures financial strategy. The regulatory variable, REG_t , is time-varying and common to all firms within a given year.

The fixed-effects regression model is specified as follows (2):

$$CRI_{it} = \beta_0 + \beta_1 CI_{it} + \beta_2 EQ_{it} + \beta_3 GF_{it} + \beta_4 REG_t + \beta_5 SIZE_{it} + \alpha_i + \gamma_t + \varepsilon_{it} \quad (2)$$

where:

CRI_{it} – the Carbon Risk Index of firm *i* in year *t*;

CI_{it} – the production carbon intensity;

EQ_{it} – the share of obsolete equipment;

GF_{it} – the share of green finance;

REG_t – the regulatory exposure;

$SIZE_{it}$ – the firm size;

α_i – firm fixed effects;

γ_t – year fixed effects;

ε_{it} – idiosyncratic error term.

Since several explanatory variables are also used in constructing the composite CRI, the regression results are interpreted as an explanatory decomposition of carbon risk dynamics rather than as a strict causal estimate. The choice of the FE estimator is supported by the Hausman test ($\chi^2=18.4$, $p<0.01$) (Hausman, 1978). Heteroskedasticity was assessed using the White test (White, 1980), and standard errors were clustered at the firm level to account for serial correlation. Multicollinearity was diagnosed using variance inflation factors, with all VIF values below 4.2. The final panel consisted of 180 firm-year observations, covering 12 firms over 15 years.

RESULTS

The empirical analysis is presented sequentially in the results section. First, the general dynamics of carbon transition indicators in Kazakhstan's industrial sector are considered; then the relationships among key variables are analyzed; and finally, the results of a regression assessment of carbon risk factors are presented. Additionally, the dynamics of the CRI index across the main industrial sectors were compared, and a matrix of risks and opportunities for the carbon transition was developed. The data obtained shows multidirectional dynamics. On the one hand, the carbon intensity of the industrial sector has been gradually decreasing, indicating improved production efficiency. On the other hand, the absolute volume of CO₂ emissions continued to grow, except for a temporary decrease in 2020 related to the pandemic recession in economic activity. This situation reflects the effect of weak decoupling: relative carbon intensity decreases while total emissions continue to increase.

Table 1 presents the key carbon transition indicators for Kazakhstan's industrial sector over the period 2011–2025, including CO₂ emissions, emission intensity, the share of renewables, KazETS allowance prices, and the CRI index.

Table 1. Key carbon transition indicators for Kazakhstan's industrial sector for 2011-2025

Year	CO ₂ emissions, Mt	Emission intensity*	Renewables share, %	ETS price, KZT/t	CRI index
2011	227.4	6.82	0.8%	-	0.72
2013	235.8	6.71	1.0%	200	0.71
2015	233.5	6.48	1.3%	200	0.68
2017	232.7	6.21	1.7%	300	0.63
2019	241.6	5.98	2.4%	500	0.60
2020	228.3	5.83	2.8%	500	0.58
2022	248.9	5.60	3.8%	750	0.55
2023	251.4	5.52	4.3%	1.000	0.54
2024	253.2	5.61	4.9%	1.200	0.55
2025	252.6	5.57	5.6%	1.500	0.53

Note: compiled by the authors based on the Bureau of National Statistics (2025)

Three structural conclusions emerge from these figures. First, the gap between falling intensity (-18.4%) and rising absolute emissions (+11.2%) shows that efficiency gains are being overtaken by the scale effect of economic growth and capacity expansion - a phenomenon widely described as the Jevons paradox and confirmed for Kazakhstan by Zhakiyev et al. (2024). Second, despite continuous increases in ETS prices from KZT 200 to KZT 1,500 per tonne, the level remains well below the social

cost of carbon (approximately USD 80-100/t per IPCC, 2023), limiting the disciplining effect of the carbon market. Third, the share of renewables has grown from 0.8% to 5.6%. Nevertheless, it still lags far behind Kazakhstan's Green Economy Concept target of 30% by 2030, indicating an insufficient policy incentive structure for a large-scale transition.

The divergent dynamics of Kazakhstan's industrial carbon transition are illustrated in Figure 1.

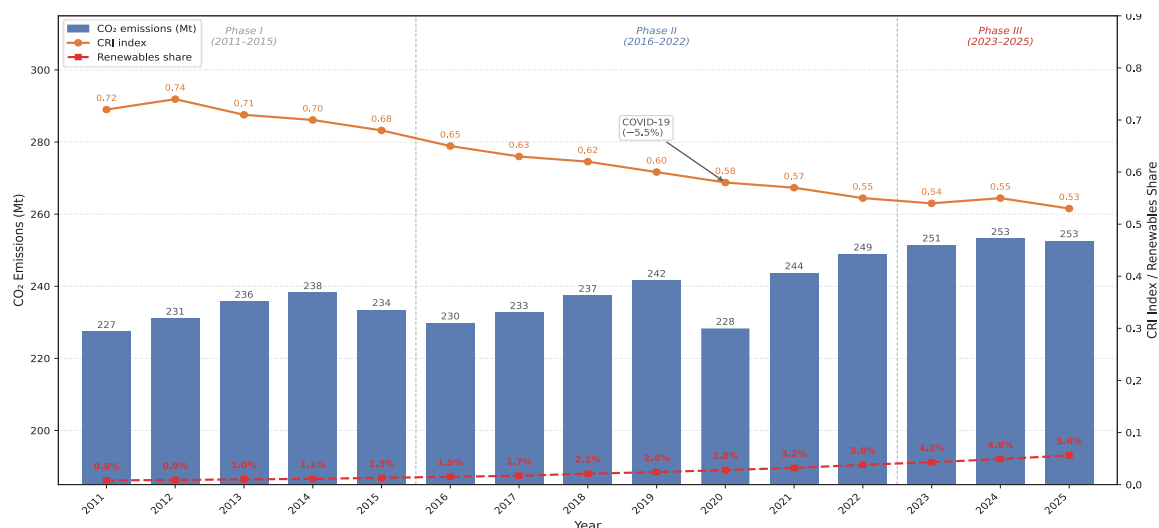


Figure 1. Dynamics of CO₂ emissions, CRI index and renewable energy share in Kazakhstan's industrial sector for 2011–2025

The chart shows that, despite a gradual decline in emission intensity and the CRI index, absolute CO₂ emissions continued to increase over most of the observed period. During the 'inertial phase' (2011-2015), the emission bars grow steadily while the CRI curve starts a modest downward drift, reflecting early organisational adjustments. In the

'regulatory activation' period (2016-2022), the CRI slope steepens in line with ETS price increases and the renewables share accelerates. The year 2020 is analytically important, the pandemic-driven drop in emissions did not produce any structural improvement - emissions rebounded to historical highs as early as 2021, confirming the path-dependent

nature of heavy industrial infrastructure (Bolton & Kacperczyk, 2021). The 'transitional turbulence' phase (2023-2025) is characterized by rising absolute emissions alongside a moderating decline in CRI, reflecting a tension between new capacity additions

that push up total emissions and improvements in risk management systems.

The dynamics of the KazETS allowance price are shown in Figure 2.

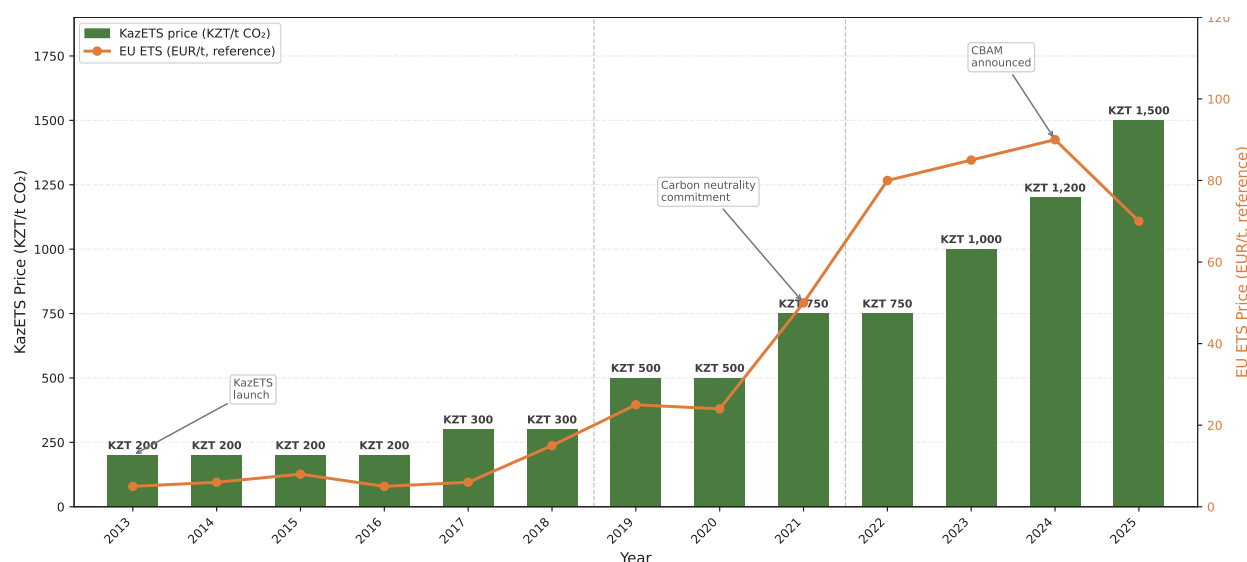


Figure 2. KazETS allowance price dynamics in Kazakhstan for 2013–2025

The chart illustrates a stepwise carbon price path typical of the 'soft start' design of cap-and-trade systems (Green, 2021). From 2013 to 2019, the price held in the KZT 200-500 per ton range (roughly USD 0.40-1.00 per ton) - exceptionally low by international standards: the EU ETS traded at EUR 5-25 per tonne over the same period. The acceleration from 2021 onward (KZT 750 to KZT 1,500) reflects two drivers: anticipation of the EU

CBAM (Grubb et al., 2022) and Kazakhstan's adoption of a Carbon Neutrality Strategy in 2023. Yet at roughly USD 3.30 per tonne, the current price remains a largely symbolic signal - well below the USD 50-100 per tonne threshold widely considered necessary to drive major low-carbon capital expenditure (Dietz & Stern, 2015; Bai & Ru, 2024).

The Pearson correlation matrix in Table 2 reveals the theoretically expected pattern of associations.

Table 2. Pearson correlation matrix for the main variables

Variable	CRI	CI	EQ	GF	REG	SIZE
CRI (Risk index)	1.00					
CI (Carbon intensity)	0.74***	1.00				
EQ (Obsolete equipment)	0.61***	0.58***	1.00			
GF (Green finance)	-0.53**	-0.47**	-0.39**	1.00		
REG (Regulatory index)	-0.31*	-0.29*	-0.22	0.44**	1.00	
SIZE (Firm size)	-0.18	-0.21	-0.26*	0.31*	0.12	1.00

*** p<0.001; ** p<0.01; * p<0.05. N=180 (12 firms × 15 years). Standard errors clustered at the firm level.

Note: compiled by the authors

The results show that the CRI index has a strong positive relationship with the carbon intensity of production ($r = 0.74$; $p < 0.001$) and a moderate positive relationship with the proportion of obsolete equipment ($r = 0.61$; $p < 0.001$). This means that enterprises with higher carbon intensity and a higher

proportion of physically worn-out production assets face a higher risk of carbon transition. Green finance has a negative relationship with the CRI index ($r = -0.53$; $p < 0.01$), indicating lower carbon risk for companies with greater access to green financial instruments. The relationship between regulatory

intensity and CRI is also negative but weaker ($r = -0.31$; $p < 0.05$). This may indicate that increased carbon regulation is encouraging companies to reduce carbon risks.

To provide a visual representation of the relationships among the main variables, a correlation heatmap is presented in Figure 3.



Figure 3. Pearson correlation heatmap

The heatmap reveals two variable clusters: a 'risk cluster' - CRI, CI, EQ -connected by mutually positive correlations of moderate to high magnitude; and a 'protective cluster' - GF, REG, SIZE - negatively associated with the risk cluster. The moderate positive correlation between GF and REG ($r=0.44$) is particularly noteworthy: stricter carbon regulation appears to push firms toward green finance instruments, an effect documented by Flammer et al. (2021) for developed markets and corroborated here for Kazakhstan for the first

time. The negative but insignificant SIZE-CRI link suggests that the competitive advantages of scale in carbon risk management operate indirectly, mediated through GF and EQ rather than through size per se.

After examining the bivariate relationships among the variables, a fixed-effects panel regression was estimated to identify the main factors associated with firm-level carbon transition risk. The regression results are presented in Table 3.

Table 3. Fixed-effects panel regression results for the CRI

Variable	Coeff. (β)	Std. error	t-stat.	p-value
Intercept (β_0)	0.412	0.088	4.68	0.000
CI (Carbon intensity)	0.614***	0.071	8.65	0.000
EQ (Obsolete equipment)	0.441**	0.094	4.69	0.002
GF (Green finance)	-0.383**	0.102	-3.75	0.006
REG (Regulatory index)	-0.217*	0.086	-2.52	0.028
SIZE (Firm size)	-0.093	0.061	-1.52	0.142
R ² (within)	0.712	-	-	-
F-statistic	38.6***	-	-	-
N (observations)	180	-	-	-

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. Standard errors clustered at the firm level. Firm and year fixed effects included.
Note: compiled by the authors

The model fits the data well, a within- R^2 of 0.712 means that the included variables account for over 71% of the within-firm variation in the CRI - a figure comparable to analogous panel studies in developed markets (e.g., Sautner et al., 2023), where $R^2=0.68$. The Hausman test (Hausman, 1978) ($\chi^2=18.4, p<0.01$) firmly favours the fixed-effects over a random-effects estimator. The White test (White, 1980) detects no significant heteroskedasticity ($p=0.34$).

The carbon intensity of production has the strongest positive impact on the CRI index. The coefficient for the CI variable is 0.614 and

statistically significant at $p < 0.001$. This shows that enterprises with higher carbon intensity are characterized by a higher risk of carbon transition. The second significant factor is the proportion of obsolete equipment. Green financing has a negative and statistically significant coefficient (-0.383; $p = 0.006$). This means that higher access to green financial instruments is associated with a reduction in carbon risk. For a more visual representation of the regression results, Figure 4 shows standardized coefficients for factors related to the carbon risk index.

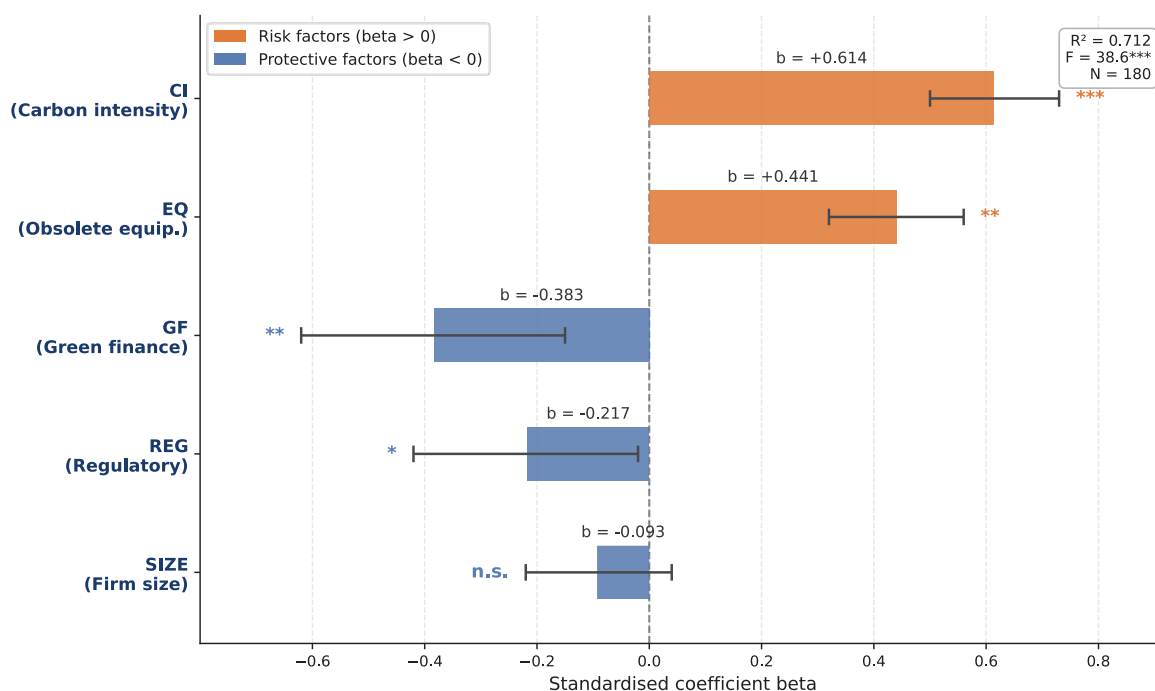


Figure 4. Standardised coefficients of factors associated with the CRI

Several findings stand out from the regression results. The dominant risk factor is carbon intensity ($\beta = 0.614$), which has the largest standardised effect and indicates that firms with more carbon-intensive production are associated with higher levels of carbon transition risk. This result is consistent with the theoretical predictions of Bolton and Kacperczyk (2021) and Venturini (2022). Technological obsolescence is the second important risk factor ($\beta = 0.441$), reflecting a structural problem characteristic of post-Soviet industry, in which outdated production assets make it more difficult to adapt to low-carbon requirements. Green finance ($\beta = -0.383$) has a negative and statistically significant coefficient, suggesting that access to

sustainable finance instruments may reduce firms' vulnerability to carbon-related risks. This finding is broadly consistent with the results of Flammer (2021) in the context of sustainable finance. Finally, the insignificance of firm size ($\beta = -0.093, p = 0.142$) suggests that among Kazakhstan's large industrial firms, scale alone is not sufficient to reduce carbon transition risk; technological renewal and access to green finance appear to matter more.

To examine sectoral differences in carbon transition risk, the CRI dynamics were further decomposed by major industrial sectors. Table 4 presents the changes in the Carbon Risk Index across five sectors of Kazakhstan's industry over the period 2011–2025.

Table 4. CRI index by Kazakhstan industrial sectors for 2011-2025

Sector	2011	2015	2019	2022	2025	2011-2025
Oil and Gas	0.81	0.78	0.71	0.64	0.59	- 27.2%
Metallurgy	0.76	0.73	0.67	0.62	0.57	- 25.0%
Mining	0.68	0.64	0.61	0.60	0.62	- 8.8%
Chemicals	0.71	0.67	0.62	0.57	0.52	- 26.8%
Power generation	0.85	0.80	0.72	0.65	0.58	- 31.8%
Average	0.72	0.68	0.60	0.57	0.53	- 26.4%

Note: compiled by the authors

The data show that in 2011-2025, the carbon risk index decreased across all sectors considered, but the rate of decline varied. The most noticeable reduction in CRI is observed in the electric power industry (-31.8%), chemical industry (-26.8%), oil and gas sector (-27.2%), and metallurgy (-25.0%). The least pronounced decrease was recorded in the mining sector (-8.8%), where the index increased from 0.60 to 0.62 after 2022. This indicates a higher risk of carbon inertia in this sector. On average, the CRI for industrial sectors decreased from 0.72 in 2011 to 0.53 in 2025, indicating an overall reduction

in carbon transition risks, while maintaining significant industry differences. This differentiation is consistent with Aghion et al. (2016) findings of sector-specific responses to carbon incentives: industries with greater technology substitution elasticity - oil and gas, power generation - convert regulatory signals into real-world improvements far more readily than mining, where technological choice is constrained.

Furthermore, Figure 5 illustrates the sectoral dynamics of the CRI in Kazakhstan's industry over the period 2011–2025.

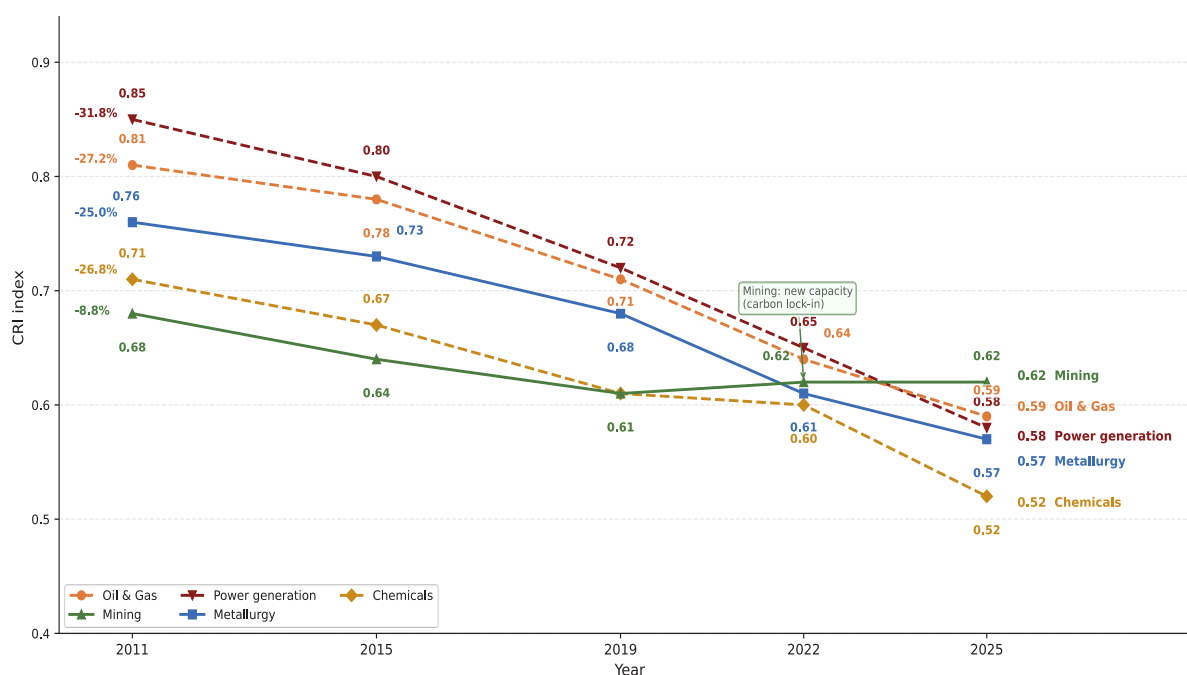


Figure 5. CRI index by Kazakhstan industrial sectors for 2011-2025

The chart highlights a strategically important phenomenon: the mining sector, which had the lowest starting CRI in 2011 (0.68), shows not improvement but deterioration by 2025 (0.62 - a 2.2% rise since 2022). This is a textbook instance of carbon lock-in (Frankel, 2010), caused by the

commissioning of new mining capacity in 2022-2024 without integrating low-carbon technologies - investment decisions made on a 20–30-year operating horizon that locked in a high-emission technological trajectory. By contrast, power generation experienced the largest absolute decline

in CRI (-0.27 points), attributable to direct regulatory pressure from KazETS, state renewable energy targets, and international modernization finance from the EBRD and the Green Climate Fund. Oil and gas occupy an intermediate position: despite a substantial CRI decline (-0.22 points), it retains the

highest absolute risk level (0.59 in 2025), reflecting the sector's structural carbon intensity.

The matrix in Table 5 and Appendix 1 synthesises the regression results with content analysis of strategic documents from the 12 sample firms.

Table 5. Carbon transition risk and opportunity management matrix for Kazakhstan's industrial companies

Category	Type	Likelihood	Impact	Strategic response
Regulatory	Risk	High	High	Active KazETS participation; engagement on transition timelines; CBAM compliance planning
Rising carbon price	Risk	High	High	Reducing unit emissions; forward contracts on allowances
Technological obsolescence	Risk	Medium	High	Phased low-carbon modernisation; partnerships with technology leaders
Reputational (ESG)	Risk	Medium	Medium	TCFD-aligned ESG reporting; investor and NGO engagement
Green finance access	Opportunity	High	High	Green bond issuance; EBRD climate credit lines; ESG funds
Export ESG premium	Opportunity	Medium	High	Low-carbon product certification; CBAM readiness for EU markets
Hydrogen and renewables	Opportunity	Low	Very high	R&D investment; pilot projects; public-private partnerships; GCF funding
Resource efficiency	Opportunity	High	Medium	Energy audits; ISO 50001; circular economy principles

Note: compiled by the authors

The two-dimensional structure - likelihood of occurrence and magnitude of impact - follows TCFD methodology and enriches it with strategic recommendations tailored to Kazakhstan's institutional context (Zhakiyev et al., 2024). Three strategic clusters emerge from the matrix. The 'immediate priorities' cluster (top-right quadrant) brings together regulatory risk, carbon price risk, and the green finance opportunity - all three characterised by high likelihood and high impact. Notably, a key opportunity lies in the same quadrant as the most pressing risks, underscoring the symmetric nature of the carbon transition: firms that actively manage risks simultaneously unlock new financing sources (Flammer, 2021). The 'quick wins' cluster (bottom-right) comprises resource efficiency and ESG talent development - high likelihood combined with moderate impact makes these attractive near-term levers for corporate transformation. The 'long-term options' cluster (top-left) - hydrogen and new energy - features low near-term probability but exceptionally high potential impact, fitting the 'real options' logic in strategic management (Teece et al., 1997): early R&D investment creates the right, but not the obligation, to enter a transforming market.

DISCUSSION

The findings contribute to the literature on climate risk management in emerging markets along four dimensions.

Primacy of internal operational factors over regulatory signals. The largest coefficient is for carbon intensity ($\beta=0.614$), and the second largest for technological obsolescence ($\beta=0.441$), together indicating that the dominant determinants of carbon risk in emerging markets are firm-internal rather than regulatory. This contrasts with patterns observed in the EU ETS (Dechezleprêtre et al., 2023), where regulatory signals drive much of the observed variation in emissions outcomes. Theoretically, this is consistent with resource dependence logic (Aldy & Stavins, 2012): sunk investments in carbon-intensive infrastructure create institutional inertia that modest KazETS price signals cannot overcome.

Green finance as a structural buffer against carbon risk. The significant negative coefficient on GF ($\beta = -0.383$) raises questions about the mechanism of the impact. The paper hypothesizes three channels. The signalling channel: issuing green bonds or securing

ESG loans requires verification of environmental commitments, thereby incentivising genuine emission reductions (Christensen et al., 2022). The investment channel: access to cheaper green capital lowers barriers to low-carbon modernisation (Flammer, 2021). The monitoring channel: ESG lender disclosure requirements improve corporate climate risk governance (Hossain & Masum, 2022). A stark benchmark comparison emerges: green finance accounted for just 3.2% of sample firms' total investment in 2025, compared with 12-18% for comparable European companies. Closing this gap is a systemic policy task.

Carbon lock-in in the mining sector. The rising CRI in mining over 2022-2025 is a classic carbon lock-in episode (Frankel, 2010): capacity expansion decisions were made on a 20–30-year horizon without proper accounting for climate risk. Content analysis of company documents reveals that neither of the two mining firms in the sample had incorporated a 1.5°C scenario analysis into their strategic planning documents as of 2024 – a requirement that TCFD has recommended since 2017.

Policy implications. Kazakhstan's climate policy faces a triple challenge: 1) accelerating the ETS price trajectory toward an 'effective' level (USD 50+ per tonne by 2030) while managing competitiveness (Green, 2021; Dietz & Stern, 2015); 2) building a green finance infrastructure – national taxonomies, ESG reporting standards, and de-risking tools for international investors and 3) developing sector-differentiated decarbonisation roadmaps that respect the distinct starting points and technological constraints of each industry (Shao et al., 2022; IEA, 2021).

CONCLUSION

This study provides a systematic empirical assessment of carbon transition risk dynamics in Kazakhstan's industrial sector over the period 2011–2025. Several key conclusions can be drawn.

First, Kazakhstan's industry demonstrates improvement in relative carbon risk indicators, while absolute emissions continue to increase. The Carbon Risk Index declined from 0.72 to 0.53, and emission intensity decreased by 18.4%. However, total CO₂ emissions increased by 11.2% over the same period. This indicates a weak decoupling pattern, in which production becomes less carbon-intensive, but the

overall scale of industrial emissions continues to grow.

Second, the regression results show that the main factors associated with the Carbon Risk Index are carbon intensity, the share of obsolete equipment, and access to green finance. Carbon intensity and technological obsolescence are positively associated with CRI, indicating that firms with more carbon-intensive production and outdated assets face higher transition risks. Green finance is negatively associated with CRI, suggesting that access to green bonds, ESG loans, and climate-related financing may reduce firms' exposure to carbon transition risks. The model explains 71.2% of within-firm variation in the index.

Third, the results reveal substantial differences across industrial sectors. The strongest reduction in CRI is observed in power generation, followed by oil and gas, chemicals, and metallurgy. In contrast, the mining sector shows the weakest improvement, with a slight increase in the index after 2022. This suggests that the mining sector remains more exposed to carbon lock-in risks due to limited technological substitution and continued reliance on carbon-intensive production assets.

Fourth, the risk-opportunity matrix identifies the most relevant areas for carbon transition risk management. The key risks include regulatory pressure, rising carbon prices, technological obsolescence, and reputational risks related to ESG. At the same time, green finance, resource efficiency, CBAM preparedness, low-carbon product certification, and investment in renewable energy and hydrogen technologies represent important opportunities for industrial companies.

The study has several limitations. The sample includes only 12 large industrial firms and excludes small and medium-sized enterprises, as well as companies without systematic public environmental reporting. In addition, data for 2024–2025 are preliminary and should be interpreted with caution. The CRI is also based on available indicators and may not fully capture all sector-specific dimensions of carbon transition risk.

The findings suggest that reducing carbon transition risks in Kazakhstan's industrial sector requires coordinated action by companies and policymakers. Industrial firms need to integrate climate-related risks into strategic and investment decision-making, rather than treating them only as

a compliance issue. Policymakers, in turn, should strengthen the green finance ecosystem, improve carbon regulation, and support sector-specific decarbonisation pathways.

Particular attention should be given to expanding access to green finance. Firms with higher green finance exposure exhibit lower CRI values, indicating that sustainable finance can support technological renewal and improve corporate climate risk management. Early engagement with green finance instruments, low-carbon technology partnerships, and CBAM preparedness can help Kazakhstan's industrial sector reduce transition risks and strengthen its long-term competitiveness.

AUTHOR CONTRIBUTIONS

Conceptualization and theory: LK, ZD and ZM; research design: LK, ZD, ZM and DB; data collection: LK.; analysis and interpretation: LK, ZD, ZM and DB; writing - original draft preparation: ZD, ZM and DB; supervision: LK, ZD and DB; writing - review and editing: LK, ZD, ZM and DB; proofreading and final approval: LK. All authors have read and agreed to the published version of this manuscript.

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Appendix 1

Carbon transition risk and opportunity bubble matrix



X-axis - probability of occurrence; Y-axis - potential financial impact; bubble diameter - aggregate significance. Orange bubbles - risks; blue bubbles - opportunities. Quadrant boundaries are set at median values on both axes.



Brand Perception, Origin Confusion and Local Brand Loyalty in Merged Provinces of Vietnam

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ABSTRACT

In the context of administrative transformations and the enlargement of territorial units in Vietnam, the problem of uncertainty of the origin of products is increasing, which affects the stability of local markets and consumer behavior. The aim of the study is to assess the impact of regional brand perception on loyalty to local brands, as well as to analyze the moderating role of uncertainty of origin in the context of provincial unification. The paper uses a quantitative approach using the PLS-SEM method. The empirical base consisted of data from a survey of 628 households in North Vietnam. The results showed that the perception of a regional brand has a positive and statistically significant effect on loyalty ($\beta = 0.257$; $p < 0.001$), while uncertainty of origin has a negative effect ($\beta = -0.306$; $p < 0.001$) and weakens this dependence (moderating effect $\beta = -0.200$; $p = 0.007$). The model explains 28.7% of the loyalty variation ($R^2 = 0.287$), which indicates a significant but vulnerable role of regional branding in the context of institutional changes. The results obtained emphasize the need to increase the transparency of information about the origin of products and the consistency of regional branding strategies in order to maintain the economic stability of local markets. By providing empirical evidence from an evolving administrative context, the study contributes to regional marketing literature and offers practical insights for policymakers, cooperatives, and producers aiming to safeguard local economic value amid structural reforms.

KEYWORDS: Brand, Regional Branding, Brand Loyalty, Consumer Behavior, Consumer Confusion, Marketing Strategy, Economic Resilience, Vietnam

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Восприятие бренда, неопределённость происхождения и лояльность к локальным брендам в объединённых провинциях Вьетнама

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АННОТАЦИЯ

В условиях административных преобразований и укрупнения территориальных единиц во Вьетнаме усиливается проблема неопределённости происхождения продукции, что оказывает влияние на устойчивость локальных рынков и потребительское поведение. Целью исследования является оценка влияния восприятия регионального бренда на лояльность к локальным брендам, а также анализ модерерирующей роли неопределённости происхождения в условиях объединения провинций. В работе использован количественный подход с применением метода PLS-SEM. Эмпирическую базу составили данные опроса 628 домохозяйств Северного Вьетнама. Результаты показали, что восприятие регионального бренда оказывает положительное и статистически значимое влияние на лояльность ($\beta = 0,257$; $p < 0,001$), тогда как неопределённость происхождения оказывает отрицательное влияние ($\beta = -0,306$; $p < 0,001$) и ослабляет данную зависимость (модерерирующий эффект $\beta = -0,200$; $p = 0,007$). Модель объясняет 28,7% вариации лояльности ($R^2 = 0,287$), что свидетельствует о значимой, но уязвимой роли регионального брендинга в условиях институциональных изменений. Полученные результаты подчеркивают необходимость повышения прозрачности информации о происхождении продукции и согласованности региональных брендинговых стратегий для поддержания экономической устойчивости локальных рынков.

Предоставляя эмпирические данные в условиях трансформирующегося административного контекста, исследование вносит вклад в литературу по региональному маркетингу и предлагает практические рекомендации для органов государственной власти, кооперативов и производителей, направленные на сохранение экономической ценности локальных продуктов в условиях структурных реформ.

КЛЮЧЕВЫЕ СЛОВА: бренд, региональный брендинг, лояльность к бренду, поведение потребителей, непонимание потребителей, маркетинговая стратегия, устойчивость экономики, Вьетнам

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INTRODUCTION

Recent administrative mergers implemented across Northern Vietnam have reshaped not only governance structures but also the symbolic foundations of local markets. Many local products, particularly OCOP goods, traditional specialties, and place-based brands, were historically associated with specific communes or district names that no longer exist in their former administrative form. As territorial identities are redefined, long-standing geographical cues embedded in product labeling and certification become misaligned with newly formalized administrative names. This misalignment generates increasing uncertainty in how consumers interpret product origins, giving rise to a distinct form of market disruption characterized by origin confusion.

This phenomenon poses a critical challenge for local economies that rely on place-based products. Regional brand perception plays a central role in sustaining authenticity signals, cultural meaning, and trust, key elements underpinning consumer loyalty and local economic resilience. However, administrative restructuring risks weakening these place-based anchors, potentially destabilizing local brand loyalty even when product quality and cultural value remain unchanged. Despite the scale and policy significance of administrative mergers, empirical research has paid limited attention to how such structural changes affect consumer perceptions, origin interpretation, and loyalty toward local brands.

Addressing this gap, the present study examines the interplay between regional brand perception, origin confusion, and local brand loyalty in the context of merged provinces in Northern Vietnam. Specifically, the study investigates (1) the effect of regional brand perception on local brand loyalty, (2) the direct impact of origin confusion on loyalty, and (3) the moderating role of origin confusion in shaping the relationship between perception and loyalty.

By doing so, this research makes two key contributions. Theoretically, it extends regional branding and consumer behavior literature by introducing administrative restructuring as a contextual driver of origin confusion and by clarifying its role in moderating loyalty formation. In practice, it offers evidence-based insights for

policymakers and local producers on how to preserve place-based brand value amid institutional change, thereby supporting the sustainability of local product competitiveness in post-merger contexts.

The scientific novelty of the study lies in the inclusion of institutional changes related to administrative reform as a factor that creates consumer uncertainty and affects the sustainability of local brands. Thus, in the context of the transformation of the administrative-territorial structure, there is a need for a deeper understanding of how changes in the institutional environment affect the perception of regional brands and consumer behavior. The aim of this study is to examine the effect of regional brand perception on local brand loyalty and to assess the moderating role of origin confusion in the context of administrative mergers in Northern Vietnam.

LITERATURE REVIEW

Brand loyalty is a central construct in marketing and consumer behavior research, commonly defined as a consumer's enduring preference and commitment toward a brand, reflected in both repeat purchase behavior and favorable attitudinal disposition (Dick & Basu, 1994; Chaudhuri & Holbrook, 2001). Traditional approaches conceptualize loyalty as a combination of behavioral consistency and attitudinal attachment, shaped by satisfaction, trust, and perceived value. More recent perspectives emphasize that loyalty is not purely transactional but also relational, involving emotional bonds and identity-related evaluations (Veloutsou, 2015).

Contemporary loyalty research highlights several directions relevant to this study. First, brand loyalty has been increasingly linked to symbolic and identity-based meanings, particularly in contexts where products carry cultural or place-based significance (Batra et al., 2012; Liu et al., 2012). Second, studies show that loyalty is sensitive to consumers' cognitive clarity and perceived credibility, especially when brand-related information becomes ambiguous or inconsistent (Shahid et al., 2025; Walsh & Mitchell, 2010). These strands suggest that loyalty toward regional or local brands depends not only on satisfaction but also on the stability of symbolic cues that connect the brand to consumers' identity frameworks.

In the context of regional and local brands in Vietnam, brand loyalty is closely tied to geographical

origin and place-based identity, particularly for agricultural and specialty products associated with specific provinces (Veloutsou, 2015). Administrative unit mergers alter official place designations and may weaken established origin cues, thereby challenging consumers' ability to sustain loyalty grounded in regional identity. This study, therefore, treats local brand loyalty as a relational outcome that remains meaningful but potentially vulnerable when institutional changes disrupt consumers' perception of stable brand–place associations.

Brand perception refers to consumers' overall cognitive and affective evaluation of a brand, encompassing interpretations of functional quality, symbolic meaning, and emotional value (Arai et al., 2014; Kervyn et al., 2012). Traditional approaches view brand perception as the result of accumulated experiences, communication, and social meaning, which influence downstream outcomes such as trust, purchase intention, and loyalty (Schivinski & Dabrowski, 2016; Nyadzayo & Khajehzadeh, 2016). In this sense, brand perception functions as a key mediating mechanism between brand signals and consumer responses.

Recent research on regional branding emphasizes that brand perception is strongly shaped by origin-based cues and evaluations of authenticity. Studies demonstrate that consumers rely on geographical origin, cultural heritage, and perceived authenticity to form favorable perceptions of regional brands (Nikraftar et al., 2025; Hurdawaty et al., 2025). At the same time, emerging work highlights that sustainability communication and digitally mediated representations of place influence how regional identity is interpreted, potentially strengthening or weakening perceived authenticity (Isac et al., 2025; Japutra et al., 2025; Tao et al., 2026). These findings indicate that regional brand perception remains rooted in place-based meaning but is increasingly exposed to contextual complexity.

Within the Vietnamese context of administrative mergers, regional brand perception faces additional challenges. Changes in official provincial boundaries and place names may create discontinuities between historically recognized origins and newly formalized administrative identities. Prior research suggests that such institutional shifts can destabilize the symbolic coherence of place-based brands, particularly when consumers rely on origin cues as signals of authenticity and quality (Liao et al., 2025; Mbinza,

2025). Accordingly, this study conceptualizes regional brand perception as a context-sensitive evaluation shaped by consumers' efforts to reconcile established regional meanings with administratively redefined geographical identities.

Origin confusion is conceptually derived from consumer confusion theory, which describes a state in which consumers experience uncertainty or misinterpretation during evaluation and decision-making processes due to ambiguous, inconsistent, or excessive information (Walsh & Mitchell, 2010; Shahid et al., 2025). In traditional consumer behavior research, confusion is understood as a cognitive response that reduces judgment accuracy, confidence, and perceived control, thereby weakening evaluative clarity and trust (Chen & Chang, 2013). When applied to branding contexts, confusion undermines consumers' ability to correctly infer key brand attributes and meanings.

Building on this foundation, origin confusion refers specifically to consumers' uncertainty or misperception regarding a product's geographical or cultural origin (Thakor & Lavack, 2003; Samiee et al., 2005). Empirical research demonstrates that unclear or inconsistent origin cues—such as place names, symbols, or labeling can distort consumers' origin inferences and alter their attitudes and behavioral intentions (Zhou & Hui, 2003; Wang et al., 2004). Further recent studies show that ambiguity surrounding sustainability claims, overlapping symbolic cues, and dense digital information environments intensify confusion and weaken perceived authenticity, credibility, and trust (Daou et al., 2025; Mauri et al., 2025; Agnihotri et al., 2025).

In the context of administrative unit mergers in Vietnam, origin confusion emerges as a salient issue for regional and local brands. Products traditionally associated with specific provinces or districts may face discrepancies between historically recognized place identities and newly formalized administrative labels. Prior research suggests that when origin cues lose consistency or continuity, consumers may struggle to reconcile established mental representations of place-based brands with institutional redefinitions, increasing uncertainty regarding authenticity and provenance (Samiee et al., 2005; Liao et al., 2025). Accordingly, this study conceptualizes origin confusion as context-specific uncertainty arising from administrative restructuring

that disrupts consumers' interpretation of regional brand origin.

Based on the theoretical background discussed above, this study develops hypotheses regarding the relationships between regional brand perception, origin confusion, and local brand loyalty.

H1: Regional brand perception positively influences local brand loyalty

The positive relationship between regional brand perception and local brand loyalty can be explained through the functional theory of attitude, which posits that attitudes serve knowledge and value-expressive functions, enabling consumers to organize information and express self-identity (Eagly & Chaiken, 1993; Shavitt, 1990). When a regional brand is perceived as an authentic symbol of local heritage, consumers develop favorable evaluations and an emotional attachment, which in turn strengthen loyalty (Ajzen, 2001). Recent regional branding research further suggests that perceptions related to sustainability, digital representations, and experiential authenticity can reinforce consumers' emotional connection to place-based brands (Ren et al., 2026; Hurdawaty et al., 2025).

This relationship is also supported by consumer ethnocentrism theory, which argues that preference for domestic or local products is rooted in moral and cultural considerations (Shimp & Sharma, 1987). Strong regional brand perception reinforces pride and familiarity with local identity, thereby fostering commitment and loyalty. Empirical evidence indicates that such identity-based loyalty operates within evolving socio-cultural contexts and may vary across demographic and generational groups (Fang et al., 2025; Vinyals-Mirabent et al., 2025). In merged provinces, loyalty is therefore maintained when consumers continue to perceive brands as authentically representing their region.

H2: Origin confusion negatively influences local brand loyalty

Origin confusion refers to consumers' uncertainty regarding a product's true geographical or brand origin (Samiee et al., 2005; Thakor & Lavack, 2003). According to consumer confusion theory, ambiguous or inconsistent information

increases cognitive overload, reduces trust, and weakens loyalty (Walsh & Mitchell, 2010). A recent meta-analysis confirms that confusion leads to negative behavioral outcomes, including reduced purchase intention and loyalty (Shahid et al., 2025). Contemporary studies further show that confusion induced by greenwashing, digital information overload, or inconsistent brand representations erodes perceptions of authenticity and consumer commitment (Daou et al., 2025; Nguyen & Duong, 2025; Agnihotri et al., 2025). In the context of local products, origin confusion weakens the symbolic association between the brand and the place, a key driver of loyalty. When consumers are uncertain about whether a product truly represents its traditional locality, perceived risk and skepticism increase, leading to disengagement (Chen & Chang, 2013).

H3: Origin confusion weakens the positive relationship between regional brand perception and local brand loyalty

Beyond its direct effect, origin confusion is expected to moderate the relationship between regional brand perception and local brand loyalty. Consumer learning theory suggests that consumers update their beliefs when confronted with conflicting information, potentially downgrading prior evaluations (Zhao et al., 2011; Cleeren et al., 2013). When positive regional brand perceptions coexist with uncertain origin cues, the translation of favorable perception into loyalty becomes weaker.

This moderating effect is consistent with ethnocentrism theory, as loyalty toward local products depends on perceived authenticity and symbolic congruence with regional identity (Shimp & Sharma, 1987). Empirical studies show that confusion reduces trust and word-of-mouth, thereby constraining otherwise positive brand effects (Walsh & Mitchell, 2010). Accordingly, origin confusion not only reduces loyalty directly but also weakens the positive impact of regional brand perception on loyalty.

Based on the hypotheses put forward, a conceptual research model is formed, shown in Figure 1.

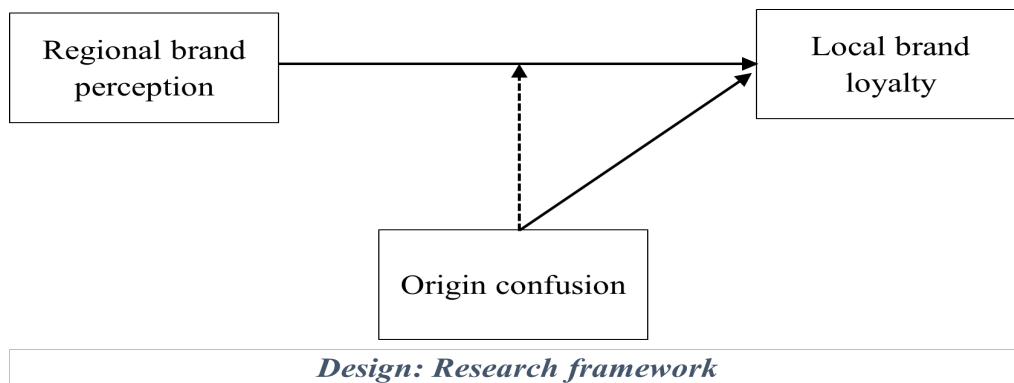


Figure 1. Conceptual research model

The conceptual research model presented reflects the relationship among perception of a regional brand, uncertainty of origin, and loyalty to local brands. The model includes the direct positive impact of regional brand perception on loyalty, as well as the negative impact of origin uncertainty. Based on the proposed hypothesis, the study proposes the above research framework with the independent variable “Regional brand perception”, the dependent variable “Local brand loyalty”, and the moderating variable “Origin confusion”.

METHODOLOGY

This study is situated in Northern Vietnam, a region currently undergoing large-scale administrative unit restructuring. Following the Government of Vietnam’s national program to reorganize district- and commune-level administrative units, numerous communes and districts have been merged, renamed, or dissolved, with several provinces moving toward consolidating lower administrative levels and eliminating intermediary units. While this reform aims to enhance governance efficiency, it has also produced unintended consequences for place-based identity and local product recognition.

For many local products in Northern Vietnam, particularly agricultural specialties, handicrafts, and traditional foods brand identity has historically been anchored in specific communes or districts. These place names function not merely as administrative labels but as symbolic origin cues that signal authenticity, heritage, and trust. Administrative mergers disrupt this linkage by replacing historically embedded geographical identifiers with newly formalized administrative names. As a result, products that were once clearly associated

with a familiar locality may now display labels or certifications that no longer align with consumers’ long-standing mental representations of place.

This context is particularly salient given Vietnam’s “One Commune, One Product” (OCOP) program, which emphasizes the development and certification of local specialties based on geographical origin and cultural distinctiveness. When administrative boundaries are redefined, OCOP products may be relabeled or reclassified, creating inconsistencies between historical place identity and current administrative designations. These inconsistencies create conditions under which consumers continue to perceive strong regional brand meaning while simultaneously experiencing uncertainty about product origin. Accordingly, administrative restructuring in Northern Vietnam provides a natural and theoretically relevant setting to examine how regional brand perception influences local brand loyalty and how origin confusion constrains this relationship.

This study adopts a quantitative research method to test the relationships proposed in the conceptual model. All measurement scales were adapted from established studies to ensure validity and reliability, with contextual adjustments made to reflect administrative restructuring in Northern Vietnam. The scale development process followed standard procedures, including adaptation from prior literature, contextual rewording, pilot testing, and refinement.

Regional Brand Perception (RGP) and Local Brand Loyalty (LBL) were adapted from widely validated scales in the branding literature (Johnson & Bruwer, 2007; Hankinson, 2005; Chaudhuri & Holbrook, 2001; Yoo & Donthu, 2001). Given their extensive prior validation, these constructs required

only minor wording adjustments to ensure relevance to local products in Vietnam, without altering their conceptual structure.

Origin Confusion (OCF) was adapted from the consumer confusion proneness scale developed by Walsh and Mitchell (2010). In the original scale, confusion is operationalized through multiple dimensions, including similarity, overload, and ambiguity. In this study, selected items, primarily from the ambiguity-related dimension, were reworded to capture uncertainty regarding product origin following administrative unit mergers, while maintaining the original item logic. For example, the original item “The information I get from advertising often is so vague that it is hard to know what a product can actually perform” was adapted to reflect origin-related ambiguity as “Information about this product’s place of origin is often unclear after recent administrative changes.” Similarly, the item “When buying a product I rarely feel sufficiently informed” was rephrased as “I often feel insufficiently informed about whether this product still comes from its traditionally recognized locality.”

A pilot test with 30 respondents was conducted to assess clarity and contextual relevance. Feedback indicated that the adapted origin-related items were clearly understood in relation to administrative restructuring. Minor wording refinements were made to improve precision, and no items were

removed at this stage. All constructs were measured using a five-point Likert scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”). The questionnaire was translated and back-translated to ensure semantic consistency.

Data were collected using a stratified random sampling approach targeting consumers in Northern Vietnamese provinces affected by administrative unit mergers. The sampling design followed two layers. The first layer was based on provincial distribution, proportionally aligned with household expenditure scale across major northern localities such as Ha Noi, Hai Phong, Quang Ninh, and Bac Ninh. The second layer stratified respondents by household income groups to ensure socio-economic representation. Each household was represented by one primary respondent, and each completed questionnaire constituted one valid observation.

The survey employed a household-based approach, as local and OCOP-related products are primarily purchased for household consumption. As a result, the sample includes a high proportion of female respondents (81.85%), reflecting the consumption context rather than sampling bias, since women in Vietnam typically assume primary responsibility for household purchasing decisions, particularly for food and everyday household items. A total of 628 usable responses were retained for analysis. Detailed demographic characteristics are presented in Table 1 below.

Table 1. Descriptive statistics results

Characteristics		Responses (N=628)	Percentage
Gender	Female	514	81.85
	Male	114	18.15
Household size	Single family	125	19.90
	Nuclear family	290	46.18
	Multigenerational household	213	33.92
Annual household income per capita	Under 5000 USD	311	49.52
	5000-10,000 USD	187	29.78
	10,000-20,000 USD	97	15.45
	Above 20,000 USD	33	5.25
Location	Ha Noi City (The Capital)	178	28.34
	Hai Phong City	102	16.24
	Quang Ninh Province	71	11.31
	Bac Ninh Province	59	9.39
	Red River Delta (Ninh Binh and Hung Yen provinces)	62	9.87
	Other provinces	156	24.84

Note: compiled by the authors

The final dataset included valid responses from participants with prior experience purchasing or consuming local products from the merged provinces. Data screening and cleaning were conducted using Microsoft Excel to remove incomplete or inconsistent responses. Common Method Bias (CMB) was tested using AMOS 24.0, and hypothesis testing was performed in SmartPLS 4.0 to assess both the measurement and structural models, following standard PLS-SEM procedures. The use of PLS-SEM is appropriate for both the proposed model and the practical context, as PLS-SEM is considered the most suitable approach for assessing moderation effects and theory-building orientations, rather than confirmatory testing, in line with the recommendations of Hair et al. (2019).

The CMB assessment was conducted following the recommendations of Henseler et al. (2016) using Confirmatory Factor Analysis (CFA). The model fit indices shown in the figure indicate that no issues related to Common Method Bias were detected in the dataset.

The measurement model was evaluated according to the guidelines of Hair et al. (2021). Reliability was confirmed through factor loadings exceeding 0.708 for all indicators, and Cronbach's Alpha and Composite Reliability (CR) values above 0.7 for all constructs. Convergent validity was established with AVE values greater than 0.5, while discriminant validity was verified using HTMT ratios below 0.85. The results are summarized in Table 2 below.

Table 2. Summarize the results of the measurement models

Code	<i>LBL</i> <i>(mean = 3.78)</i>	<i>OCF</i> <i>(mean =4.12)</i>	<i>RGP</i> <i>(mean =3.98)</i>	<i>OCF x RGP</i>
LBL1	0.811			
LBL2	0.832			
LBL3	0.811			
LBL4	0.821			
LBL5	0.828			
LBL6	0.800			
OCF1		0.847		
OCF2		0.894		
OCF3		0.852		
OCF4		0.813		
RGP1			0.855	
RGP2			0.845	
RGP3			0.870	
RGP4			0.845	
RGP5			0.862	
OCF x RGP				1
Cronbach's alpha	0.901	0.875	0.909	
CR	0.903	0.899	0.918	
AVE	0.668	0.727	0.732	
HTMT table	LBL	OCF	RGP	OCF x RGP
LBL	0.36			
OCF	0.394			
RGP	0.076	0.409		
OCF x RGP	0.360	0.400		

Note: authors' calculations using SmartPLS 4.0

These results confirm that the measurement model meets all recommended thresholds and is suitable for further structural model evaluation. The structural model was assessed using VIF values (to evaluate multicollinearity), R^2 (to assess the

explained variance of the endogenous constructs), f^2 (to determine effect sizes), and the significance of the structural paths. As reported in Table 3, all VIF values were below the recommended threshold of 3, indicating no multicollinearity issues.

Table 3. VIF and f^2 result

Relationship	VIF	f^2	Path coefficient (β)	t-value	p-value
OCF $\rightarrow$ LBL	1.352	0.187	-0.306	4.097	0.000
RGP $\rightarrow$ LBL	1.167	0.172	0.257	3.814	0.000
OCF $\times$ RGP $\rightarrow$ LBL	1.176	0.139	-0.200	2.699	0.007

Note: authors' calculations using SmartPLS 4.0

Perception of a regional brand has a positive and statistically significant effect on loyalty ($\beta = 0.257$; $p < 0.001$), while uncertainty of origin has a negative effect ($\beta = -0.306$; $p < 0.001$). The moderation effect is also significant ($\beta = -0.200$; $p = 0.007$), indicating that the influence of brand perception on loyalty weakens as uncertainty increases. The model explains a moderate proportion of variance

in local brand loyalty ($R^2 = 0.287$). All hypothesized relationships are statistically significant, including the direct effects of regional brand perception and origin confusion, as well as the moderating effect of origin confusion.

Figure 2 visually summarizes the structural relationships and illustrates the moderating role of origin confusion in the model.

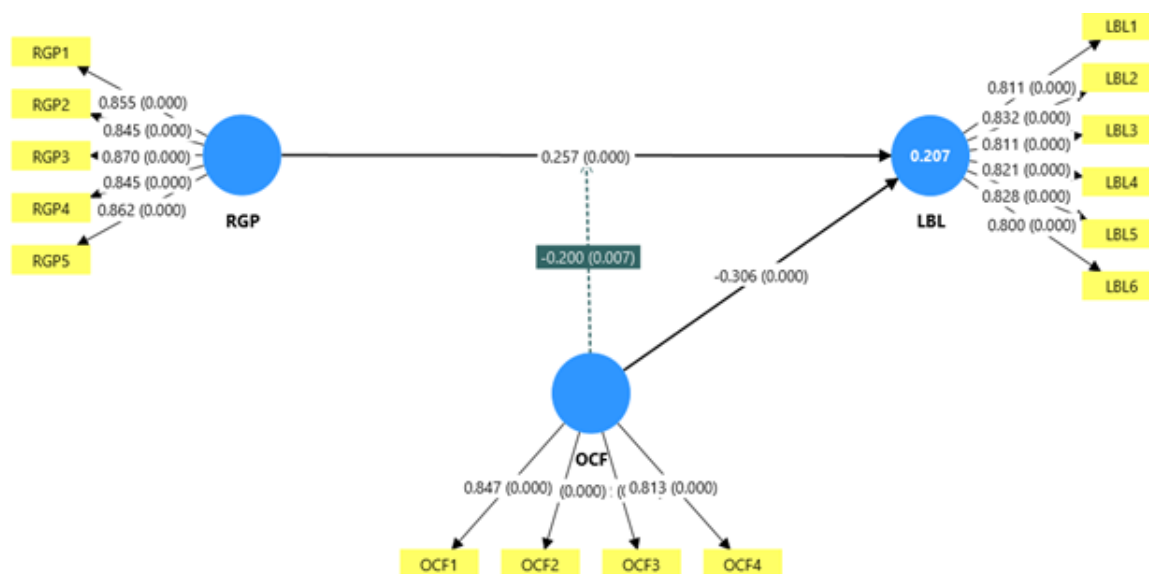


Figure 2. Summary result of the study

Figure 1 depicts a structural research model comprising three latent variables: perception of a regional brand (RGP), uncertainty of origin (OCF), and loyalty to a local brand (LBL). Perception of a regional brand has a positive effect on loyalty ($\beta = 0.257$; $p < 0.001$), while uncertainty of origin has a negative effect ($\beta = -0.306$; $p < 0.001$). A negative moderation effect was also observed ($\beta = -0.200$; p

$= 0.007$), indicating that the positive relationship between brand perception and loyalty weakens as uncertainty increases. All indicators have high factor loads, which confirms the reliability of the measurement model.

As shown in Table 4, all the relationships studied are statistically significant and correspond to the hypotheses put forward.

Table 4. Path coefficients results (Direct effect)

Relationship	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
OCF → LBL	-0.306	0.305	0.075	4.097	0.000
OCF x RGP → LBL	-0.200	0.189	0.074	2.699	0.007
RGP → LBL	0.257	0.264	0.068	3.814	0.000

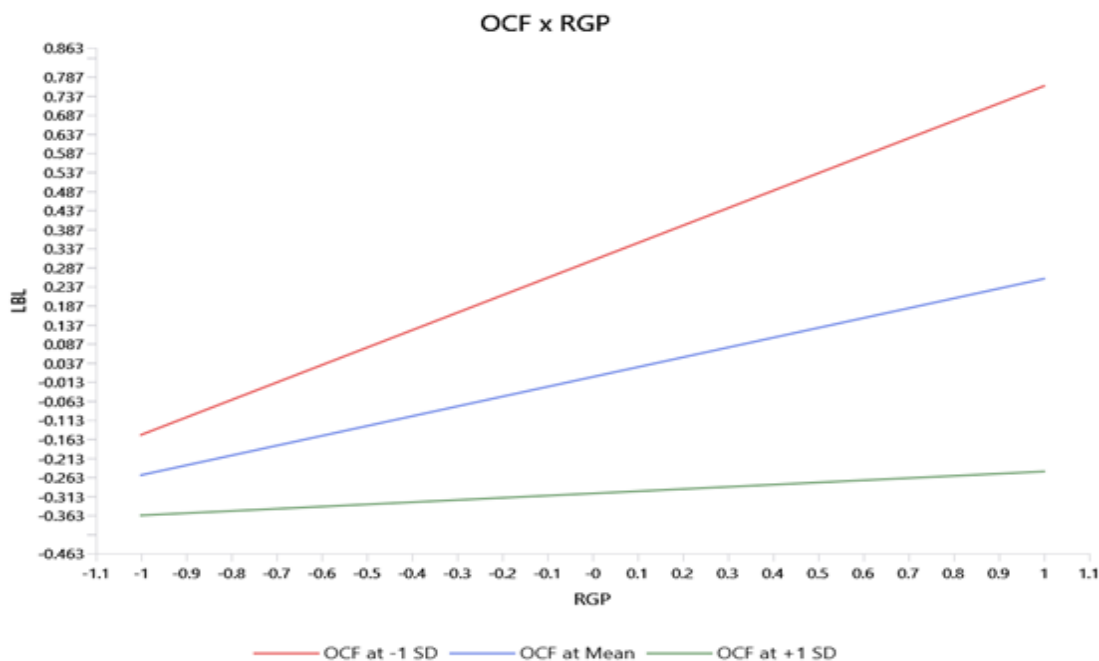
Note: authors' calculations using SmartPLS 4.0

Perception of a regional brand has a positive effect on loyalty ($\beta = 0.257$; $p < 0.001$), while uncertainty of origin has a negative effect ($\beta = -0.306$; $p < 0.001$). The moderation effect is also significant ($\beta = -0.200$; $p = 0.007$), indicating a weakening of the positive impact of brand perception on loyalty as origin uncertainty increases. The moderating effect of origin confusion was examined using path

coefficients and further visualized through a simple slope analysis. Based on the estimated standardized coefficients, the relationship can be expressed as follows:

$$LBL = 0.257 * RGP - 0.306 * OCF - 0.200 * RGP * OCF$$

The moderation effect is clearly shown in Figure 3.

**Figure 3.** Simple Slope analysis result

The results show that at origin confusion values corresponding to the mean, mean – 1 SD, and mean + 1 SD, the slope of the effect of regional brand perception decreases as origin confusion increases. This implies that when confusion about product origin becomes more prominent, particularly in the context of provincial mergers, where many former administrative identities now exist only historically, the influence of regional brand perception weakens and is no longer strong enough to generate local brand loyalty. This pattern is visualized through the Simple Slope Analysis above.

DISCUSSION

The findings of this study provide important insights into how regional brand perception, origin confusion, and local brand loyalty interact during administrative unit mergers in Northern Vietnam. By integrating established theoretical perspectives such as the functional theory of attitudes, consumer ethnocentrism, and consumer confusion theory with household-based empirical data, the study reveals both the resilience and the emerging vulnerability of local brand loyalty during periods of territorial restructuring.

The positive mean value of regional brand perception ($RGP = 3.98$) indicates that consumers continue to hold highly favorable evaluations of local products in merged provinces. This finding is consistent with prior literature suggesting that regional brands accumulate symbolic, cultural, and emotional value over time, often functioning as expressions of local identity and community pride (Arai et al., 2014; Veloutsou, 2015). The significant and positive structural path from RGP to local brand loyalty further confirms that, even amid administrative complexity, consumers rely on deeply embedded associations with origin, authenticity, and cultural symbolism.

The demographic structure of the sample provides additional context for this stability. The predominance of female respondents (81.85%), together with the high proportions of nuclear (46.18%) and multigenerational households (33.92%), reflects consumption patterns in which women typically assume primary responsibility for food purchasing and for maintaining traditional consumption habits. This household-based dynamic helps explain why regional brand perception remains strong: local specialty products often carry intergenerational meaning, and women play a central role in preserving recognition and trust toward familiar place-based brands.

Moreover, the relatively balanced geographical distribution of respondents—from major urban centers such as Ha Noi and Hai Phong City to semi-rural provinces including Quang Ninh, Bac Ninh, Ninh Binh, and Hung Yen, suggests that attachment to regional identity continues to influence consumer evaluation across diverse socio-spatial contexts. This supports signaling and self-congruity perspectives, indicating that cultural narratives embedded in regional brands remain salient despite administrative reclassification.

Origin confusion exhibits the highest mean value among the constructs ($OCF = 4.12$), indicating that uncertainty regarding product origin is widespread and intense. This pattern reflects the real-world consequences of Vietnam's administrative mergers, where long-standing commune and district names have been renamed, dissolved, or merged. Many OCOP and local specialty products, historically anchored to specific place names, now face inconsistencies between consumers' mental representations of origin and newly formalized administrative labels.

Consistent with consumer confusion theory (Walsh & Mitchell, 2010; Chen & Chang, 2013), such ambiguity increases cognitive load, weakens confidence in origin claims, and disrupts evaluative clarity. The significant negative effect of origin confusion on local brand loyalty supports H2 and aligns with prior empirical findings showing that confusion undermines trust, emotional attachment, and purchase commitment (Shahid et al., 2025). In this context, administrative restructuring disrupts both cognitive cues (accurate identification of origin) and symbolic cues (cultural continuity), leading consumers to question whether products still embody the identities they value.

Although local brand loyalty maintains a relatively strong mean value ($LBL = 3.78$), it remains lower than both RGP and OCF, suggesting that loyalty is increasingly placed under pressure. From the perspective of the functional theory of attitudes, loyalty depends on the knowledge function, which uses familiar origin cues to organize judgments, and the value-expressive function, which uses regional brands to express cultural identity (Eagly & Chaiken, 1993; Katz, 1960). When origin cues become uncertain, these functions are disrupted, weakening the attitudinal foundation of loyalty. This highlights a critical research gap: existing regional branding studies rarely account for how policy-driven structural changes, rather than market competition alone, destabilize identity-laden brand relationships.

The moderation results further reinforce this insight. Origin confusion significantly weakens the positive relationship between regional brand perception and local brand loyalty, supporting H3. Even when consumers evaluate regional brands positively, uncertainty regarding origin diminishes the strength of their loyalty. This finding is consistent with consumer learning theory (Zhao et al., 2011; Cleeren et al., 2013), which suggests that conflicting new information, such as the renaming of administrative units, leads consumers to revise, and sometimes downgrade, prior evaluations.

These findings carry important economic implications for post-merger socio-economic transformation. Local brands, particularly agricultural and OCOP-certified products, represent not only cultural assets but also critical sources of household income, rural livelihoods, and regional competitiveness. The high level of origin confusion,

therefore, signals a tangible economic risk: weakened loyalty may reduce market stability, disrupt consumer–producer trust, and fragment branding strategies across newly merged administrative units.

At the same time, the coexistence of strong regional brand perception (3.98) and moderate loyalty (3.78) suggests a window of opportunity. Provincial governments and local cooperatives can re-anchor regional economic value through clearer origin communication, consistent labeling practices, and coherent regional branding strategies that reconcile historical place identities with new administrative boundaries. Failure to address origin confusion, however, may result in long-term dilution of brand equity, undermining OCOP initiatives and constraining local economic development.

CONCLUSIONS

This study examined how regional brand perception shapes local brand loyalty in the context of administrative mergers in Northern Vietnam and assessed the moderating role of origin confusion. The findings confirm that regional brand perception continues to serve as a strong attitudinal anchor, supporting loyalty through culturally embedded associations of authenticity, heritage, and place-based identity. However, origin confusion, heightened by the renaming and restructuring of local administrative units, exerts a significant negative influence on loyalty and simultaneously weakens the positive impact of regional brand perception. This indicates that even strong cultural and symbolic ties to local products become vulnerable when consumers face uncertainty about geographical origin. Although loyalty remains relatively stable, the growing mismatch between historical place cues and newly formalized administrative identities poses substantive challenges to sustaining long-term consumer commitment to local products, particularly those closely tied to cultural narratives and regional economic development.

The findings highlight important implications for local governments, producers, and regional development stakeholders. For policymakers, the results underscore the need to establish clearer, more consistent communication about product origins following administrative mergers. Aligning labeling, certification, and promotional materials with new administrative structures, while simultaneously

acknowledging historically meaningful place names, will reduce confusion and preserve consumer trust. Such alignment is particularly crucial given that policy-driven structural changes, rather than market competition alone, are now a major source of ambiguity about origins.

For local producers and cooperatives, the study points to the strategic importance of reinforcing authenticity cues through coherent brand storytelling, traceability systems, and unified regional communication efforts that maintain continuity between past and present geographical identities. These recommendations directly reflect the study's limitations: because restructuring is still ongoing and varies across regions, communication strategies must be adaptive and sensitive to evolving consumer interpretations. More broadly, ensuring clarity in origin claims will help stabilize local consumption patterns, sustain household income tied to specialty products, and support the long-term viability of regional branding initiatives such as OCOP.

Although comprehensive in scope, this study is limited to Northern Vietnam, where the scale and pace of administrative mergers may differ from other regions. Future research could employ comparative or longitudinal designs to capture how origin confusion evolves as new administrative identities become normalized. Additional moderators such as regional attachment, cultural pride, or consumer familiarity with policy reforms may further enrich the model's explanatory power. Moreover, exploring differences across product categories could provide more nuanced insights into how various types of local goods respond to shifts in place-based identity cues. These limitations also indicate that practical recommendations must be interpreted within the policy environment that gives rise to origin ambiguity, reinforcing the need for ongoing coordination between branding initiatives and administrative decision-making.

AUTHOR CONTRIBUTIONS

Conceptualization and theory: DHL, THL, LMS and NTH; research design: DHL, THL, LMS and NTH; data collection: DHL; analysis and interpretation: THL; writing draft preparation: LMS and NTH; supervision: DHL and THL; correction of article: DHL, THL, LMS and NTH; proofread and final approval of article: DHL, THL, LMS and NTH. All authors have read and agreed to the published version of the manuscript.

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Value-Driven Consumer Behavior in the Art Retail Market: A Behavioral Economics Approach

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ABSTRACT

In the context of the transformation of consumer behavior and the growing importance of intangible assets, the study of factors determining recommendation behavior in the art market is becoming particularly relevant. The purpose of this study is to identify the influence of consumer values on the recommendation behavior of consumers in the art market, taking into account the mediating role of hedonic and eudaimonic happiness. An online survey was conducted with 342 MZ generation respondents. Five consumption values (functional, emotional, social, epistemic, and ethical) were measured along with two types of happiness and word-of-mouth (hereinafter – WOM). Structural equation modeling and bootstrapping were used to test the hypothesized relationships and mediating effects. The analysis results show that social ($\beta = 0.284$; $p < 0.001$), epistemic ($\beta = 0.205$; $p < 0.001$) and ethical ($\beta = 0.229$; $p < 0.001$) values have a significant impact on eudaimonic happiness, while emotional ($\beta = 0.240$; $p < 0.001$) and social ($\beta = 0.289$; $p < 0.001$) values significantly affect hedonic happiness. The study identifies dual hedonic and eudaimonic pathways through which consumption values shape WOM in the arts retail context. The results obtained confirm that consumer happiness is a key behavioral mechanism for the transformation of consumer values into recommendatory behavior, which is important for developing strategies for the development of the art market and improving the effectiveness of marketing communications.

KEYWORDS: Market, Retail Market, Retail Behavior, Behavioral Economics, Consumer, Consumer Happiness, Marketing Strategy, Creative Economy

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Ценностно-ориентированное потребительское поведение на арт-рынке: поведенческо-экономический подход

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АННОТАЦИЯ

В условиях трансформации потребительского поведения и роста значимости нематериальных ценностей исследование факторов, определяющих рекомендательное поведение на рынке искусства, приобретает особую актуальность. Целью данного исследования является выявление влияния ценностей потребления на рекомендательное поведение потребителей на арт-рынке с учётом медирующей роли гедонического и эвдемонического счастья. Онлайн-опрос был проведён среди 342 респондентов поколения MZ. Были измерены пять типов ценностей потребления (функциональная, эмоциональная, социальная, эпистемическая и этическая), а также два вида счастья и рекомендательное поведение (далее – WOM). Для проверки выдвинутых гипотез и оценки медирующих эффектов применялись методы структурного моделирования и бутстрэппинга. Результаты анализа показывают, что социальная ($\beta = 0.284$; $p < 0.001$), эпистемическая ($\beta = 0.205$; $p < 0.001$) и этическая ($\beta = 0.229$; $p < 0.001$) ценности оказывают значимое влияние на эвдемоническое счастье, тогда как эмоциональная ($\beta = 0.240$; $p < 0.001$) и социальная ($\beta = 0.289$; $p < 0.001$) ценности значимо влияют на гедоническое счастье. В исследовании выявлены двойственные гедонические и эвдемонические механизмы, посредством которых ценности потребления формируют рекомендательное поведение в контексте розничной торговли на арт-рынке. Полученные результаты подтверждают, что потребительское благополучие является ключевым поведенческим механизмом трансформации ценностей потребления в рекомендательное поведение, что имеет важное значение для разработки стратегий развития арт-рынка и повышения эффективности маркетинговых коммуникаций.

КЛЮЧЕВЫЕ СЛОВА: рынок, розничный рынок, розничное потребительское поведение, поведенческая экономика, потребитель, потребительское благополучие, маркетинговая стратегия, креативная экономика

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INTRODUCTION

Modern consumer culture is increasingly shifting from material-oriented consumption to a focus on emotional satisfaction and meaningful experiences. In this context, the arts have evolved from mere objects of aesthetic appreciation to retailable experiential goods distributed across diverse offline and online channels. Art galleries, museum shops, and digital platforms now function as key distribution nodes, allowing consumers to purchase, share, and recommend cultural products as part of a broader lifestyle economy (McCarthy et al., 2001).

In Korea, participation in cultural and artistic consumption has expanded significantly, particularly among the MZ generation. For example, new art collectors in their 20s and 30s camped outside galleries to acquire works by emerging artists, and more than half of the visitors to KIAF Seoul 2021 were under 40. According to the Ministry of Culture, Sports and Tourism (2019), cultural event attendance among individuals in their 20s and 30s reached 97.4% and 91.5%, respectively, far exceeding the national average of 81.8%. These shifts not only signal a generational transformation in art appreciation but also represent a distributional transition in how arts are marketed, purchased, and shared through retail and digital channels.

The MZ generation, a collective term for Millennials and Generation Z, exhibits distinct value-driven shopping and consumption behaviors (Jeong, 2023). Despite their relatively limited income and assets (Bank of Korea, 2022), they actively engage in leisure and cultural spending, viewing consumption as a means of self-expression and social signaling (Choi, 2022). Arts retailing resonates with these tendencies, encompassing emotional gratification, social bonding, and ethical awareness. Therefore, understanding how this generation's consumption values influence behavioral outcomes, particularly word-of-mouth (hereinafter – WOM) across distribution channels, is essential for both marketing and retail strategy.

Recent developments in digital retailing and consumer participation have further reshaped how value is created and communicated in the marketplace. Studies on digital WOM highlight the increasing influence of online reviews, platform algorithms, and consumer-generated content on retail decision-making (Feng et al., 2024; Sang et

al., 2024; Srivastava et al., 2025). Research on social commerce emphasizes interactive, community-based purchasing behaviors in which sharing and engagement accelerate product diffusion (Guo & Li, 2022; Xq et al., 2021). In addition, the value co-creation perspective suggests that consumers actively co-produce meanings and experiences with brands across physical and digital channels (Cui et al., 2022).

Moreover, from a distribution perspective, WOM plays a critical role in shaping channel performance in the arts retail market. As cultural products circulate across offline galleries, pop-up stores, and digital commerce platforms, consumer-generated WOM reduces information asymmetry, enhances channel efficiency, and accelerates product diffusion. Particularly among MZ consumers, who actively engage with multi-channel retail environments, WOM serves as a key mechanism driving consumer traffic, increasing platform visibility, and influencing the allocation of attention and resources across distribution channels. By positioning WOM as a channel-level outcome, this study contributes to a deeper understanding of value-based behaviors within the arts distribution ecosystem.

Furthermore, the arts retail market increasingly reflects broader trends in logistics and supply chain management, as cultural goods move through hybrid channels that integrate offline galleries, pop-up stores, and online marketplaces. These developments illustrate the emergence of shortened supply chains, direct-to-consumer (D2C) models, algorithm-driven visibility, and evolving power-dependence structures among artists, galleries, intermediaries, and digital platforms. Arts consumption is also becoming embedded in diverse retail environments such as museum stores, department-store art zones, and shopping centers, where consumers' shopping journeys, store experiences, and cross-channel transitions influence both product diffusion and channel performance. These retail contexts underscore the importance of channel management in optimizing assortment strategies, traffic flows, and value delivery.

Despite these advances, few studies have examined how such contemporary frameworks operate in the arts retail and distribution market, where subjective evaluation, experiential immersion, and symbolic value are especially salient. Prior research has tended to focus on cultural participation

or psychological outcomes, but has not explicitly linked consumption values – happiness – WOM as a mechanism of channel engagement among MZ consumers. By incorporating modern perspectives on consumer behavior into the arts retail context, this study addresses this theoretical gap and contributes to both consumer research and distribution science.

This study addresses this gap by examining arts consumption as a retail and distribution phenomenon, focusing on how the MZ generation's perceived consumption values (functional, emotional, social, epistemic, and ethical) shape WOM behavior within the arts retail market. Furthermore, the study investigates the mediating effects of eudaimonic and hedonic happiness in this process. The findings are expected to deepen theoretical understanding of value-based distribution behavior and offer strategic insights for cultural retailers, online platforms, and distributors seeking to enhance consumer engagement and market performance in the creative economy.

LITERATURE REVIEW

The MZ generation, comprising Millennials (born in the early 1980s to mid-1990s) and Generation Z (born in the mid-1990s to early 2010s), grew up in digital environments and demonstrates independent, value-oriented consumption patterns. This cohort not only appreciates cultural and artistic content but also participates in the retail and distribution of cultural products, purchasing and sharing them through both offline and online channels. They actively express beliefs and identities through consumption, respond sensitively to others' shopping and cultural experiences, and place strong trust in online word-of-mouth (e-WOM) when making purchase decisions (Choi, 2022).

Consumption value refers to the multidimensional utility derived from goods or services, encompassing not only functional efficiency but also emotional, social, symbolic, epistemic, and ethical dimensions (Sheth et al., 1991). Within the arts retail and distribution market, these values influence how MZ consumers evaluate, purchase, and recommend cultural products. This study explores five key value dimensions, functional, emotional, social, epistemic, and ethical that reflect the unique consumption and distribution behaviors of the MZ generation.

First, functional value refers to the practical utility

gained from the product's physical or performance attributes, such as quality, price, and accessibility. This aligns with recent findings showing that retail cues and private label strategies influence functional and emotional value perceptions, ultimately driving repurchase intentions (Bai & Kim, 2024). In the retail context, this includes affordability, convenience of purchase channels, and perceived fairness of pricing. MZ consumers, accustomed to digital marketplaces, rely on price comparisons and online reviews to assess value (Pham et al., 2021). Second, emotional value arises from positive affective states experienced during the shopping or consumption process. In art retailing, this includes the pleasure of visiting galleries, browsing online exhibitions, or engaging with immersive digital art platforms. Emotional satisfaction serves as a strong motivator for continued engagement and recommendation (Alba & Williams, 2013). Third, social value is realized when purchases enhance one's social status, belonging, or recognition. The MZ generation shares retail experiences through social media, creating symbolic visibility around cultural consumption. Purchasing limited editions or attending exclusive exhibitions provides a sense of identity and social capital (Kang & Kim, 2025). Fourth, epistemic value stems from novelty and creativity. As digital natives, the MZ generation favors innovative distribution formats such as NFT art marketplaces, pop-up stores, or collaborative exhibitions that provide unique experiences beyond traditional retail. They seek discovery and personalization rather than mere brand loyalty (Bilgihan, 2016). Finally, ethical value refers to the alignment between personal ethics and consumption choices, emphasizing sustainability, fair trade, and cultural authenticity. In arts retailing, this may include supporting local artists, using eco-friendly materials.

In summary, the MZ generation integrates diverse consumption values, ranging from functional efficiency to ethical alignment, when purchasing and distributing cultural and artistic products. Understanding how these multidimensional values shape WOM and retail engagement offer both theoretical insight and practical guidance for retailers, galleries, and cultural institutions aiming to optimize distribution strategies in the contemporary arts market.

Happiness is a core component of consumer well-being and has been widely explored across

disciplines such as psychology, economics, and marketing. Within the field of distribution and consumer behavior, scholars have emphasized that consumers derive not only utilitarian satisfaction from transactions but also emotional and experiential fulfillment throughout the retail process (Desmeules, 2002). Accordingly, the concept of consumer happiness extends beyond product ownership to encompass the psychological value obtained from shopping, purchasing, and post-purchase sharing across retail channels.

From a marketing and distribution perspective, consumer happiness can be viewed as a key driver of store loyalty, channel preference, and WOM diffusion. When consumers experience pleasure and meaning during retail interactions, whether in physical galleries, pop-up stores, or online platforms, they are more likely to share their experiences, revisit stores, and recommend products to others. This study follows the dual conceptualization of happiness into hedonic happiness and eudaimonic happiness (Waterman, 1993; Ryan & Deci, 2001), each representing distinct pathways through which retail and consumption experiences contribute to overall well-being.

Hedonic happiness is associated with immediate pleasure, excitement, and enjoyment derived from the consumption and shopping process. In the context of arts retailing, it refers to the joy of exploring aesthetically appealing environments, discovering new artworks, or engaging with creative displays and digital exhibitions. Such emotionally charged experiences often enhance intrinsic motivation to recommend products or share retail encounters through online and offline WOM channels. Prior studies have confirmed that hedonic satisfaction in shopping environments contributes to repeat visits and spontaneous advocacy (Alba & Williams, 2013).

Eudaimonic happiness, on the other hand, represents a deeper and more enduring sense of fulfillment derived from self-expression, personal growth, and alignment with one's values (Ryan & Deci, 2001; Waterman, 1993). In arts retailing, eudaimonic happiness arises when consumers feel that their purchases support local artists, sustain cultural heritage, or embody ethical principles such as fairness and environmental responsibility. These value-based purchases satisfy intrinsic psychological needs, autonomy, competence, and relatedness, and foster meaning-driven engagement with distribution

channels. For example, purchasing from community-based galleries or socially responsible online platforms enhances both individual satisfaction and loyalty to the cultural ecosystem.

Each dimension of consumption value, functional, emotional, social, epistemic, and ethical, contributes to consumer happiness through distinct mechanisms within the retail and distribution process. Functional value fulfills practical expectations related to price and quality; emotional value generates joy through aesthetic and sensory engagement; social value strengthens belonging and identity through social visibility; epistemic value satisfies curiosity through novel experiences; and ethical value fosters internal harmony through responsible and sustainable consumption.

In summary, consumer happiness in the arts retail market emerges not only from the aesthetic pleasure of consumption but also from meaningful participation in the distribution and exchange of cultural goods. Understanding how these two dimensions of happiness, hedonic and eudaimonic, operate within the consumer journey provides essential insights for retailers, galleries, and online platforms aiming to design experience-oriented distribution strategies that foster loyalty, advocacy, and long-term well-being among MZ consumers.

WOM refers to the voluntary act of sharing information, opinions, or experiences about a product or service following personal interaction with it (Anderson, 1998). In the field of distribution and retailing, WOM plays a critical role as a non-contractual, consumer-driven communication channel that significantly affects product evaluation, brand reputation, and purchase decisions (Allsop et al., 2007). Particularly in the arts retail market, where products are highly subjective, aesthetically variable, and experientially valuable, WOM serves as a major driver of demand formation and channel diffusion (Nguyen et al., 2022).

With the growing convergence of cultural consumption and retail distribution, the ways consumers communicate their experiences have diversified. Offline WOM, such as recommendations in galleries, museums, and pop-up exhibitions, coexists with e-WOM disseminated through online retail platforms, social media, and review communities (Hennig-Thurau et al., 2004; Senecal & Nantel, 2004). For MZ consumers, who are highly familiar with digital channels, sharing

experiences through Instagram posts, YouTube reviews, and art commerce platforms has become a form of self-expression and social participation. This dual-channel communication, both offline and online, extends the reach of WOM beyond personal networks, influencing broader distribution and retail outcomes.

In arts retailing, WOM serves multiple functions beyond simple information exchange. First, it reduces uncertainty in high-involvement purchases by providing credible cues about product quality, artist reputation, and authenticity. Second, it acts as a social validation mechanism, where positive feedback reinforces perceived value and encourages repeat purchases. Third, WOM shapes distribution efficiency by organically promoting certain products, stores, or platforms, reducing reliance on formal advertising and channel intermediaries. Through such mechanisms, WOM effectively bridges the gap between cultural production and consumer markets, supporting a more dynamic and consumer-led distribution structure.

The psychological drivers of WOM in arts distribution are closely linked to hedonic and eudaimonic experiences. When consumers experience joy, inspiration, or personal meaning through their engagement with art products or exhibitions, they are more likely to communicate these experiences to others. For instance, MZ consumers may share a sense of aesthetic pleasure (hedonic happiness) through social media or express moral satisfaction (eudaimonic happiness) by recommending eco-conscious or fair-trade art brands. In both cases, WOM functions as a form of emotional and ethical signaling, shaping retail trends and channel reputation.

Moreover, the digitalization of arts retailing has expanded the WOM ecosystem into multi-platform networks. Recommendation algorithms, hashtags, and influencer endorsements amplify WOM effects across the distribution chain, transforming individual experiences into collective market movements. This shift underscores the importance of managing consumer-generated content (CGC) as a strategic asset in distribution management. Retailers and galleries can encourage positive WOM by curating engaging environments, offering shareable content, and ensuring transparent, value-driven communication with customers.

In summary, WOM behavior in arts retail and

distribution is not merely a by-product of consumer satisfaction but a central mechanism through which cultural products circulate, reputations are built, and markets evolve. Understanding the antecedents and psychological mediators of WOM, particularly among MZ consumers, provides valuable insights into how value-driven experiences translate into distributional impact. For practitioners, leveraging WOM as a strategic distribution channel can enhance customer engagement, reduce promotional costs, and foster sustainable growth within the creative economy.

In the distribution literature, WOM has been recognized as an efficient, consumer-led communication mechanism that enhances channel performance by reducing search costs, signaling product quality, and facilitating demand forecasting across retail outlets (Sigurdsson et al., 2020; Yan & Hu, 2023). Recent studies further highlight that digital WOM influences platform algorithms, ranking visibility, and sales conversion in online retail settings (Alzate et al., 2021; Yang et al., 2018). However, despite these developments, little research has examined how value-driven psychological states, such as hedonic and eudaimonic happiness, translate into WOM that directly affects retail channel dynamics in the arts market. This study addresses this gap.

RESEARCH METHODS

This study aims to structurally analyze how various consumption values held by the MZ generation influence their perceived well-being, hedonic and eudaimonic, and how these types of well-being, in turn, affect their WOM behavior related to art consumption. Furthermore, the study investigates the mediating role of happiness in the relationship between consumption values and WOM, thereby uncovering the psychological transfer process within the consumption of experiential goods such as art.

Consumption values are defined as the psychological and functional rewards consumers derive from products or services. Based on the works of Smith (1996) and Sweeney and Soutar (2001), this study categorizes consumption values into five types: functional, emotional, social, epistemic (novelty), and ethical values. These values are hypothesized to influence two distinct types

of happiness: hedonic happiness, characterized by pleasure and enjoyment, and eudaimonic happiness, characterized by meaning, autonomy, competence, and social connectedness (Ryan & Deci, 2001; Huta & Ryan, 2010). The MZ generation places high importance on personal identity and value orientation, showing a tendency to seek not only material satisfaction but also emotional involvement, moral value, and rarity in consumption. Therefore, each type of consumption value may influence different pathways to happiness. Accordingly, the following hypotheses are proposed.

(1) H1-1: Functional value will positively affect hedonic happiness.

(2) H1-2: Emotional value will positively affect hedonic happiness.

(3) H1-3: Social value will positively affect hedonic happiness.

(4) H1-4: Epistemic value will positively affect hedonic happiness.

(5) H1-5: Ethical value will positively affect hedonic happiness.

(6) H2-1: Functional value will positively affect eudaimonic happiness.

(7) H2-2: Emotional value will positively affect eudaimonic happiness.

(8) H2-3: Social value will positively affect eudaimonic happiness.

(9) H2-4: Epistemic value will positively affect eudaimonic happiness.

(10) H2-5: Ethical value will positively affect eudaimonic happiness.

Happiness plays a central role in explaining consumer behavior (Ryan & Deci, 2001). Specifically, hedonic and eudaimonic happiness function differently in influencing post-consumption actions such as WOM (Huta & Ryan, 2010). Hedonic happiness, involving positive emotional states such as pleasure and excitement, is known to enhance consumers' intrinsic motivation to voluntarily share their experiences (Williams & Aaker, 2002). In the context of art consumption, hedonic happiness often arises from the joy or emotional resonance experienced during performances or exhibitions, leading to spontaneous WOM through social media posts, reviews, or personal recommendations

(Bagozzi et al., 1999). Conversely, eudaimonic happiness is derived from fulfilling intrinsic psychological needs, such as autonomy, personal growth, and meaningful social connections (Ryan, Huta, & Deci, 2008). Cultural and artistic activities often facilitate this type of happiness through reflective appreciation, moral resonance, and community bonding, which may motivate consumers to engage in WOM that expresses identity and value orientation (Hollebeek, 2011). Hence, the following hypotheses are proposed.

H3: Hedonic happiness will positively affect WOM behavior in art consumption.

H4: Eudaimonic happiness will positively affect WOM behavior in art consumption.

Rather than assuming a direct causal link between consumption values and WOM behavior, this study posits that the psychological state of happiness acts as a mediator that better explains the consumer experience (Ryan & Deci, 2001; Huta & Ryan, 2010). Each consumption value provides distinct emotional rewards that, in turn, contribute to either hedonic or eudaimonic happiness (Huta, 2016). For instance, emotional and epistemic values may trigger hedonic happiness, leading to an urge to share enjoyable experiences. In contrast, ethical and social values may enhance eudaimonic happiness, prompting a desire to share meaningful experiences that align with one's values (Harrison & Loureiro, 2020). This psychological transfer process is particularly evident in the high-involvement domain of art consumption, where emotional immersion and value pursuit are closely tied to identity expression and social interaction (Hollebeek, 2011). Therefore, the influence of consumption values on WOM behavior can be more accurately understood through a structural pathway mediated by happiness. The final hypotheses are as follows.

H5: Consumption values will influence WOM behavior through the mediation of hedonic happiness.

H6: Consumption values will influence WOM behavior through the mediation of eudaimonic happiness.

Based on the hypotheses, the conceptual research model is illustrated in Figure 1.

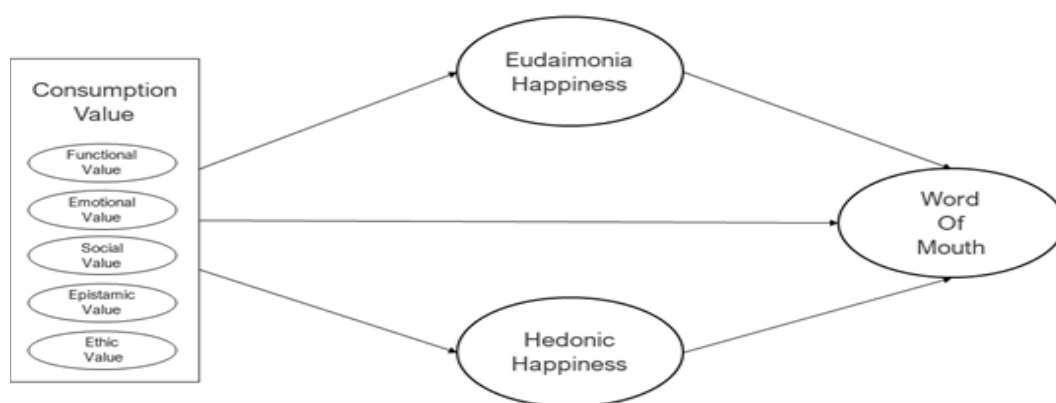


Figure 1. Research model

It shows the paths from five types of consumption values to two types of happiness, which, in turn, affect WOM behavior in the context of art consumption. This study aimed to empirically investigate the structural relationships among consumption values, hedonic and eudaimonic happiness, and WOM behavior in the context of art consumption among the MZ generation. An online survey was conducted over one week from April 2, 2023, using a commercial panel platform. Out of 400 responses collected, 342 valid responses were retained for analysis after excluding insincere or incomplete responses. Participants were limited to individuals born between 1980 and 2010, corresponding to the MZ generation. Among them, respondents in their 20s accounted for 38.9%, while those in their 30s accounted for 57.6%. In terms of gender, 72.8% were female. Regarding educational background, 76.6% had completed at least a college-level education. Monthly income ranged mostly between \$3,000 and \$5,000 (51.5%). The predominant occupational categories were office/administrative workers (57.0%) and professionals (24.9%). Excluding one non-response, the average self-reported maximum spending limit for a single personal purchase was \$748.

The questionnaire consisted of five main constructs. Items were adapted and refined from previously validated scales to suit the study context and target respondents. Consumption Values were measured based on the theoretical frameworks of Sheth et al. (1991) and Holbrook (2005). A total of 21 items were developed by referencing the measurement scales proposed by Sweeney & Soutar (2001) and Gallarza & Saura (2006).

Hedonic Happiness and Eudaimonic Happiness were each measured using four items adapted from Waterman's (1993) Personally Expressive Activities Questionnaire (PEAQ). Hedonic happiness captured immediate pleasure and emotional satisfaction derived from art consumption, whereas eudaimonic happiness assessed emotional fulfillment associated with self-actualization, meaning, and self-expression. Art-Related Word-of-Mouth Behavior was measured using three items derived from Hennig-Thurau et al. (2004) to capture the intention to share or recommend art experiences via SNS or face-to-face communication. All survey items were measured on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). The questionnaire underwent expert review and a pilot test to ensure clarity, readability, and construct validity before the final survey was administered.

RESULTS

To assess the explanatory power and construct validity of the latent variables specified in the structural model, a Confirmatory Factor Analysis (CFA) conducted using structural equation modeling. The factor loading of all items ranged from .600 to .771, exceeding the minimum recommended threshold of .50 and remaining within the acceptable upper limit of .95, indicating adequate indicator reliability. As a result, no items were excluded, and all were retained for further analysis. Internal consistency was evaluated using Cronbach's alpha coefficients, which ranged from .703 to .786, surpassing the .60 cutoff point and thus confirming acceptable reliability.

Table 1. Results of CFA and reliability assessment

Construct	Variable	Loading	Cronbach's alpha	CR	AVE
Functional value	Func2	0.756	0.786	0.875	0.585
	Func3	0.759			
	Func4	0.660			
	Func5	0.663			
Emotional value	Emo1	0.626	0.712	0.811	0.589
	Emo2	0.648			
	Emo3	0.723			
Social value	Soc2	0.686	0.713	0.866	0.618
	Soc3	0.678			
	Soc4	0.692			
	Soc5	0.728			
Epistemic value	Epi1	0.759	0.715	0.849	0.586
	Epi2	0.600			
	Epi3	0.698			
	Epi4	0.748			
Ethical value	Ethi2	0.729	0.738	0.856	0.543
	Ethi3	0.672			
	Ethi5	0.732			
	Ethi6	0.680			
	Ethi7	0.660			
Eudaimonic happiness	EUH3	0.737	0.703	0.846	0.58
	EUH4	0.764			
	EUH5	0.658			
	EUH6	0.734			
Hedonic happiness	HEH3	0.771	0.726	0.839	0.566
	HEH4	0.702			
	HEH5	0.729			
	HEH6	0.726			
WOM	WOM2	0.709	0.719	0.809	0.585
	WOM3	0.689			
	WOM4	0.739			

$\chi^2(436) = 963.405$, $p < 0.001$, GFI = 0.939, IFI = 0.912, CFI = 0.911, RMSEA = 0.060

Note: compiled by the authors

The factor loading of all items ranged from 0.600 to 0.771, exceeding the minimum recommended threshold of 0.500 and remaining within the acceptable upper limit of 0.950, indicating adequate indicator reliability. As a result, no items were excluded, and all were retained for further analysis. Internal consistency was evaluated using Cronbach's alpha coefficients, which ranged from 0.703 to 0.786, surpassing the 0.600 cutoff point and thus confirming acceptable reliability.

Construct validity was examined through convergent and discriminant validity. For convergent validity, the composite reliability (CR) values ranged from 0.809 to 0.875, exceeding the 0.700 benchmark, thereby meeting the criterion proposed

by Anderson and Gerbing (1988). Additionally, the average variance extracted (AVE) values ranged from 0.543 to 0.618, surpassing the 0.500 threshold and further confirming convergent validity (Fornell & Larcker, 1981).

Discriminant validity was assessed by comparing the square roots of AVE values with the squared correlations between latent variables. Discriminant validity is supported when the AVE for each construct exceeds the squared correlations with other constructs (Hair et al., 2010). As shown in Table 2, all AVE values were greater than the squared inter-construct correlations, confirming the discriminant validity of the constructs employed in this study.

Table 2. Discriminant validity

Variable	Func	Emo	Soc	Epi	Ethi	EUH	HEH	WOM
Functional value	0.585							
Emotional value	0.413	0.589						
Social value	0.484	0.545	0.618					
Epistemic value	0.465	0.484	0.494	0.586				
Ethical value	0.531	0.421	0.434	0.521	0.543			
Eudaimonic happiness	0.493	0.539	0.530	0.567	0.551	0.580		
Hedonic happiness	0.398	0.490	0.575	0.560	0.585	0.537	0.566	
WOM	0.407	0.434	0.518	0.561	0.521	0.584	0.566	0.585

Note: compiled by the authors

Model fit was evaluated using multiple goodness-of-fit indices to ensure the adequacy of the measurement model. According to conventional criteria, an acceptable model fit is indicated when the chi-square to degrees of freedom ratio is less than 3.0, the RMSEA is below 0.08, and incremental fit indices such as the CFI and IFI exceed 0.90. In this study, the model demonstrated satisfactory fit, with CMIN/DF = 2.209, the GFI = 0.939, the IFI = 0.912, the CFI = 0.911, and the RMSEA = 0.060. Overall, these values meet the recommended thresholds, indicating that the measurement model provides a good representation of the observed data and can be considered statistically adequate for further structural analysis.

This study investigated how the consumption values of the MZ generation influence eudaimonic

and hedonic happiness, and how these two types of happiness subsequently affect word-of-mouth (WOM) behavior in the context of art consumption. However, three specific relationships were found to be statistically non-significant: (1) emotional value → eudaimonic happiness, (2) functional value → hedonic happiness, and (3) ethical value → hedonic happiness. These non-significant paths led to the rejection of the corresponding hypotheses (H1-2, H2-1, and H2-5). Both eudaimonic and hedonic happiness showed significant positive effects on WOM behavior, highlighting their mediating roles within the proposed model. As shown in Table 3, the path analysis demonstrated that most consumption value dimensions had significant effects on one or both types of happiness.

Table 3. Results

Hypotheses	Beta	S.E.	t-value	p-value
H1-1. Functional Value -> Eudaimonic Happiness	0.106	0.044	2.407	< 0.05
H1-2. Emotional Value -> Eudaimonic Happiness	0.089	0.046	1.951	N.S.
H1-3. Social Value -> Eudaimonic Happiness	0.284	0.056	5.058	< 0.001
H1-4. Epistemic Value -> Eudaimonic Happiness	0.205	0.060	3.390	< 0.001
H1-5. Ethic Value-> Eudaimonic Happiness	0.229	0.047	4.920	< 0.001
H2-1. Functional Value -> Hedonic Happiness	0.058	0.036	1.635	N.S.
H2-2. Emotional Value -> Hedonic Happiness	0.240	0.037	6.546	< 0.001
H2-3. Social Value -> Hedonic Happiness	0.289	0.047	6.206	< 0.001
H2-4. Epistemic Value -> Hedonic Happiness	0.039	0.049	4.989	< 0.001
H2-5. Ethic Value-> Hedonic Happiness	0.244	0.039	1.021	N.S.
H3-1. Eudaimonic Happiness -> Word of Mouth	0.227	0.084	2.691	< 0.01
H3-2. Hedonic Happiness -> Word of Mouth	0.223	0.103	2.160	< 0.05
$\chi^2(440) = 953.496$, $p < 0.001$, GFI = 0.845, IFI = 0.911, CFI = 0.910, RMSEA = 0.058				

Note: compiled by the authors

This study also investigated the mediating roles of eudaimonic and hedonic happiness in the relationship between consumption values and WOM

behavior. A bootstrapping procedure was employed to test indirect effects.

The results demonstrated that eudaimonic

happiness significantly mediated the relationships between functional value, social value, epistemic (novelty) value, ethical value, and WOM behavior, with the exception of emotional value. These findings suggest that when the MZ generation experiences these forms of value, they are likely to feel a sense of meaning or purpose, which in turn fosters positive affect leading to WOM behavior. In contrast, hedonic happiness exhibited significant mediating effects only in the cases of emotional value and social value. As these value types are

closely associated with pleasure, enjoyment, and playfulness in everyday life, it is plausible that such immediate emotional gratification directly encourages WOM engagement. However, no significant mediation effects were found for hedonic happiness in the paths involving functional value, epistemic value, and ethical value, indicating that these forms of value are more closely tied to long-term meaning-making than to short-term pleasure.

These findings are summarized in Table 4.

Table 4. Discriminant validity

IV	DV	MV	DE	SE	t-value	p-value	LLCI	ULCI
Functional value	WOM		0.077	0.067	1.139	0.255	-0.056	0.209
Emotional value			0.026	0.074	0.355	0.723	-0.119	0.171
Social value			0.117	0.093	1.255	0.210	-0.066	0.300
Epistemic value			0.101	0.096	1.055	0.292	-0.088	0.290
Ethical value			0.153	0.073	2.095	0.037	0.009	0.297
Functional value	WOM	EUH	0.024	0.016	-	-	0	0.063
Emotional value			0.02	0.017	-	-	-0.003	0.061
Social value			0.064	0.036	-	-	0.006	0.147
Epistemic value			0.046	0.029	-	-	0.002	0.113
Ethical value			0.052	0.030	-	-	0.003	0.123
Functional value	WOM	HEH	0.013	0.011	-	-	-0.004	0.041
Emotional value			0.054	0.029	-	-	0	0.116
Social value			0.065	0.036	-	-	0.001	0.14
Epistemic value			0.055	0.029	-	-	-0.001	0.113
Ethical value			0.009	0.006	-	-	-0.01	0.034

Number of bootstrap samples for bias-corrected bootstrap confidence intervals: 10,000. IV = Independent Variable, DV = Dependent Variable, MV = Mediating Variable, DE = Direct Effect, SE = Standard Error, LLCI = Lower Limit Confidence Interval, ULCI = Upper Limit Confidence Interval, IE = Indirect Effect, Boot SE = Bootstrap Standard Error, Boot LLCI = Bootstrap Lower Limit Confidence Interval, Boot ULCI = Bootstrap Upper Limit Confidence Interval. Func = Functional Value, Emo = Emotional Value, Soc = Social Value, Epi = Epistemic Value, Eth = Ethical Value, EUH = Eudaimonic Happiness, HEH = Hedonic Happiness, WOM = Word-of-Mouth

Note: compiled by the authors

CONCLUSION

This study examined how the consumption values of the MZ generation influence both eudaimonic and hedonic happiness and, in turn, how these two types of happiness affect WOM behavior in the context of arts retail and distribution. Specifically, it empirically investigated the mediating roles of eudaimonic and hedonic happiness in the relationship between consumption values and WOM behavior. To this end, five consumption values, functional, emotional, social, epistemic, and ethical values were set as independent variables, while WOM behavior was designated as the dependent

variable. Eudaimonic and hedonic happiness were considered as mediating variables, and structural equation modeling and bootstrapping analysis were employed to test the hypothesized relationships.

The results revealed that functional, social, epistemic, and ethical values significantly influenced eudaimonic happiness, whereas emotional, social, and epistemic values significantly affected hedonic happiness. Furthermore, both eudaimonic and hedonic happiness exerted significant effects on WOM behavior. The mediation analyses confirmed that eudaimonic happiness mediated the relationships between functional, social, epistemic, and ethical values and WOM behavior, while

hedonic happiness mediated the effects of emotional and social values on WOM behavior. These findings indicate that consumer happiness functions as a psychological mechanism linking value-oriented consumption with communication behavior across retail and distribution channels.

In addition to these significant paths, several non-significant relationships also yield meaningful theoretical insights. First, the insignificant effect of emotional value on eudaimonic happiness may reflect characteristics of Korean MZ consumers, who tend to interpret emotional enjoyment as an immediate, pleasure-driven response rather than a source of deeper meaning or self-realization. Accordingly, affective pleasure does not readily translate into eudaimonic fulfillment, which is typically associated with personal growth, identity formation, and value-driven experiences. Second, the absence of a significant relationship between functional value and hedonic happiness can be attributed to the experiential and symbolic nature of arts consumption. Because artistic goods are less utilitarian than everyday products, pragmatic judgments such as price fairness or convenience contribute minimally to the excitement, sensory pleasure, or emotional arousal that define hedonic happiness. Third, the non-significant effect of ethical value on hedonic happiness suggests that moral satisfaction, arising from supporting fair, sustainable, or socially responsible practices aligns more closely with eudaimonic well-being than with immediate enjoyment. For many Korean MZ consumers, ethical consumption operates as a form of identity expression and value alignment rather than a source of short-term affective pleasure, thereby weakening its association with hedonic happiness. Collectively, these findings underscore that different value dimensions activate distinct psychological mechanisms, reinforcing the importance of differentiating between hedonic and eudaimonic pathways in understanding arts-related distribution behavior.

The academic and practical implications of this study are as follows. Theoretically, this research contributes to the expansion of the happiness construct in consumer and distribution research by conceptualizing consumer happiness as a dual structure, eudaimonic and hedonic and empirically verifying its mediating role in value-based behavior within arts retailing. While prior

studies have emphasized emotional satisfaction as a unidimensional construct, this study demonstrates that both pleasure-driven (hedonic) and meaning-driven (eudaimonic) experiences jointly shape the diffusion of WOM within cultural and artistic markets. Moreover, by incorporating epistemic and ethical values into the analysis, the study extends the literature on consumer value and distribution behavior, suggesting that moral and innovative consumption motives can reinforce communicative behaviors that enhance market circulation.

From a managerial perspective, the findings emphasize the importance of developing value-based strategies that strengthen consumer experience and engagement within arts retail and distribution networks. Experiences that highlight emotional, epistemic, and social values can enhance hedonic happiness and encourage spontaneous WOM across online and offline retail channels, while strategies that promote functional, ethical, and social values can cultivate eudaimonic happiness, leading to deeper consumer loyalty and community-oriented engagement. These outcomes demonstrate that value-driven marketing and channel strategies can enhance both short-term WOM effects and long-term customer retention in the arts market.

From a distribution standpoint, the findings further underscore the strategic value of WOM in improving channel efficiency, logistics performance, and supply chain coordination. Positive hedonic and eudaimonic responses can strengthen demand forecasting accuracy, reduce promotional and customer acquisition costs, and increase organic traffic across omnichannel retail environments. For galleries, cultural retailers, and online marketplaces, value-based happiness can enhance inventory rotation, optimize assortment strategies, and improve merchandising decisions. In addition, WOM-driven visibility can reshape power-dependence relationships among artists, galleries, intermediaries, and digital platforms, thereby influencing channel governance and negotiation dynamics. These outcomes suggest that cultivating consumer happiness is not merely a psychological goal but a distribution strategy that enhances overall channel performance.

Despite these contributions, several limitations should be noted. First, the cross-sectional survey design limits causal inference regarding the relationships among constructs; future research

should adopt experimental or longitudinal approaches to validate the proposed mechanisms. Second, this study's sample was confined to the MZ generation, and comparative analyses across generational cohorts could provide further insights into differences in consumption values and retail engagement. Third, WOM behavior was treated as a single construct; subsequent studies could distinguish between offline WOM, online WOM, and platform-based recommendations to better capture consumer communication across distribution channels. Future work may also incorporate logistics metrics, supply chain performance indicators, or channel power measures to more comprehensively assess distribution-related outcomes.

In conclusion, this study advances understanding of how consumption values and consumer happiness jointly influence WOM behavior within the arts retail and distribution market. The findings not only deepen theoretical perspectives on value-driven consumer psychology but also provide practical insights for retailers, distributors, and cultural organizations seeking to enhance channel engagement, brand advocacy, and sustainable distribution performance in the creative economy.

Ultimately, the study highlights that integrating consumer value theory with logistics, supply chain management, and channel strategy can offer a more holistic framework for understanding and improving arts-related distribution systems. It is hoped that this research will serve as a meaningful steppingstone for future studies aiming to further bridge consumer value theory with distribution science and retail strategy in the cultural and creative sectors.

AUTHOR CONTRIBUTIONS

Conceptualization and theory: HY; research design: SP; data collection: HY and SP; analysis and interpretation: HY and SP; writing draft preparation: HY and SP; supervision: SP; correction of article: HY and SP; proofread and final approval of article: HY and SP. All authors have read and agreed to the published version of the manuscript.

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Technological Human Capital and Organizational Commitment: Evidence from Hungarian Employees

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ABSTRACT

In the context of digital transformation and accelerated technological development, employees' competitiveness is increasingly determined not only by professional knowledge but also by the ability to master new technologies, adapt to change, and continuously develop their competencies. This study aimed to explore how technological competencies, openness to learning, adaptability, and willingness to retrain are interrelated and how these factors influence employees' organizational commitment. The methodological basis of the study was exploratory factor analysis, evaluation of scale reliability using Cronbach's alpha, Pearson correlation analysis, and linear regression analysis. The empirical basis of the study was an online survey of 281 employees of small and medium-sized enterprises in Hungary conducted in January 2026. The results empirically supported the hypothesis that technological competence, learning orientation, adaptability, and willingness to retrain are integrated into a single adaptive technological human capital (hereinafter – ATHC) index (Cronbach's alpha = 0.837). ATHC showed a strong, positive relationship with affective organizational commitment ($r = 0.758$; $p < 0.001$) and explained 57.4% of its variance. However, a weak but significant positive relationship was found for continuance organizational commitment ($r = 0.220$; $p < 0.001$), which did not support the theoretically hypothesized negative relationship. The results indicate that developing adaptive technological human capital can not only enhance employees' employability and adaptability but also contribute to organizational competitiveness by increasing organizational commitment. Thus, in the digital economy, adaptive technological human capital is an important resource for enhancing employee resilience, strengthening organizational commitment, and ensuring long-term organizational competitiveness.

KEYWORDS: Economy, Digital Economy, Digital Transformation, Human Capital, Labor Mobility, Employee Adaptability, Retraining, Organizational Commitment

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Технологический человеческий капитал и организационная приверженность: данные по работникам Венгрии

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АННОТАЦИЯ

В условиях цифровой трансформации и ускоренного технологического развития конкурентоспособность работников всё в большей степени определяется не только профессиональными знаниями, но и способностью осваивать новые технологии, адаптироваться к изменениям и непрерывно развивать компетенции. Цель данного исследования заключалась в исследовании взаимосвязи между технологическими компетенциями, открытостью к обучению, адаптивностью и готовностью к переобучению, а также в оценке влияния этих факторов на организационную приверженность работников. Методологическую основу исследования составили разведочный факторный анализ, оценка надежности шкал с использованием коэффициента альфа Кронбаха, корреляционный анализ Пирсона и линейный регрессионный анализ. Эмпирическая база исследования сформирована на основе онлайн-опроса 281 работника малых и средних предприятий Венгрии, проведенного в январе 2026 г. Результаты эмпирически подтвердили гипотезу о том, что технологическая компетентность, ориентация на обучение, адаптивность и готовность к переобучению интегрируются в единый индекс адаптивного технологического человеческого капитала, значение коэффициента альфа Кронбаха для которого составило 0,837. Индекс адаптивного технологического человеческого капитала продемонстрировал сильную положительную связь с аффективной организационной приверженностью работников ($r = 0,758$; $p < 0,001$) и объяснил 57,4% ее вариации. Вместе с тем для продолжительной организационной приверженности была выявлена слабая, но статистически значимая положительная связь ($r = 0,220$; $p < 0,001$), что не подтвердило теоретически выдвинутое предположение об отрицательном характере данной взаимосвязи. Таким образом, в условиях цифровой экономики адаптивный технологический человеческий капитал выступает значимым ресурсом повышения устойчивости работников, укрепления их организационной приверженности и обеспечения долгосрочной конкурентоспособности организаций.

КЛЮЧЕВЫЕ СЛОВА: экономика, цифровая экономика, цифровая трансформация, человеческий капитал, мобильность рабочей силы, адаптивность сотрудников, переподготовка, организационная приверженность

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INTRODUCTION

Digital transformation, automation, and the rise of knowledge-intensive economic activities have fundamentally transformed the world of work. Technological advancements are reshaping not only work processes and organizational operations but also the range of competencies expected of employees. In the modern labor market, competitiveness depends less and less on formal qualifications or professional experience alone, while skills that enable the application of new technologies, continuous learning, and adaptation to a changing work environment are becoming increasingly valuable. As a result, technological human capital has become a key resource for the competitiveness of organizations and individuals. The 2008 financial crisis, the COVID-19 pandemic, and the resulting geopolitical and economic uncertainty have highlighted that the long-term success of workers increasingly depends on their adaptability and their ability to update their skills.

The pandemic has particularly accelerated digitalization, the spread of remote work, and the rise of technology-based forms of work, while highlighting the importance of digital skills and learning flexibility. Employees who adapted quickly to the new technological environment maintained a more favorable position in the labor market and responded more effectively to changing circumstances. At the same time, technological advancements do not affect only employability. The development of competencies, the acquisition of new knowledge, and increased professional autonomy can also influence employees' relationships with the organization. In modern organizations, learning opportunities, support for competency development, and adaptation to technological advancements are increasingly important factors in fostering organizational commitment. Technological competencies can therefore be viewed not only as an economic resource but also as a factor influencing employees' integration into the organization and their long-term commitment.

Although the international literature extensively addresses issues of human capital, employability, adaptability, and organizational commitment, few empirical studies in Central and Eastern Europe analyze the combined presence of these factors. In particular, there is a lack of research in Hungary

examining the relationship among technological competencies, learning orientation, adaptability, and organizational commitment as an integrated system. This study aimed to explore how technological competencies, openness to learning, adaptability, and willingness to retrain are interrelated and how these factors influence employees' organizational commitment.

LITERATURE REVIEW

Human capital theory is a defining theoretical framework in modern economics and labor market research. The basic assumption of the theory is that individuals' knowledge, skills, competencies, and experiences are resources that increase productivity, thereby creating economic value for both the individual and the organization. The concept of human capital came to the center of economic thinking in the mid-20th century, when the role of education and knowledge in explaining economic growth became increasingly evident.

According to Psacharopoulos and Schultz (1972), a significant portion of economic development cannot be explained solely by the accumulation of physical capital. They argue that investments in education, training, healthcare, and professional development can be viewed as investments that increase people's productivity and long-term income-generating capacity. The best-known proponent of human capital theory is Becker (1975), who defined human capital as an investment made in the hope of future economic returns. According to Becker, knowledge acquired through education, vocational training, and work experience increases an individual's productivity, which translates into higher earnings and a more favorable position in the labor market. One of the theory's most important conclusions is that a significant portion of the differences observed in the labor market stems from individuals' varying levels of human capital. The empirical research of Thurow and Mincer (1976) further reinforced the significance of human capital theory. The earnings function they developed showed that years spent in education and work experience have a significant impact on individuals' income. For a long time, the model served as one of the most important analytical frameworks in human capital research, and it is still frequently used to examine labor market returns.

However, globalization and the rise of the

knowledge-based economy have significantly transformed the nature of human capital. According to Drucker (1993), in the post-industrial economy, knowledge has become the most important factor of production, leading to the emergence of a new group of knowledge workers. The author emphasized that competitiveness increasingly depends on the ability to create, share, and apply knowledge, thereby giving rise to new dimensions of human capital. The rapid development of digital technologies has further strengthened this process. Autor et al. (2003) have pointed out that the spread of information technologies has fundamentally transformed the content of jobs. According to their research, routine tasks can be increasingly automated, while skills that require problem-solving, creativity, complex decision-making, and adaptability are becoming more valued. In his later work, Autor (2015) emphasized that technological progress does not primarily eliminate jobs, but transforms the content of work. As a result of technological changes, employees who can cooperate with new technologies, quickly acquire new knowledge, and adapt to changing working conditions are increasingly valuable (Novotná et al., 2023). Reports from international organizations also confirm the growing importance of technological human capital. According to the OECD (2023), digital skills, problem-solving abilities, and lifelong learning are among the most important factors for success in the labor market.

According to the World Economic Forum (2023), analytical thinking, technological knowledge, adaptability, and self-directed learning will be the most in-demand competencies in the labor market over the next decade. The acceleration of technological development has fundamentally changed the structure of competencies considered valuable in the labor market. According to van Laar et al. (2020), digital competencies extend beyond the use of IT systems to encompass complex skills such as information management, communication, collaboration, problem-solving, and critical thinking. The authors emphasize that successful functioning in a digital environment increasingly depends on the integrated application of these competencies. According to Schwab (2016), employees' success depends not only on the amount of knowledge they have but also on how quickly they can acquire new knowledge and apply it in practice. One of the most important prerequisites for adapting to technological

changes is learning orientation. Learning orientation can be understood as a relatively stable individual trait that determines an individual's willingness to develop, acquire new knowledge, and expand their competencies (Noe et al., 2014). Employees with a high learning orientation are more likely to seek out new development opportunities, participate more actively in training, and adapt more easily to new job requirements. The role of lifelong learning is also emphasized by Illeris (2003), who states that in the modern economy, learning can no longer be considered a process linked to a specific life cycle. Due to rapid technological change, the continuous renewal of competencies has become a fundamental condition for success in the labor market. The willingness to learn is thus not only a tool for individual development but also a strategic resource for maintaining employability. According to Savickas's (1997) theory of career adaptability, one of the most important prerequisites for success in the modern labor market is the ability of individuals to respond to uncertainty and constant change. The author identifies four fundamental dimensions: future orientation, sense of control, curiosity, and self-confidence. Together, these enable employees to shape their careers and adapt to new circumstances actively. The importance of career adaptability has also been confirmed by the research of Rudolph et al. (2017). According to their findings, adaptability is positively associated with a willingness to learn, career success, workplace performance, and psychological well-being. Adaptive employees handle technological and organizational changes more easily and acquire new competencies more effectively. A key element of successful adaptation to technological change is the willingness to reskill. According to the OECD (2023), a significant proportion of workers will need to acquire new skills in the next decade to remain competitive in the labor market. The World Economic Forum (2023) has reached a similar conclusion, stating that a significant proportion of current jobs will require competencies that are not yet among workers' core skills.

Based on the research presented, technological competencies, learning orientation, adaptability, and willingness to retrain cannot be considered independent factors. These dimensions reinforce one another and collectively contribute to employees' ability to meet the challenges of the digital economy. Accordingly, this study interprets these factors

as part of an integrated index defined as Adaptive Technological Human Capital (ATHC). ATHC represents a complex human capital resource built on a combined system of technological readiness, openness to learning, adaptability, and willingness to develop competencies.

H1: Technological competencies, learning orientation, adaptability, and willingness to retrain form a single-factor structure suitable for the development of the ATHC index.

Organizational commitment is one of the most widely studied indicators of organizational behavior and human resource management. Research shows that committed employees perform better, are more satisfied with their work, are less likely to leave their organization, and are more willing to support organizational goals (Meyer et al., 2002). The importance of commitment has become particularly significant in the knowledge-based economy, where organizational competitiveness increasingly depends on employees' knowledge, competencies, and innovative capabilities. The best-known theoretical model of organizational commitment was developed by Meyer and Allen (1991). According to this three-component model, commitment consists of three distinct yet interrelated dimensions: affective, continuance, and normative. Affective commitment expresses the employee's emotional attachment, identification, and involvement with the organization.

Continuance commitment, in contrast, is linked to the perceived costs of leaving the organization, while normative commitment stems from a sense of moral obligation. The literature considers affective commitment to be the component most closely associated with favorable organizational outcomes. An analysis by Meyer et al. (2002) demonstrated that affective commitment shows the strongest relationship with performance, job satisfaction, and intention to remain with the organization. Organizational experiences that support an individual's development, sense of competence, and professional self-actualization play a significant role in shaping affective commitment. One of the most important theoretical explanations of the relationship between technological human capital and organizational commitment is Social Exchange Theory. According to Blau (1964), the relationship between employees and the organization is reciprocal. If the organization supports employees'

development, training, and competency development, employees may reciprocate with increased commitment and positive organizational attitudes (Eisenberger et al., 1986; Wayne et al., 1997). This type of organizational support is particularly valuable in an era of rapid technological change, where ensuring continuous learning is one of the most important signs of care on the part of the organization (Gruman & Saks, 2011). The relationship between training and organizational commitment was also examined by Bartlett (2001). According to his results, employees with greater access to training and development opportunities exhibit higher levels of affective commitment. An organizational environment that supports learning can also contribute to the development of organizational commitment. According to Kyndt et al. (2009), organizations that support continuous learning and competency development experience more favorable employee attitudes and lower turnover rates. Learning opportunities related to technological development, therefore, not only develop human capital but also serve as important tools for organizational integration.

Based on the research presented, there appears to be a positive relationship between adaptive technological human capital and affective organizational commitment. Employees who possess high technological competencies, are open to learning, can adapt to change, and are willing to acquire new skills are expected to develop a stronger emotional attachment to their organization.

H2: Adaptive Technological Human Capital is positively associated with affective organizational commitment.

While affective commitment expresses an emotional attachment to the organization, continuance commitment is fundamentally based on economic and career-related considerations. According to Meyer and Allen (1991), continuance commitment stems from the employee's perception of significant costs associated with leaving the organization. These costs can be financial, professional, or social. According to Powell and Meyer (2004), employees accumulate investments in their organizations over time, such as professional relationships, organizational knowledge, or career advantages that are costly to lose. As a result, staying with an organization is not necessarily driven by emotional attachment, but by loss avoidance. Human capital theory, however, suggests that

employees with higher human capital generally have more labor market alternatives. According to Fugate et al. (2004), more advanced competencies and higher employability increase mobility opportunities, thereby potentially reducing forced attachment to the organization. Ng and Feldman (2010) reached similar conclusions, noting that employees with higher skill levels generally have greater career opportunities and are less dependent on a single employer.

Adaptive technological human capital can play a particularly important role in this process. Employees who are capable of mastering new technologies, continuously develop their competencies, and are open to retraining typically have more favorable labor market opportunities. As a result, they are less likely to remain in their current jobs solely because of the costs of leaving the organization.

H3: Adaptive Technological Human Capital is negatively correlated with continuance organizational commitment

Based on the theoretical approaches presented,

technological competencies, learning orientation, adaptability, and willingness to retrain can be interpreted as a complex system of competencies that determines employees' long-term adaptability and success in the labor market. This study defines this integrated competency system as the Adaptive Technological Human Capital (ATHC) index. The ATHC is a multidimensional human capital index that encompasses technological competencies, openness to continuous learning, adaptability, and willingness to undergo retraining and skills development.

According to the theoretical model, these factors do not appear as distinct characteristics but function as part of a common adaptive human capital system. The research hypotheses suggest that this index is positively correlated with affective organizational commitment and negatively correlated with the continuance organizational commitment factor.

The theoretical model of the study is illustrated in Figure 1.

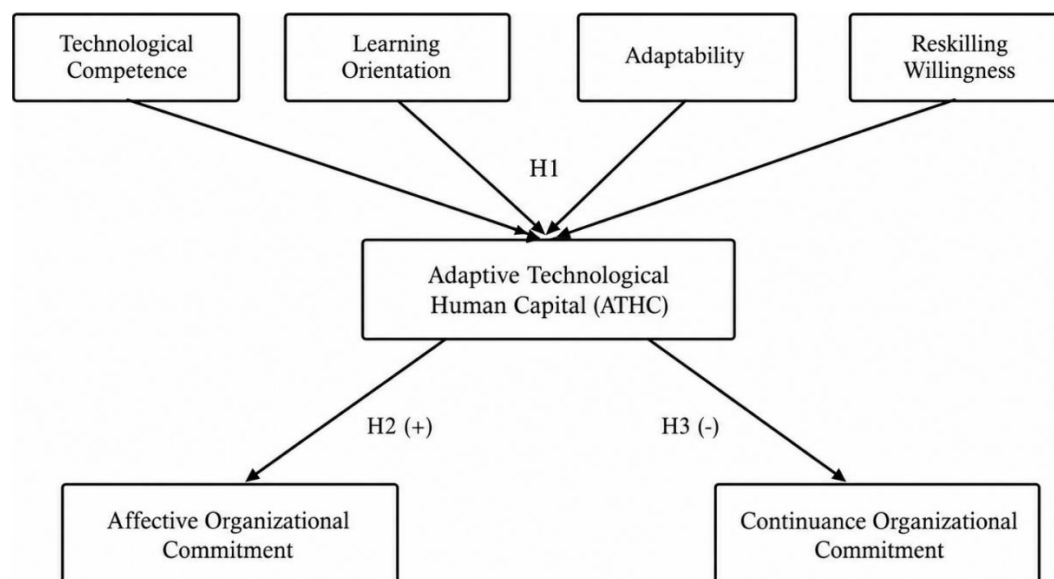


Figure 1. Conceptual research model

METHODOLOGY

Data for the study were collected in January 2026 from employees working in small- and medium-sized enterprises in Hungary. The primary objective of the study was to explore the relationships among technological competencies, learning orientation, adaptability, and willingness to retrain, and to determine whether these dimensions can be

interpreted as a common adaptive technological human capital index. In addition, the research examined how this index relates to various dimensions of organizational commitment.

Data collection was conducted using an online questionnaire. Participation in the study was voluntary and anonymous. Before completing the questionnaire, respondents were informed about the purpose of the study, the confidentiality of data

handling, and the academic nature of the research. The questionnaire did not contain any personally identifiable information.

The questionnaire consisted of three main sections. The first section was designed to gather information on the respondents' demographic and employment characteristics, including gender, age, educational attainment, marital status, type of residence, length of employment, and job position. The second section focused on measuring the dimensions of adaptive technological human capital. Respondents reflected on their technological competencies, learning orientation, adaptability, and their willingness to acquire new skills and participate in retraining. The third section was

designed to measure organizational commitment. The statements were based on Meyer and Allen's (1991) three-component model of commitment, with particular emphasis on the affective and continuance dimensions.

All attitude variables were measured on a seven-point Likert scale, where a score of 1 indicated complete disagreement and a score of 7 indicated complete agreement. Following data collection, a total of 281 valid questionnaires were included in the final database. During data cleaning, all responses were found to be of sufficient quality, so all respondents were included in subsequent analyses. Table 1 presents the detailed demographic characteristics of the respondents.

Table 1. Demographic characteristics of the sample

Indicator	Category	Frequency	Percent
Gender	Male	161	57.3
	Female	120	42.7
Age	18–29	141	50.2
	30–45	100	35.6
	46–60	37	13.2
	60 and older	3	1.1
Educational level	University degree	158	56.2
	High school	107	38.1
	Primary school	16	5.7
Work experience	More than 10 years	69	24.6
	5–10 years	108	38.4
	1–5 years	96	34.2
	Less than 1 year	8	2.8
Job position	White-collar job position	123	43.8
	Blue-collar job position	158	56.2

Note: compiled by the authors

Table 1 summarizes the demographic profile of the sample (N = 281). Male respondents accounted for 57.3% of the sample, while female respondents accounted for 42.7%. The majority of participants were between 18 and 29 years of age (50.2%), followed by those aged 30–45 years (35.6%). Most respondents held a university degree (56.2%), whereas 38.1% had completed high school and 5.7% had primary school education. With respect to work experience, the largest proportion of respondents reported 5–10 years of experience (38.4%), followed by 1–5 years (34.2%) and more than 10 years (24.6%). Regarding occupational status, 56.2% of respondents were employed in blue-collar positions and 43.8% in white-collar positions. This distribution indicates a relatively diverse sample

across age, educational background, professional experience, and job position. Although the sample cannot be considered statistically representative of the entire Hungarian workforce due to the snowball sampling method, its diversity provides an adequate basis for exploring the index under study.

The data were analyzed using IBM SPSS Statistics software. As a first step in the analysis, we calculated descriptive statistics to present the sample's demographic characteristics and the basic characteristics of the variables under study. The paper applied exploratory factor analysis (EFA) to examine whether the variables of technological competencies, learning orientation, adaptability, and willingness to retrain were suitable for developing a common adaptive technological human capital

(hereinafter – ATHC) index. We treated affective and continuance organizational commitment as separate outcome variables in subsequent analyses.

Before conducting the factor analysis, we assessed the suitability of the data using the Kaiser–Meyer–Olkin index and Bartlett’s sphericity test. In the next step, the paper assessed the internal reliability of the identified factors using Cronbach’s alpha. The study used the generally accepted

threshold of 0.70 to evaluate the reliability of the scales (Nunnally & Bernstein, 1994). Following the establishment of the factor structure, correlation and regression analyses were performed to explore how adaptive technological human capital relates to the various dimensions of organizational commitment.

The internal consistency of the scales was evaluated using Cronbach’s alpha, and the results are reported in Table 2.

Table 2. Reliability statistics

Scale	Number of items	Cronbach’s Alpha
ATHC	4	0.837
Affective Organizational Commitment	2	0.746
Continuance Organizational Commitment	3	0.713

Note: compiled by the authors

Factor analysis was conducted on the variables constituting the theoretical dimensions of ATHC. The analysis aimed to investigate whether technological competence, learning orientation, adaptability, and willingness to reskill converge into a single latent construct. Based on the results, the four variables loaded onto a single factor, providing a sound basis for constructing the ATHC index. The Cronbach’s alpha value for the ATHC index was 0.837, indicating good internal reliability. The Affective Organizational Commitment scale yielded

a Cronbach’s alpha of 0.746, while the Continuance Organizational Commitment scale yielded an alpha of 0.713. All three values exceed the generally accepted threshold of 0.70, thereby confirming the scales’ adequate reliability.

Based on the reliability results, the research data proved suitable for further hypothesis testing and empirical testing of the research model. To examine the potential impact of common method bias (CMB), Harman’s single-factor test was performed (Table 3).

Table 3. Harman’s Single-Factor Test (Unrotated PCA)

Statistic	Value
Number of variables included	9.000
First component eigenvalue	4.097
Variance explained by the first component, %	45.530
Threshold for common method bias assessment, %	50.000

Note: compiled by the authors

All measurement items associated with technological competence, learning orientation, adaptability, willingness to reskill, affective commitment, and continuance commitment were entered simultaneously into an unrotated principal component analysis. The first unrotated factor explained 45.53% of the total variance, which is below the 50% threshold commonly used to indicate a substantial common method bias problem (Podsakoff et al., 2003). Accordingly, common method bias is unlikely to have significantly influenced the observed relationships among the study variables.

RESULTS

The aim of the study was to examine how technological competencies, learning orientation, adaptability, and willingness to retrain are interrelated, and whether these dimensions can be interpreted as a common ATHC index. In addition, the study also examined how this index relates to various dimensions of organizational commitment. Before performing factor analysis, the suitability of the dataset for factor extraction was assessed using the Kaiser–Meyer–Olkin measure of sampling adequacy and Bartlett’s test of sphericity (Table 4).

Table 4. KMO and Bartlett's Test

Measure	Value
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.709
Bartlett's Test of Sphericity Approx. Chi-Square	529.875
Degrees of freedom	6
P-value	<0.001

Note: compiled by the authors

The suitability of the data for factor analysis was assessed using the Kaiser–Meyer–Olkin measure and Bartlett's test of sphericity. The Kaiser–Meyer–Olkin value was 0.709, indicating adequate sampling adequacy. Bartlett's test of sphericity was statistically significant ($\chi^2 = 529.875$, $df = 6$, $p < 0.001$), suggesting that the correlation structure among the variables was appropriate for conducting factor analysis. The principal component analysis identified a single dominant factor based on the Kaiser criterion. The aim of the analysis was to examine whether technological competence, learning orientation, adaptability, and willingness

to retrain can be organized into a common ATHC index. Based on the eigenvalue analysis, a dominant factor accounted for 67.33% of the total variance. The results indicate that technological competence, learning orientation, adaptability, and willingness to retrain are closely correlated. The results support the view that the dimensions examined can be considered components of a common adaptive technological human capital index. Based on this, we created the ATHC index and used it as an independent variable in subsequent hypothesis testing.

The component matrix is presented in Table 5.

Table 5. Component matrix of ATHC Variables

Variable	Component 1
Technological competence	0.771
Adaptability	0.815
Learning orientation	0.827
Reskilling willingness	0.867

Note: compiled by the authors

The results show that all four variables have high factor loads for the first component: technological competence (0.771), adaptability (0.815), learning orientation (0.827), and readiness for retraining (0.867). Since the values of factor loads exceed the threshold of 0.700, it can be concluded that each variable is strongly related to the common factor.

The results confirm that the four dimensions are collectively suitable for developing the ATHC index.

Pearson correlation analysis was conducted to examine the relationships between ATHC and the two dimensions of organizational commitment. The results are presented in Table 6.

Table 6. Correlation analysis

Variable	Adaptive Technological Human Capital	Affective Organizational Commitment	Continuance Organizational Commitment
Adaptive Technological Human Capital	1.000		
Affective Organizational Commitment	0.758***	1.000	
Continuance Organizational Commitment	0.220***	0.245***	1.000

***Correlation is significant at the 0.001 level (2-tailed)

Note: compiled by the authors

Pearson correlation analysis revealed a strong positive association between ATHC and Affective Organizational Commitment ($r = 0.758$, $p < 0.001$). The ATHC was also positively related to Continuance Organizational Commitment ($r = 0.220$, $p < 0.001$),

although this relationship was considerably weaker. Similarly, Affective Organizational Commitment showed a weak positive correlation with Continuance Organizational Commitment ($r = 0.245$, $p < 0.001$).

The results indicate a strong, positive, and

statistically significant relationship between the ATHC and affective organizational commitment ($r = 0.758$; $p < 0.001$). This suggests that employees with higher technological competence, greater openness to learning, greater adaptability, and a stronger willingness to retrain typically demonstrate a stronger emotional attachment to their organization. This result is consistent with the basic assumptions of social exchange theory (Blau, 1964) and organizational support theory (Eisenberger et al., 1986), which suggest that opportunities for development and competency development can strengthen emotional attachment to the organization.

A weaker correlation was found between the ATHC index and continuance organizational commitment ($r = 0.220$; $p < 0.001$). Although the correlation is statistically significant, its strength is considered low. This suggests that technological human capital primarily influences emotional attachment, while it has a significantly smaller effect on cost-based considerations regarding staying with the organization. An interesting finding is that the relationship is positive, even though some of the literature would have suggested a negative correlation. This is because employees with higher human capital generally have more alternatives in the external labor market, which in theory could reduce their commitment to staying with the organization. However, the results of this study suggest that employees with greater technological skills may, to some extent, place a higher value on their current

workplace, and thus perceive the costs of leaving the organization as higher.

The correlation results provide preliminary support for the relationships hypothesized in the research model, but regression analyses were also conducted to examine them more precisely. To test the research hypotheses, we relied on factor analysis, correlation analysis, and linear regression. When evaluating the hypotheses, we considered not only the statistical significance, but also the practical importance and explanatory power of the relationships.

To test hypothesis H1, we used factor analysis, which is presented in Table 5. Based on the results of the factor analysis, the variables of technological competence, learning orientation, adaptability, and retraining willingness formed a common factor structure, which formed the basis for the development of the ATHC index. Based on the results of the factor analysis, technological competence, adaptability, learning orientation, and willingness to retrain were grouped into a single common factor. The first factor had a value of 2.693, explaining 67.33% of the total variance. The factor weights exceeded 0.70 for all variables, indicating a strong relationship with the common factor. Based on the results, the four dimensions proved suitable for developing the ATHC index, and H1 was empirically supported.

To test Hypothesis H2, a linear regression analysis was conducted, with Affective Organizational Commitment as the dependent variable and ATHC index as the independent variable (Table 7).

Table 7. The effect of the ATHC index on affective organizational commitment

Section	Indicator	Value
Model summary	R	0.758
	R Square	0.574
	Adjusted R-Square	0.573
	Std. Error of the Estimate	1.044
ANOVA	Regression Sum of Squares	409.882
	Residual Sum of Squares	304.023
	Total Sum of Squares	713.906
	Regression df	1
	Residual df	279
	Total df	280
	Mean Square Regression	409.882
	Mean Square Residual	1.090
	F	376.146
	Sig.	< 0.001

Coefficients	Constant: Unstandardized B	1.459
	Constant: Std. Error	0.173
	Constant: t	8.414
	Constant: Sig.	< 0.001
	ATHC: Unstandardized B	0.832
	ATHC: Std. Error	0.043
	ATHC: Standardized Beta	0.758
	ATHC: t	19.394
	ATHC: Sig.	< 0.001

Note: compiled by the authors

Based on the results, the ATHC index had a significant positive effect on affective organizational commitment ($B = 0.832$; $\beta = 0.758$; $t = 19.394$; $p < 0.001$). The model's explanatory power was significant ($R^2 = 0.574$), meaning that ATHC explains 57.4% of the variance in affective organizational commitment. Based on the results, Hypothesis H2 was empirically supported. The results of this study suggest that technological human capital not only creates economic value but also has significant organizational and psychological implications. The results are consistent with the research of Bartlett (2001) and Kyndt et al. (2009), which found that development opportunities, a sense of competence, and an organizational environment that supports learning

strengthen employees' emotional attachment. The high correlation coefficient ($r = 0.758$) from the correlation analysis further confirms that the relationship between the ATHC index and affective commitment is not only statistically significant but also practically significant. Based on the results, it can be concluded that developing technological competencies and fostering a culture of learning can serve not only to increase organizational productivity but also to strengthen emotionally based organizational commitment.

Hypothesis H3 assumed that the ATHC is negatively related to continuance organizational commitment. In testing hypothesis H3, we analyzed the relationship between the ATHC and continuance organizational commitment using linear regression (Table 8).

Table 8. The effect of the ATHC index on continuance organizational commitment

Section	Indicator	Value
Model summary	R	0.220
	R Square	0.049
	Adjusted R-Square	0.045
	Std. Error of the Estimate	1.466
ANOVA	Regression Sum of Squares	30.586
	Residual Sum of Squares	599.464
	Total Sum of Squares	630.050
	Regression df	1
	Residual df	279
	Total df	280
	F	14.235
	Sig.	< 0.001
Coefficients	Constant: Unstandardized B	3.003
	Constant: Std. Error	0.243
	Constant: t	12.337
	Constant: Sig.	< 0.001
	ATHC: Unstandardized B	0.227
	ATHC: Std. Error	0.060
	ATHC: Standardized Beta	0.220
	ATHC: t	3.773
	ATHC: Sig.	< 0.001

Note: compiled by the authors

The results indicate that the ATHC had a weak but statistically significant positive effect on continuance organizational commitment ($B = 0.227$; $\beta = 0.220$; $t = 3.773$; $p < 0.001$). However, the model's explanatory power was low ($R^2 = 0.049$), meaning that the ATHC explains 4.9% of the variance in continuance organizational commitment. Since the results showed a positive relationship, while the hypothesis

assumed a negative correlation, Hypothesis H3 was not empirically supported. However, the results suggest that employees with higher ATHC may perceive leaving their current job as a greater loss, which may, in turn, lead to a positive relationship with continuance organizational commitment.

A summary of the hypothesis testing results is presented in Table 9.

Table 9. Hypothesis testing summary

Hypothesis	Statement	Result	Empirical evidence
H1	Technological competence, learning orientation, adaptability, and willingness to reskill are suitable for constructing the ATHC index.	Supported	Eigenvalue = 2.693; Variance explained = 67.33%; loadings > 0.77; $\alpha = 0.837$
H2	The ATHC index is positively related to affective organizational commitment.	Supported	$\beta = 0.758$; $R^2 = 0.574$; $p < 0.001$
H3	The ATHC index is negatively related to continuance organizational commitment.	Not supported	Observed relationship was positive: $\beta = 0.220$; $R^2 = 0.049$; $p < 0.001$

Note: compiled by the authors

The results show that ATHC not only emerges as a clearly identifiable and reliable index in the sample studied, but also plays a significant role in the development of organizational commitment. The strongest relationship was observed for affective organizational commitment, suggesting that technologically prepared, learning-oriented, and adaptable employees form a stronger emotional bond with their organization. This finding forms the basis for the academic and practical conclusions presented in the following chapter.

DISCUSSION

The aim of the study was to explore how technological competencies, learning orientation, adaptability, and willingness to retrain are interrelated, and to examine the role these factors play in the development of organizational commitment. Based on the study's results, two of the three hypotheses received empirical support, while Hypothesis H3 was not confirmed.

One of the most important findings of the research is that technological competencies, learning orientation, adaptability, and willingness to retrain did not emerge as separate dimensions; rather, a close relationship was observed among the examined dimensions, which enabled the development of an integrated ATHC index. This finding is consistent with the evolution of human capital theory. Becker (1975) defined human capital primarily as knowledge embodied in education, training,

and professional experience. With the emergence of the digital economy, however, the scope of human capital has expanded significantly. In the modern labor market, existing professional knowledge is becoming increasingly insufficient; rather, the skills that enable continuous adaptation and learning are becoming decisive (Autor, 2015). The findings also support Savickas's (1997) career adaptability model, which posits that employees' long-term success is primarily determined by their ability to adapt to a changing environment. Fugate et al. (2004) reached similar conclusions, interpreting employability not as a static body of knowledge but as an adaptive resource system.

According to the research findings, technological competence alone is not a sufficient resource. Technological knowledge becomes a true competitive advantage only when combined with a willingness to learn, adaptability, and a focus on continuous development (Novotná et al., 2023). This is consistent with the findings of the World Economic Forum (2023), which state that resilience, flexibility, and the ability to engage in lifelong learning are among the most important competencies in the future labor market. Based on the results of Hypothesis H1, technological competence, learning orientation, adaptability, and willingness to retrain can be considered dimensions that can be organized into an integrated ATHC index.

A second key finding of the study was the identification of a strong relationship between

ATHC and affective organizational commitment. Based on the results of the correlation analysis, a strong positive relationship was found between the two variables ($r = 0.758$; $p < 0.001$), while according to the regression model, ATHC explained 57.4% of the variance in affective commitment. This result indicates that technologically competent, learning-oriented, and adaptable employees develop a significantly stronger emotional attachment to their organization. The strength of this relationship suggests that technological human capital cannot be interpreted merely as an economic or productivity factor, but also has significant organizational and psychological implications. The results are closely linked to Meyer and Allen's (1991) concept of affective commitment, according to which emotional attachment to the organization is based on identification, involvement, and agreement with organizational goals. Employees with higher technological human capital are likely to cope more successfully with organizational changes, have a greater sense of competence, and evaluate their own role in the organization's operations more positively. The results also support Blau's (1964) social exchange theory. If an organization supports its employees' development, training, and skill enhancement, employees may reciprocate with increased commitment. Eisenberger et al. (1986) reached a similar conclusion, stating that perceived organizational support is one of the strongest predictors of affective commitment.

Based on the findings of this study, digital training, retraining programs, and an organizational culture that supports learning can not only enhance employees' skill levels but also contribute significantly to strengthening organizational commitment.

One of the most interesting findings of the study was the identification of associations related to continuance organizational commitment. Correlation analysis revealed a weak but statistically significant positive relationship between ATHC index and continuance organizational commitment ($r = 0.220$; $p < 0.001$). The results differ in part from the classical expectations derived from human capital theory. Much of the literature assumes that employees with higher human capital have more external labor market alternatives and are therefore less dependent on their current employer (Ng & Feldman, 2010). Based on this logic, one might even have expected a negative relationship. However, the results of the

present study shows different findings. The positive relationship may suggest that employees with high technological human capital place greater value on their current organization, especially when they have the opportunity to utilize and further develop their competencies there. Leaving the organization in this case would not merely mean changing jobs but also the loss of professional and relational resources accumulated over a long period of time.

The results obtained differ from the expectations derived from classical human capital theory; therefore, Hypothesis H3 was not empirically supported. The positive relationship may suggest that in the Hungarian labor market, employees with high technological and adaptive competencies may possess both high employability and strong organizational commitment. Despite opportunities for market mobility, leaving the organization could represent a significant loss for them due to the loss of compensation, development opportunities, training programs, or international career paths. The results, therefore, suggest that the simultaneous presence of affective and continuance organizational commitment may be more common in Central and Eastern European labor markets than classical Western models assume.

CONCLUSIONS

The aim of this study was to examine how technological competence, learning orientation, adaptability, and willingness to retrain are related to the various dimensions of organizational commitment among Hungarian employees. Based on the results, these factors can be interpreted as components of an integrated ATHC index that significantly impacts the development of organizational commitment.

The analyses confirmed that the ATHC index has a strong positive relationship with affective organizational commitment, suggesting that employees who are open to technological development and adaptable are also more emotionally attached to their organizations. In the case of continuance organizational commitment, however, a weak positive relationship was observed, contrary to expectations. This suggests that employees with high ATHC evaluate the benefits of staying with their organization not only on emotional grounds but also based on rational considerations.

One of the most important findings of the

research is that in the Hungarian labor market, the commitment patterns of employees with high technological and adaptive competencies may differ from the relationship framework assumed by classical international models. Despite opportunities for market mobility, the simultaneous presence of emotional attachment and switching costs may result in a unique commitment structure.

The study highlights that developing ATHC is a key factor for the long-term competitiveness of organizations in the digital economy. Supporting technological competencies, continuous learning, and adaptability can not only increase employees' employability but also strengthen organizational commitment and employee retention.

Based on the findings, developing technological competencies, supporting continuous learning, and strengthening adaptability can not only improve employee performance and employability but also positively influence organizational commitment.

One of the most important practical lessons from the study is that companies need not fear that investments in developing digital skills and training employees will automatically increase turnover. On the contrary, our results show that employees who are open to technological progress and focused on learning develop a stronger emotional attachment to their organization. Providing opportunities for development can therefore serve the dual goals of competitiveness and employee retention.

The positive correlation observed for continuance organizational commitment also indicates that employees with high ATHC place significant value on the benefits provided by the organization. Competitive compensation, professional development opportunities, participation in international projects, and training programs are resources that increase employees' intention to stay. Accordingly, when designing talent management systems, organizations should pay special attention to supporting continuous competency development.

The research findings are particularly relevant for organizations undergoing digital transformation. The long-term success of technology investments depends not only on the quality of the technologies used but also on the extent to which employees can adapt to the new environment. Accordingly, organizations' competitive advantage may increasingly be based on the development of adaptive technological human capital.

AUTHOR CONTRIBUTIONS

Conceptualization and theory: PK; research design: PK and PH; data collection: PK and PH; analysis and interpretation: PK and PH; writing draft preparation: PK and PH; supervision: PK; correction of article: PK and PH; proofread and final approval of article: PK. All authors have read and agreed to the published version of the manuscript.

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Competitiveness and Place Branding: A Systematic Review and Comparative Analysis

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ABSTRACT

Increased competition between territories highlights the need for a deeper understanding of the relationship between competitiveness and the brand of the territory as factors of sustainable regional development. The purpose of this study is to determine the relationship between the categories “competitiveness of the territory” and “brand of the territory” through a comparative analysis of their content. The study uses a systematic review of the literature based on the PRISMA method in combination with retrospective, comparative and spatial analysis methods. The data was processed and systematized using Python programming language tools. The empirical basis of the study was 1972 scientific publications, including 690 articles by Russian authors selected from the database. eLibrary.ru and 1,282 foreign publications identified through Google Scholar, covering the entire research period without time limits. The results showed that scientific interest in territorial competitiveness began to form in the late 1970s, while research on the brand of the territory intensified only since 1998. Comparative analysis identified eight groups of characteristics shaping the conceptual content of the studied categories, including socio-demographic, financial-economic, natural-recreational, administrative-political, cultural, infrastructural, innovative, and informational dimensions. The findings reveal that territorial competitiveness and place branding are largely based on an overlapping set of characteristics, however, place branding additionally incorporates associative attributes such as symbols, images, and identity. It was also found that, by 2020–2024, domestic and international studies had converged toward similar conceptual approaches to the interpretation of these categories.

KEYWORDS: Competitiveness, Place Branding, Marketing, Place Marketing, Territorial Branding, Regional Development, Regional Economy

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Конкурентоспособность и брендинг территории: систематический обзор и сравнительный анализ

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АННОТАЦИЯ

Усиление конкуренции между территориями актуализирует необходимость более глубокого понимания взаимосвязи между конкурентоспособностью и брендом территории как факторами устойчивого регионального развития. Целью данного исследования является определение соотношения между категориями «конкурентоспособность территории» и «бренд территории» через сравнительный анализ их содержательного наполнения. В исследовании использован систематический обзор литературы на основе метода PRISMA в сочетании с ретроспективным, сравнительным и пространственным методами анализа. Обработка и систематизация данных осуществлялись с применением инструментов языка программирования Python. Эмпирическую основу исследования составили 1972 научные публикации, в том числе 690 статей российских авторов, отобранных из базы eLibrary.ru, и 1282 зарубежные публикации, выявленные через Google Scholar, охватывающие весь период исследований без временных ограничений. Результаты показали, что научный интерес к территориальной конкурентоспособности начал формироваться в конце 1970-х гг., тогда как исследования бренда территории активизировались лишь с 1998 г. Сравнительный анализ позволил выделить восемь групп характеристик, формирующих содержательное наполнение исследуемых категорий: социально-демографические, финансово-экономические, природно-рекреационные, административно-политические, культурные, инфраструктурные, инновационные и информационные. Установлено, что конкурентоспособность и бренд территории основаны преимущественно на совпадающем наборе характеристик, однако бренд территории дополнительно включает ассоциативные атрибуты, такие как символы, образы и идентичность. Показано, что к 2020–2024 гг. отечественные и зарубежные исследования пришли к близким концептуальным подходам к трактовке данных категорий.

КЛЮЧЕВЫЕ СЛОВА: конкурентоспособность, брендинг местности, маркетинг, маркетинг месторасположения, территориальный брендинг, региональное развитие, региональная экономика

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ВВЕДЕНИЕ

Усиление конкуренции между территориями актуализирует задачу формирования устойчивых конкурентных преимуществ. В этой связи территориальный бренд становится одним из ключевых инструментов развития и продвижения стран и регионов.

Актуальность исследования обусловлена тем, что в научной литературе представлены различные подходы к трактовке понятий «конкурентоспособность территории» и «бренд территории», которые зачастую рассматриваются через призму отдельных исследовательских задач. Отсутствие единой трактовки приводит к тому, что данные понятия нередко используются как взаимозаменяемые. Кроме того, разные авторы наделяют их различным набором характеристик, а взаимосвязи между ними интерпретируются неоднозначно.

Однако при попытке систематизации публикаций по данной теме возникает проблема, связанная с высокой неоднородностью исследований. Поиск, по ключевым словам, выявляет значительное количество работ, в которых данные категории рассматриваются с различных позиций. В результате прямое сопоставление понятий оказывается затруднительным, при этом в научной литературе представлены диаметрально противоположные точки зрения относительно характера их взаимосвязи. Примеры подобных противоречий будут рассмотрены далее.

Особую значимость приобретает анализ причинно-следственных связей между рассматриваемыми категориями, поскольку в научной литературе бренд территории интерпретируется как результат достигнутой конкурентоспособности, инструмент ее формирования либо самостоятельный фактор, влияющий на уровень конкурентоспособности территории. Таким образом, пробел в исследованиях заключается в отсутствии систематического сравнения содержательного наполнения двух этих категорий, характеризующих территориальное развитие. Большинство авторов изучают их по отдельности, либо указывают на их взаимосвязь без анализа структуры понятий и исследования причинно-следственных связей.

Новизна исследовательского вопроса характеризуется попыткой прямого сопоставления

содержательного наполнения категорий «конкурентоспособность территории» и «бренд территории» на большом массиве публикаций. В существующих работах вопрос о характере взаимосвязи между категориями не ставится. В данном исследовании это соотношение устанавливается через сравнительный анализ их содержательного наполнения. Практическая значимость заключается в систематизации характеристик, которая может быть использована регионами и разработчиками брендов для определения того, какие элементы формируют бренд, какие элементы формируют конкурентоспособность территории, а также какие факторы оказывают влияние на обе категории. Учет характеристик, на основе которых построены категории «конкурентоспособность региона» и «бренд региона», при разработке мероприятий по продвижению и развитию территории позволит принимать более обоснованные управленческие решения.

Целью данного исследования является определение соотношения между категориями «конкурентоспособность территории» и «бренд территории» через сравнительный анализ их содержательного наполнения.

Для достижения поставленной цели в рамках исследования были сформулированы следующие вопросы:

- (1) Какие различия и взаимосвязи существуют между категориями «конкурентоспособность территории» и «бренд территории» в концепциях зарубежных и отечественных исследователей?
- (2) Какие сходства и различия выявляются в структуре содержательного наполнения категорий «конкурентоспособность территории» и «бренд территории»?

МЕТОДЫ ИССЛЕДОВАНИЯ

В рамках данного исследования был проведен систематический обзор литературы с использованием метода PRISMA в совокупности с ретроспективным, сравнительным и пространственным методами анализа. Отбор публикаций осуществлялся в поисковой системе научной электронной библиотеки eLibrary.ru без временных ограничений, то есть охватывал весь массив публикаций с момента появления первых работ по теме. Реестр исследований был

сформирован в результате поискового запроса от 23 июня 2025 г. Запрос был осуществлен по российским журналам, входящим в перечень ВАК без указания тематики журнала. Всего было отобрано 3 489 журналов из 156 127.

В отобранных журналах осуществлялся поиск статей, по ключевым словам, а именно «конкурентоспособность региона», «конкурентоспособность территории», «конкурентоспособность города», «конкурентоспособность страны», «бренд региона», «бренд территории», «бренд города», «бренд страны», «привлекательность региона», «привлекательность территории», «привлекательность страны» и «привлекательность города». Для отбора статей был применен фильтр к заданными ключевым словам, который позволил найти их в таких элементах исследования как «название публикации», «ключевые слова» и «аннотация». Поиск осуществлялся только по статьям в журналах с учетом морфологии. В результате было отобрано 2 297 статей из 72 688 645. К сформированной выборке был применен фильтр по тематике «Экономика. Экономические науки». В результате чего в первоначальную выборку было включено 1 917 статей.

На следующем этапе осуществлялся анализ названий, ключевых слов и аннотаций отобранных статей. Ввиду того, что статьи имели как открытый, так и закрытый доступ, анализ данных элементов позволил не исключать из выборки статьи с закрытым доступом к тексту. На основе указанных элементов статей определялось, войдут ли они в подборку для полнотекстового анализа. Поскольку в рамках данного исследования понятия «бренд» и «конкурентоспособность» рассматриваются по отношению к территории, в том числе к стране, региону или городу, на данном этапе из выборки были исключены публикации, рассматривающие данные категории применительно к фирмам или отраслям. По итогам данного анализа было удалено 480 публикаций. Помимо этого, на основе анализа аффилиации авторов было удалено 26 публикаций, авторы которых

являлись зарубежными исследователями. Таким образом, была сформирована выборка для полнотекстового анализа, включающая 1 411 статей.

Поскольку исследование фокусировалось на методологических аспектах изучения бренда и конкурентоспособности территории, а не на их простом упоминании, для включения в итоговую выборку статья должна была соответствовать одному из критериев: раскрывать категорию «конкурентоспособность», оценку конкурентоспособности или элементы, влияющие на нее или зависмые от нее, применительно к территории; раскрывать категорию «бренд», оценку бренда или же элементы, влияющие на него или зависмые от него, применительно к территории; рассматривать взаимосвязи между категориями «бренд» и «конкурентоспособность» применительно к территории.

Для статей доступ к полному тексту которых был закрыт, анализ содержания осуществлялся на основе аннотаций. Если содержание аннотации позволяло сделать вывод о рассмотрении в статье исследуемых аспектов, такая статья включалась в итоговую выборку. Для статей данного типа анализ взаимосвязи между исследуемыми категориями также осуществлялся на основе аннотаций. Если связь явно не прослеживалась, информация о ее наличии не фиксировалась.

В результате из выборки была исключена 721 статья. Итоговая выборка по отечественным исследованиям составила 690 статей. Большое количество исключенных публикаций связано с тем, что упоминание конкурентоспособности или бренда в названии, ключевых словах либо аннотации еще не гарантирует исследования данных категорий. Так, в части исключенных статей исследуемые категории упоминались лишь в метаданных и не рассматривались в основном тексте статьи, тогда как в другой части публикаций на них лишь косвенно ссылались во введении.

Процесс отбора статей отечественных исследователей для систематического обзора литературы представлен на рисунке 1.

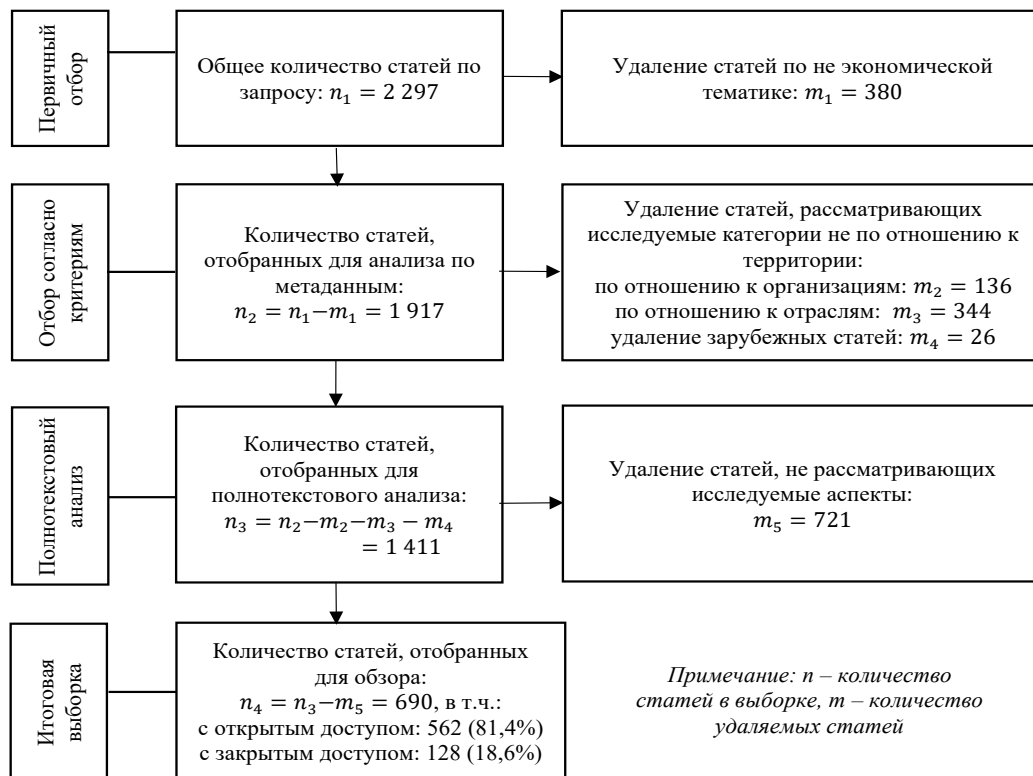


Рисунок 1. Схема PRISMA процесса отбора статей российских авторов в базе данных eLibrary.ru
Figure 1. PRISMA flow diagram of the selection process for articles by Russian authors in the eLibrary.ru database

Схема отражает последовательные этапы формирования выборки, включая первичный поиск публикаций, исключение статей по тематическим критериям, анализ метаданных и полнотекстовый анализ. Итоговая выборка была сформирована на основе критериев соответствия исследуемым аспектам конкурентоспособности и бренда территории. Следует отметить, что данный систематический обзор, в силу заданных критериев, не претендует на исчерпывающий охват всех публикаций по теме. Часть исследований могла остаться за рамками выборки, и наиболее значимые из них, не вошедшие в основной анализ, будут отдельно отмечены при рассмотрении результатов. Таблица с итоговой выборкой статей российских авторов представлена в репозитории Zenodo (Kosukhina, 2025).

При формировании выборки зарубежных статей сохранялась та же логика, что и для отечественных публикаций. Отбор зарубежных публикаций осуществлялся в поисковой системе научных публикаций Google Scholar без

временных ограничений и охватывал весь массив публикаций с момента появления первых работ по теме.

Выбор поисковой системы Google Scholar обусловлен необходимостью охвата максимально широкого круга зарубежных публикаций с учетом ряда ограничений для российских исследователей. В особенности это важно для ретроспективного анализа, поскольку первые работы по теме могут отсутствовать в более узкоспециализированных базах данных. Сформированная выборка в полной мере отражает представления о рассматриваемых понятиях, их содержательное наполнение и динамику развития. Сопоставимость выборок обеспечивается единым алгоритмом отбора, выраженным в единых критериях включения статей для российских и зарубежных публикаций. Все отобранные статьи прошли проверку на соответствие заданным критериям путем анализа метаданных и полнотекстового анализа.

Реестр полученных исследований был сформирован на основе поискового запроса от 01

июля 2025 г. Поиск осуществлялся по таким ключевым словам, как «Regional competitiveness», «Territory competitiveness», «City competitiveness», «Country competitiveness», «Regional brand», «Territory brand», «City brand», «Country brand», «Regional attractiveness», «Territory attractiveness», «Country attractiveness», «City attractiveness», «Town competitiveness», «Town brand», «place brand». Для зарубежных авторов было добавлено три ключевых слова ввиду особенностей использования терминов в зарубежной практике: город на английском языке может обозначаться как *town* или *city*, кроме того, среди зарубежных исследователей широко используется термин «бренд места» применительно к территории.

Для отбора статей был применен фильтр к заданным ключевым словам, который позволил найти искомые ключевые слова только в названиях статей. Так как других фильтров на поисковой платформе не предусмотрено, поиск по названиям позволил отобрать статьи наиболее близкие к исследуемым категориям. Таким образом в результате было отобрано 2 640 статей.

На первом этапе анализа было удалено 40 дубликатов статей и 185 статей российских авторов, которые уже включены в первую выборку.

Далее также осуществлялся анализ метаданных отобранных статей, в ходе которого было исключено 504 статьи, рассматривающих исследуемые категории по отношению не к территориям, а к фирмам и отраслям.

Затем был проведен полнотекстовый анализ статей для формирования итоговой выборки. Для включения в нее в зарубежных статьях также должен был рассматриваться хотя бы один из аспектов, связанных с конкурентоспособностью или брендом территории, аналогично критериям, примененным для выборки по отечественным публикациям. Анализ содержания статей с закрытым доступом также осуществлялся на основе аннотаций. На данном этапе из выборки было исключено 628 статей. Итоговая выборка по зарубежным исследованиям составила 1282 статьи.

Процесс отбора статей зарубежных исследователей для систематического обзора литературы представлен на рисунке 2.

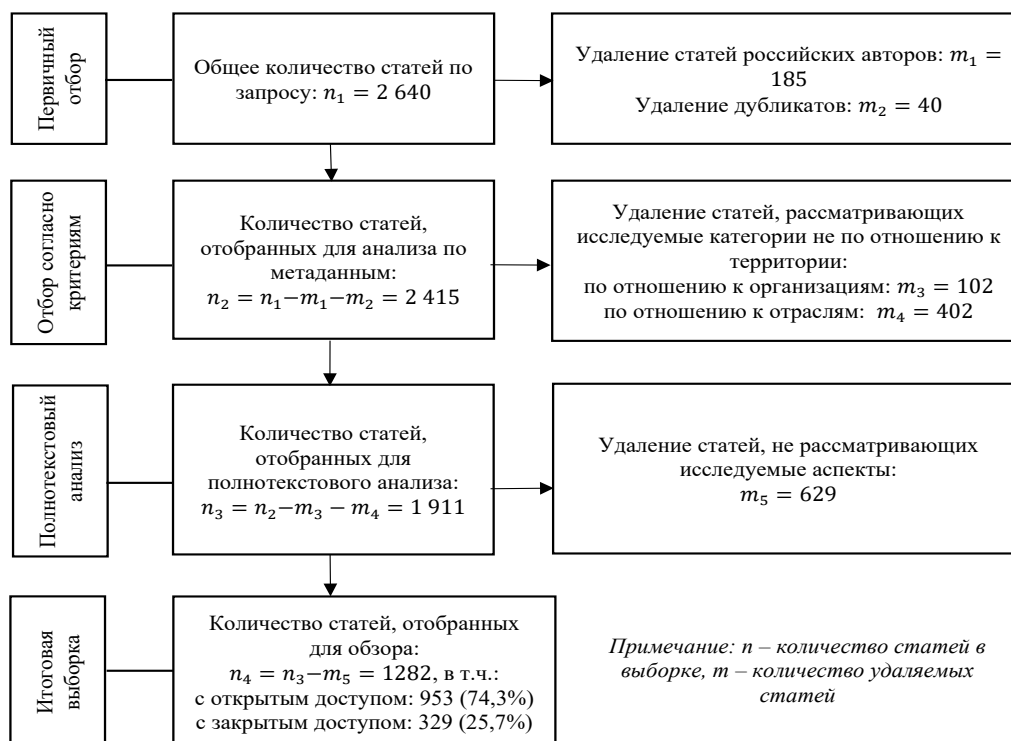


Рисунок 2. Схема PRISMA процесса отбора статей зарубежных авторов в базе данных Google Scholar
Figure 2. PRISMA flow diagram of the selection process for articles by foreign authors in the Google Scholar database

Аналогично выборке по статьям российских авторов, часть исследований могла остаться за рамками выборки. Наиболее значимые из них также будут отдельно отмечены при обсуждении результатов. Таблица с итоговой выборкой статей зарубежных авторов представлена в репозитории Zenodo (Kosukhina, 2025).

Таким образом, были сформированы две выборки: для российских и зарубежных публикаций, которые были систематизированы по хронологическому принципу. Такой подход обеспечил возможность применения ретроспективного, сравнительного и пространственного методов анализа. С помощью ретроспективного анализа рассматривалось, как менялся интерес ученых к конкурентоспособности и бренду территории с течением времени, а также как трансформировались представления о взаимосвязи между данными понятиями. Сравнительный анализ был применен для выявления различий в подходах зарубежных и российских исследователей, а также для определения соотношения характеристик конкурентоспособности и бренда территории. Обработка и систематизация данных осуществлялись с применением инструментов языка программирования Python.

Сравнительный анализ содержательного наполнения категорий проводился в несколько этапов:

(1) из каждой статьи, включенной в итоговые выборки, извлекались все характеристики, которые авторы относят к конкурентоспособности или бренду территории;

(2) характеристики группировались в кластеры по смыслу, для обработки использовался язык программирования Python с целью лемматизации и объединения близких по смыслу понятий;

(3) итоговая классификация включила 8 групп характеристик: социально-демографические, финансово-экономические, природно-рекреационные, административно-политические и культурные составляющие, инфраструктуру, инновационные и информационные характеристики, а также ассоциативные атрибуты для бренда региона;

(4) по каждой статье фиксировалось наличие или отсутствие характеристик из каждой группы.

Итоговые выборки включили в себя 1972 статьи: 690 статей составила выборка по статьям российских авторов и 1 282 статьи составила выборка по статьям зарубежных авторов. Данные выборки представлены в репозитории Zenodo. Таблицы с данными по статьям включают в себя следующую информацию:

(1) столбцы с метаданными статьи: год публикации, авторы, наименование статьи, организация, к которой прикреплен автор, ключевые слова и идентификационные номера (EDN – для статей российских авторов, DOI – для статей зарубежных авторов);

(2) столбцы с кодированием тематики исследования: «рассматривается только конкурентоспособность территории», «рассматривается только бренд территории» или «рассматриваются оба понятия» (1 указывает на то, что в статье тема рассматривается, 0 – не рассматривается);

(3) столбцы с авторскими определениями исследуемых понятий и понятий, смежных с ними (маркетинг территории, имидж территории);

(4) исследуемая территория: страна, регион, город или иная;

(5) столбец с ключевыми взаимосвязями, в котором отражается информация о взаимосвязи конкурентоспособности и бренда территории, а также их характеристики;

(6) информация о наличии доступа к полному тексту статьи;

(7) информации о наличии развернутого рассмотрения факторов и характеристик в статье.

РЕЗУЛЬТАТЫ

Формирование выборок показало, что категории «конкурентоспособность территории» и «бренд территории» характеризуются выраженной исторической динамикой и трансформацией подходов к их интерпретации. В связи с этим в данном разделе наряду с исследовательскими вопросами рассматривается эволюция представлений о данных категориях в отечественной и зарубежной научной литературе.

Структура раздела включает две взаимосвязанные части. В первой части анализируется динамика научного интереса к категориям конкурентоспособности и бренда территории в российских и зарубежных исследованиях, что позволяет проследить изменение исследовательских

акцентов и выявить различия в концептуальных подходах. Во второй части проводится сравнительный анализ содержательного наполнения рассматриваемых категорий с целью выявления их сходств, различий и точек пересечения.

Динамика публикационной активности отечественных и зарубежных авторов по темам «конкурентоспособность территории» и «бренд территории» представлена на рисунке 3.

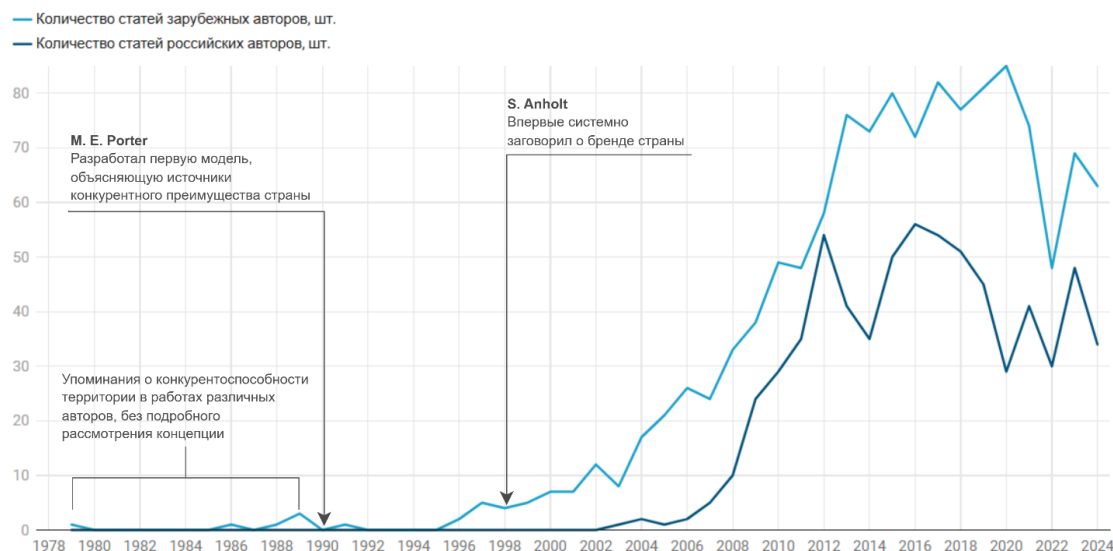


Рисунок 3. Динамика количества научных публикаций, посвященных конкурентоспособности и бренду территории в России и за рубежом в год

Figure 3. Dynamics of the number of scientific publications devoted to competitiveness and brand territory in Russia and abroad per year

Как мы можем заметить исходя из графика, первые работы, посвященные конкурентоспособности территории, начали появляться в зарубежных исследованиях в конце 1970-х годов. Однако данные статьи были посвящены тому, что различные явления могут оказывать влияние на конкурентоспособность территории, в них не рассматривалось ни понятие конкурентоспособности, ни ее характеристики. Данный этап зарождения интереса продлился до 1990 г. и включил в себя работы таких авторов как Н. Раск и Р. Адамс (Rask & Adams, 1979), Р.В. Викерман (Vickerman, 1988, 1989), Э. Малецки (Malecki, 1989). Основоположником территориальной конкурентоспособности большинство авторов выделяет М. Портера, который в своей книге в 1990 г. разработал первую модель, объясняющую источники конкурентного преимущества страны (Porter, 1990). В последующие годы появлялись единичные работы по данной тематике и лишь с 1995 г. начался устойчивый рост публикаций.

Упоминания о территориальном бренде появились почти спустя 20 лет после начала исследования территориальной конкурентоспособности. Основоположником данной концепции стал Анхольт, предложивший в 1998 г. теорию о влиянии национального бренда на компании страны, что ознаменовало формирование нового исследовательского поля (Anholt, 1998).

В российской научной среде исследование данных тем началось значительно позже. Интерес отечественных исследователей к территориальной конкурентоспособности начал активно расти лишь с 2003 г., а работы, посвященные бренду, начали появляться с 2006 г.

Примечательно, что отечественные исследователи, опираясь на уже накопленный опыт зарубежных авторов, быстрее перешли к активному исследованию данных тем и к их комплексному рассмотрению, минуя длительный этап изолированного изучения бренда и конкурентоспособности территории. Уже спустя три года после появления первых исследований

о конкурентоспособности начался рост публикационной активности, посвященной данным тематикам.

На рисунке 4 представлена структура зару-

бежных публикаций, которая позволяет проследить динамику интереса исследователей к конкурентоспособности, бренду территории и их взаимосвязи.

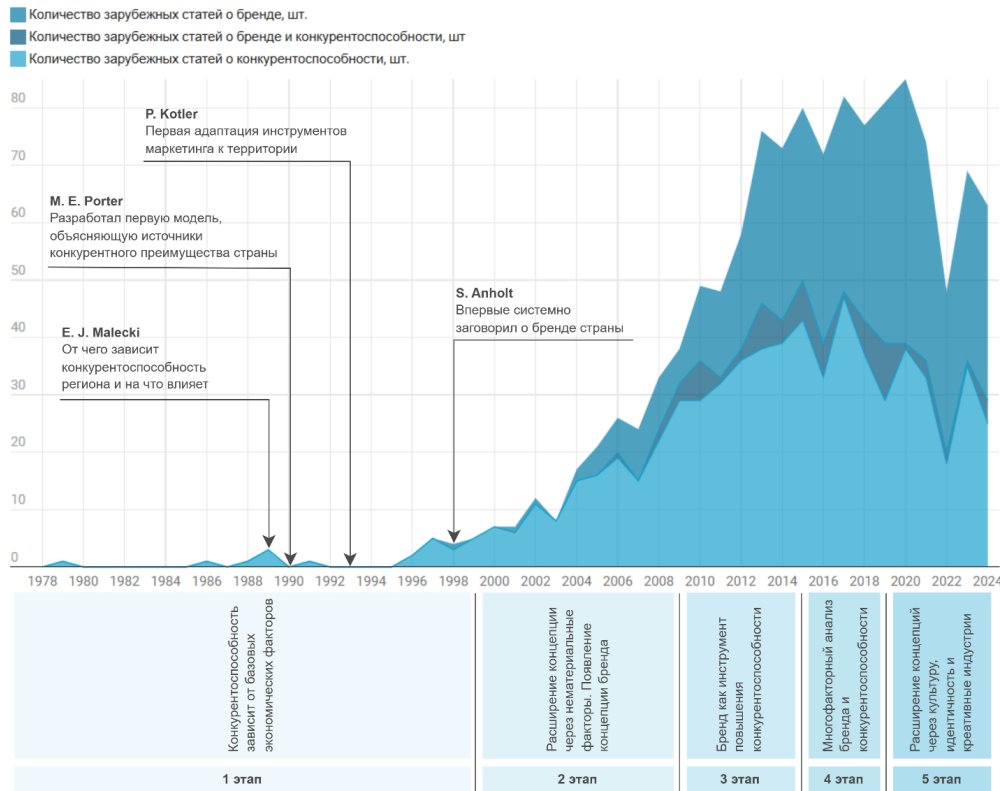


Рисунок 4. Динамика тематической структуры зарубежных исследований по конкурентоспособности, бренду территории и их взаимосвязи

Figure 4. Dynamics of the thematic structure of foreign studies on competitiveness, territorial branding, and their interrelationship

Интерес к различным аспектам конкурентоспособности и бренда территории формировался и смещался постепенно. Это позволяет выделить пять фаз в развитии научных исследований зарубежных авторов (рисунок 4).

Первый период исследований был посвящен исключительно территориальной конкурентоспособности и охватил период с конца 1970-х годов по конец 1990-х годов. Это был самый длительный период, который рассматривал конкурентоспособность с позиции базовых экономических факторов. Как уже говорилось ранее, первые работы не рассматривали конкурентоспособность содержательно, а изучали явления, которые могли оказывать влияние на нее.

Несмотря на то, что большинство авторов основоположником территориальной конкурентоспособности выделяют М. Портера, в тот же период активным изучением данной категории занимался Э. Малецки. В своей работе, опубликованной в 1989 г., он определил, что региональная конкурентоспособность зависит от трудовых ресурсов, инфраструктуры, отраслевой структуры и уровня жизни населения (Malecki, 1989). Уже после, в 1990 г., М. Портер предложил модель «конкурентного ромба», согласно которой конкурентоспособность страны зависит от факторов производства, состояния спроса, поддерживающих отраслей и внутриотраслевой конкуренции (Porter, 1990). Последующие авторы, изучающие данное

явление на этом этапе, продолжили наполнять концепцию конкурентоспособности основными экономическими факторами. Важно, что уже в тот период начались попытки применения маркетинга к территориям. Так, Котлер в своей книге, опубликованной в 1993 г. представил первую адаптацию инструментов маркетинга к территории (Kotler et al., 1993).

Второй этап исследований пришелся на период с конца 1990-х годов по 2009 г. В этот период к факторам конкурентоспособности начали добавляться нематериальные характеристики территорий. На этом же этапе после того, как Анхольт заговорил о бренде территории, начинается восхождение интереса к данной теме (Anholt, 1998). Изначально бренд и конкурентоспособность изучались параллельно. Так, одним из ключевых авторов данного периода является Ленгвел, который расширил концепцию конкурентоспособности, отнес к факторам человеческий капитал и инновации (Lengyel, 2000). Еще одним ярким исследователем того периода был Хаггинс, который отнес к факторам конкурентоспособности информацию и знания (Huggins, 2003; Huggins & Izushi, 2009). Помимо данных авторов, большое количество работ по данной теме в этот период времени посвятили, расширяя концепцию через социальный и интеллектуальный капитал (Bronisz & Heijman, 2010; Kitson et al., 2004; Camagni & Capello, 2009). В этот же период начали появляться работы, упоминающие взаимосвязь между конкурентоспособностью и брендом территории (Virgo & de Chernatony, 2006; Wu, 2008).

На следующем этапе, охватывающем период 2010–2014 гг., наблюдается выраженный рост числа публикаций, посвященных исследованию бренда территории, и уже к концу данного периода количество работ по территориальному бренду становится сопоставимым с числом исследований, посвященных территориальной конкурентоспособности. Исследовательский интерес смещается с противопоставления этих категорий на анализ их комплексного взаимодействия и изучение взаимосвязей. В данный период большинство исследователей определяют бренд в качестве инструмента повышения конкурентоспособности, параллельно наполняя категорию бренда собственными характеристиками (Zenker & Beckmann, 2013; Florek,

2012; Florek & Kavaratzis, 2014).

Четвертый и пятый периоды, начиная с 2015 г., посвящены многофакторному рассмотрению данных понятий. Бренд и конкурентоспособность территории продолжают наделяться новыми характеристиками. Бренд перестает быть просто маркетинговым инструментом, а все чаще трактуется как стратегический ресурс территории, объединяющий в себе ее экономические, социальные и культурные характеристики. С 2019 г. на первый план начинают выходить такие факторы как культура, идентичность и креативный сектор экономики.

Таким образом, за исследуемый период, зарубежные авторы перешли от параллельного изучения категорий к их комплексному рассмотрению и сформировали достаточно объемный блок характеристик, отражающих структуру территориальной конкурентоспособности и бренда.

В ходе анализа также было отмечено, что в зарубежных исследованиях появилась определенное ответвление территориального бренда – «бренд страны происхождения», которое не получило такого же повышенного интереса в отечественной литературе. Ряд работ зарубежных авторов был посвящен анализу бренда территории не напрямую, а через призму восприятия товаров, ассоциируемых с ней. Например, всем известный слоган «Сделано в Германии», который демонстрирует то, как коммерческий брендинг усиливает общий бренд страны.

Помимо этого, по результатам исследования работ зарубежных авторов был выявлен заметный географический сдвиг. Если на первых двух этапах лидерами в данной области выступали ученые из США и Европейских стран (Великобритании, Венгрии, Польши и Греции) и доля статей из этих стран ежегодно составляла более 80%, то в последнее десятилетие их интерес к данным темам начал утихать. Одновременно наблюдается резкий рост числа публикаций из развивающихся стран, таких как Индонезия, Иран, Малайзия и Китай, с 2020 г. доля статей из данных стран ежегодно составляет 40-50%, также растет интерес стран СНГ. Данный сдвиг может быть объяснен тем, что развитые европейские территории в большей степени столкнулись с проблемами чрезмерного

туристического потока и теперь решают задачи по управлению туристической активностью, в то время как развивающиеся страны активно используют брендинг как стратегию для привлечения туристов.

Динамика российских исследований, демон-

стрирует в целом схожие с зарубежной наукой фазы развития, однако, ввиду более позднего возникновения публикационной активности по данным темам, эти этапы протекали в существенно сжатые сроки (рисунок 5).

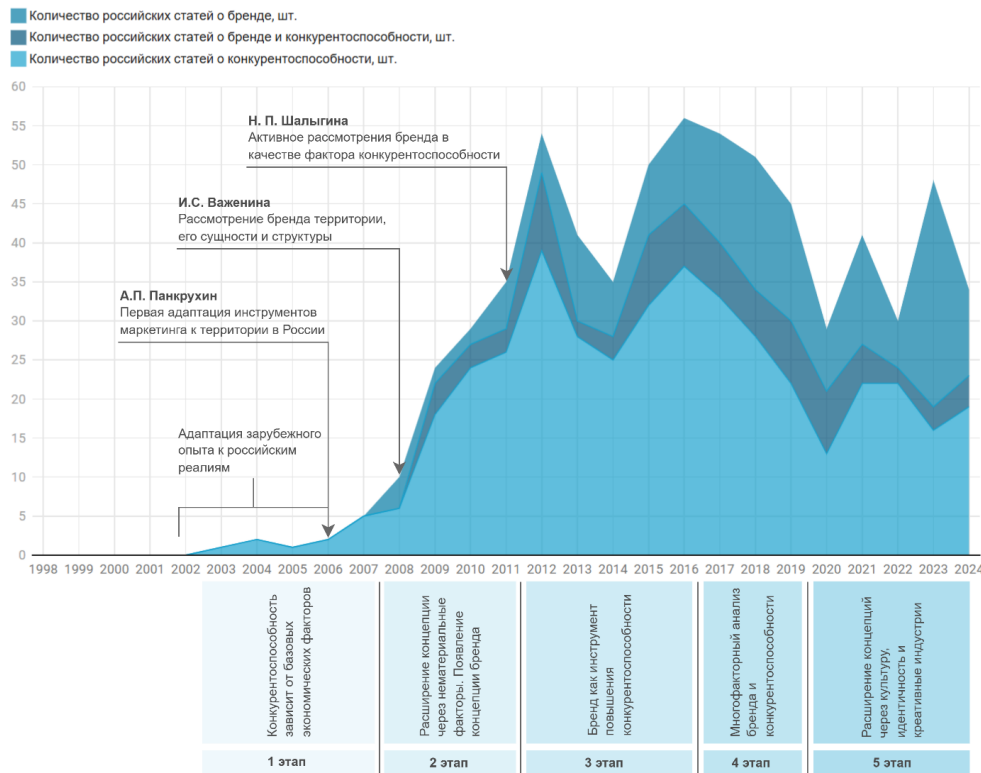


Рисунок 5. Динамика тематической структуры отечественных исследований по конкурентоспособности, бренду территории и их взаимосвязи

Figure 5. Dynamics of the thematic structure of domestic research on competitiveness, territorial branding, and their interrelationship

Выделить отечественного исследователя, впервые затронувшего тему конкурентоспособности, затруднительно, так как в начале 2000-х годов многие авторы активно адаптировали зарубежный опыт к российским реалиям (Gogoleva, 2023; Pryadeyn, 2005; Khominich & Timoshenko, 2004). После 2006 г. отмечается не только рост публикаций, посвященных конкурентоспособности территории, но и качественное изменение характера работ – авторы переходят от адаптации зарубежных наработок к самостоятельному развитию содержания категорий.

Наиболее показательным является этап объединения концепций конкурентоспособности и бренда территории. В отличие от зарубежных

исследований, где переход к комплексному анализу занял около 10 лет, в России он осуществился практически одновременно с появлением первых работ о бренде. Уже с 2009 г. начали появляться первые работы, посвященные взаимосвязи бренда и конкурентоспособности таких авторов, как Давлетшин Т.Ф., Селюков М.В., Шалыгина Н.П. (Davletshin, 2009; Selyukov et al., 2012; Shalygina et al., 2013). Однако, стоит отметить, что в отечественных исследованиях основной блок работ все же посвящен конкурентоспособности и лишь с 2023 г. тематика бренда начинает преобладать.

Немало важным аспектом является то, что к 2020 г. динамика российских исследований полностью сравнялась с зарубежными трендами,

перейдя к рассмотрению категорий с позиции таких аспектов, как культура, идентичность и креативные индустрии.

Таким образом, отечественные исследователи продемонстрировали способность к быстрой адаптации международного опыта и его применению для решения актуальных задач российских регионов, пройдя путь зарубежных авторов в ускоренном режиме, благодаря их ранним наработкам и сформированному теоретическому фундаменту.

Сравнительный анализ характеристик конкурентоспособности территории и бренда в работах зарубежных и отечественных авторов

Сравнительный метод анализа, примененный к работам зарубежных и отечественных авторов, позволил выявить сходства и различия в содержательном наполнении изучаемых категорий (рисунок 6).

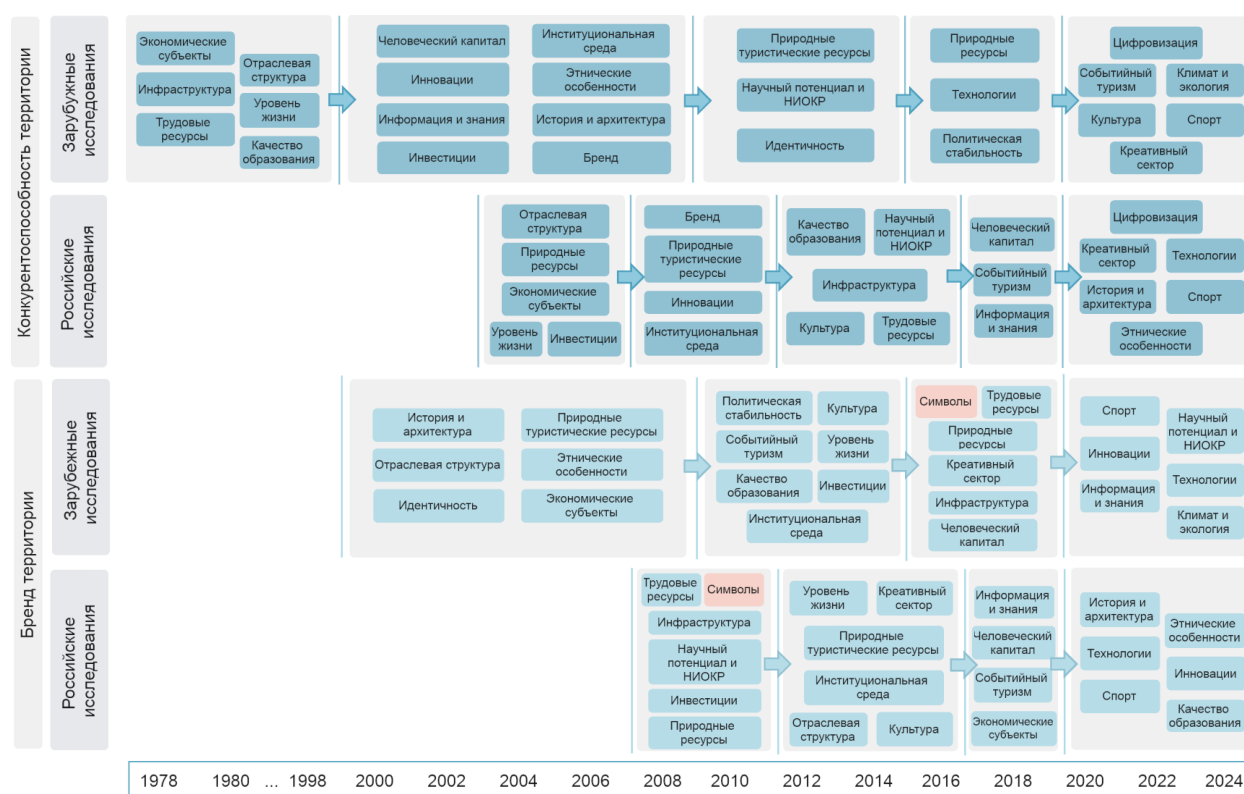


Рисунок 6. Изменение содержательного наполнения категорий бренда и конкурентоспособности территории зарубежных и российских авторов (нарастающим итогом)

Figure 6. Changes in the content of brand categories and competitiveness of foreign and Russian authors (cumulative result)

Исходя из рисунка 6 видно, что основное содержание категорий «конкурентоспособность территории» и «бренд территории» формируется из очень схожего набора характеристик как в российских, так и в зарубежных исследованиях. Уже с самого начала изучения данных категорий ученые в разных странах выделяли схожие компоненты: экономические факторы, инфраструктуру, природные ресурсы и социальные показатели.

Однако при более детальном рассмотрении заметно различие: отечественные исследователи с большим опозданием включают в анализ такие элементы как человеческий капитал, информация и знания, историко-культурные атрибуты и этнические особенности, которые в зарубежной науке начали рассматриваться в контексте исследуемых категорий значительно раньше, такими авторами как Ленгиел (Lengyel, 2005), который включил в структуру человеческого

ОБСУЖДЕНИЕ

капитал и инновации, и Хаггинс (Huggins, 2003), который сделал акцент на важность информации и знаний. Если зарубежные исследователи начали изучать эти аспекты еще в начале 2000-х годов, то в российских работах акцент на них стали делать только после 2012 г. Так, Ощепков В.М. в 2012 г. в своей работе говорит о важности нематериальных активов в развитии конкурентоспособности региона (Oshchepkov & Subbotina, 2012), а яркий акцент на взаимосвязи бренда и человеческого капитала лишь в 2021 г. в своем исследовании делает Захарчук Е.А. и Упоров В.Е., несмотря на косвенное упоминание данного фактора в работах других авторов, выпущенных несколькими годами ранее (Zakharchuk & Uporov, 2021). Это говорит о том, что отечественные исследователи в вопросе развития конкурентоспособности и бренда территории изначально были сосредоточены на материальных факторах, и лишь позже обратились к нематериальным активам территории, как драйверам развития.

Стоит отметить, что на последнем этапе развития категорий, в 2020-2024 гг., российские и зарубежные исследователи идут параллельно, наполняя конкурентоспособность и бренд территории схожими характеристиками: креативный сектор (Lemmetyinen et al., 2025; Lysova, 2021; Moradi et al., 2020), события и мероприятия (Parshin, 2025; Faragó, 2020), культура, история и идентичность (Pashkus et al., 2023; Tan et al, 2023; Wahba & Chun, 2022).

Таким образом, сравнительный анализ содержательного наполнения категорий бренда и конкурентоспособности территории позволил выделить их общие характеристики, к которым можно отнести социально-демографические, финансово-экономические, природно-рекреационные, административно-политические и культурные составляющие, а также инфраструктуру, инновационные и информационные характеристики, которые выделяют как зарубежные, так и российские исследователи для обеих категорий. Также ярко видно, что все исследователи отдельным элементом, который характеризует только бренд территории, определяются символы, которые в данном случае выступают ассоциативными атрибутами.

Проведенное исследование было направлено на систематизацию и сравнительный анализ научных подходов к конкурентоспособности и бренду территории. Систематический обзор отечественных и зарубежных публикаций позволил выявить закономерности в развитии данных категорий и определить точки их пересечения. Исследование не претендует на исчерпывающий охват всех работ, но выявляет основные тенденции в исследованиях конкурентоспособности и бренда территории.

Ретроспективный анализ показал, что изначально исследования фокусировались на конкурентоспособности, рассматривая ее преимущества на основе материальных факторов. Рост интереса к бренду территории подтолкнул исследователей к комплексному подходу, учитывающему и нематериальные активы. Наблюдаемый с 2014 г. опережающий рост публикаций, посвященных бренду, свидетельствует о смещении фокуса с создания конкурентных преимуществ на их продвижение и закрепление в восприятии.

Несмотря на более поздний интерес к темам конкурентоспособности и бренда территории, отечественные исследователи, опираясь на зарубежный опыт, преодолели первоначальное отставание. Современное понимание содержания обеих категорий в российских и зарубежных работах стало практически идентичным.

Основной вывод исследования заключается в том, что бренд территории представляет собой результирующую категорию, которая полностью включает в себя характеристики конкурентоспособности (экономические, инфраструктурные, социальные и иные) и дополняется ассоциативными атрибутами (символами, образами, историей). Данное отличие позволяет рассматривать бренд как комплексный показатель, объединяющий объективные конкурентные преимущества территории и их субъективное восприятие целевыми аудиториями через образы и символы.

Исследование имеет ряд ограничений. Основное ограничение связано с рассмотрением только научных статей из рецензируемых

журналов, входящих в перечень ВАК, Scopus и Web of Science, тогда как монографии, книги и материалы конференций не включались в анализ. Это могло привести к тому, что некоторые теоретические разработки не были учтены в полной мере. Другое ограничение связано с анализом статей с закрытым доступом, который проводился исключительно по аннотациям, что могло повлиять на глубину интерпретации их содержания. Кроме того, использование двух разных поисковых систем, eLibrary.ru и Google Scholar, несмотря на единую методику отбора, могло внести некоторую несопоставимость в исходные данные.

ЗАКЛЮЧЕНИЕ

Проведенное исследование систематизировало современные научные подходы к пониманию конкурентоспособности и бренда территории, выявив их содержательные сходства и различия. Ретроспективный анализ показал, что интерес к конкурентоспособности территории в зарубежных исследованиях возник в конце 1970-х годов, а к бренду территории позже, с 1998 г. С 2014 г. наблюдается опережающий рост публикаций, посвященных бренду территории, что свидетельствует о смещении фокуса с создания конкурентных преимуществ на их продвижение. Российские исследования по данным темам начались позже, с 2003 г., но за счет опоры на зарубежный опыт прошли аналогичные этапы развития тем в ускоренном режиме и к 2020 г. полностью сравнялись с мировыми трендами.

Сравнительный анализ содержательного наполнения категорий позволил выделить общие для конкурентоспособности и бренда территории группы характеристик: социально-демографические, финансово-экономические, природно-рекреационные, административно-политические и культурные составляющие, а также инфраструктуру, инновационные и информационные характеристики, которые выделяют как зарубежные, так и российские исследователи. Также для бренда территории дополнительно была выделена группа с ассоциативными атрибутами.

На основе сравнительного анализа 1972 статей определено соотношение между конку-

рентоспособностью территории и брендом территории. Было выявлено, что бренд территории не является синонимом конкурентоспособности и не сводится к маркетинговому инструменту. Напротив, содержательное наполнение бренда территории полностью включает в себя все характеристики конкурентоспособности, от экономических и инфраструктурных до социальных и инновационных. Качественное отличие бренда территории заключается в наличии ассоциативных атрибутов (символов, образов, истории), которых нет в структуре конкурентоспособности. Таким образом, бренд территории выступает как результирующая категория, объединяющая объективные конкурентные преимущества и их субъективное восприятие через ассоциативные атрибуты.

Полученные результаты создают основу для дальнейшего изучения взаимосвязи между данными категориями и разработки комплексных стратегий по развитию территории. На практике это означает, что регионы могут использовать предложенную систематизацию характеристик для анализа уже существующих брендов и выявления того, какие конкурентные преимущества уже отражены в образе территории, а какие требуют дополнительного развития. Данная систематизация также полезна при формировании новых брендов, так как позволяет перед началом продвижения определить, на каких конкурентных преимуществах территории сделать акцент при продвижении, и какие ассоциативные атрибуты добавят бренду устойчивости.

Дальнейшие исследования по данной теме могут быть направлены на анализ и совершенствование методик оценки данных категорий с целью повышения эффективности управления конкурентоспособностью региона через его бренд.

AUTHOR CONTRIBUTIONS

Conceptualization and theory: EK; research design: OG; data collection: EK and OG; analysis and interpretation: EK and OG; writing draft preparation: EK and OG; supervision: EK; correction of article: EK and OG; proofread and final approval of article: OG. All authors have read and agreed to the published version of the manuscript.

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Migration Attractiveness of Kazakhstan: The Role of Real Income and Regional Disparities

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ABSTRACT

Migration is an important factor of socio-economic development, influencing labor markets, demographic structure, human capital, and regional development. This study aims to analyze the dynamics and spatial disparities of external migration in Kazakhstan for 2001–2024 and to assess the role of socio-economic factors, particularly real household income, in shaping migration inflows. The study applies comparative cross-country analysis, regional spatio-temporal analysis, Pearson correlation analysis, OLS regression with Newey–West standard errors, the Augmented Dickey–Fuller test, residual-based cointegration analysis, and a first-difference model. The results show that the highest positive migration balances were recorded in Almaty city, Almaty region, Mangystau region, and Astana city, while negative values remained in North Kazakhstan, East Kazakhstan, Karaganda, Abay, Zhambyl, and Ulytau regions. Correlation analysis revealed strong positive associations between migration and GDP ($r = 0.92$), investment ($r = 0.91$), construction volume ($r = 0.90$), and real household income ($r = 0.89$), while poverty showed a negative correlation ($r = -0.81$). The results of the OLS regression showed a statistically significant positive relationship between real incomes and migration inflows. However, the cointegration test did not confirm a stable long-term relationship ($p = 0.144$), and the first-differences model did not reveal a statistically significant short-term relationship ($p = 0.3454$). The results show that migration processes in Kazakhstan are related to the income level of the population, but at the same time depend on a broader set of factors, including the state of the labor market, regional differences, infrastructure and institutional conditions.

KEYWORDS: Migration, External Migration, Migration Strategy, Human Capital, Population Mobility, Regional Economy, Regional Development

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Миграционная привлекательность Казахстана: роль реальных доходов и региональных различий

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АННОТАЦИЯ

Миграция является важным фактором социально-экономического развития, оказывающим влияние на рынки труда, демографическую структуру, человеческий капитал и региональное развитие. Цель данного исследования заключается в анализе динамики и пространственных различий внешней миграции в Казахстане за 2001–2024 годы, а также в оценке роли социально-экономических факторов, в частности реальных доходов населения, в формировании миграционных притоков. В исследовании применяются сравнительный межстрановой анализ, региональный пространственно-временной анализ, корреляционный анализ Пирсона, OLS-регрессия со стандартными ошибками Ньюи–Уэста, тест Дики–Фуллера, коинтеграционный анализ на основе остатков и модель первых разностей. Результаты показывают, что наибольшие положительные значения миграционного сальдо были зафиксированы в городе Алматы, Алматинской области, Мангистауской области и городе Астана, тогда как отрицательные значения сохранялись в Северо-Казахстанской, Восточно-Казахстанской, Карагандинской, Абайской, Жамбылской и Улытауской областях. Корреляционный анализ выявил сильные положительные связи между миграцией и ВВП ($r = 0.92$), инвестициями ($r = 0.91$), объемом строительства ($r = 0.90$) и реальными доходами населения ($r = 0.89$), тогда как уровень бедности показал отрицательную корреляцию ($r = -0.81$). Результаты OLS-регрессии показали статистически значимую положительную связь между реальными доходами и миграционными притоками. Однако коинтеграционный тест не подтвердил наличие устойчивой долгосрочной связи ($p = 0.144$), а модель первых разностей не выявила статистически значимой краткосрочной связи ($p = 0.3454$). Полученные результаты показывают, что миграционные процессы в Казахстане связаны с уровнем доходов населения, но одновременно зависят от более широкого набора факторов, включая состояние рынка труда, региональные различия, инфраструктуру и институциональные условия.

КЛЮЧЕВЫЕ СЛОВА: миграция, внешняя миграция, миграционная стратегия, человеческий капитал, мобильность населения, региональная экономика, региональное развитие

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INTRODUCTION

In the context of globalization and increasing international population mobility, migration is becoming a key factor influencing the socioeconomic development of countries. International migration flows directly affect labor market formation, demographic structure, human capital formation, and economic growth dynamics (Borjas, 2014; Castles et al., 2014). In contemporary research, migration is viewed not only as a demographic phenomenon but also as an element of the macroeconomic system, closely linked to income levels, employment status, and the population's quality of life. The growth of international labor mobility creates a need to analyze the factors determining a country's attractiveness to migrants, as well as to understand the mechanisms by which migration flows are integrated into the economy (Hatton & Williamson, 2005; Ortega & Peri, 2013).

Such studies are of particular importance for countries with developing and transition economies, including Kazakhstan. Labor migration in these countries serves a dual function: on the one hand, it fills labor shortages and stimulates economic activity, while on the other, it leads to a brain drain, a decline in human capital, and increased social tension (Docquier & Rapoport, 2012; Beine et al., 2006).

Kazakhstan, as the largest economy in Central Asia with unique economic and institutional characteristics, serves as a country of origin, a transit territory, and a destination for migrants, shaping the nature and direction of migration flows (World Bank, 2023). The impact of economic factors on migration is not straightforward and may vary depending on both domestic and external conditions. For example, the COVID-19 pandemic led to a sharp decline in international mobility, followed by a gradual recovery of migration flows. In addition, geopolitical developments, changes in international economic relations, and shifts in labor demand continue to influence the intensity and direction of migration processes (Czaika & Reinprecht, 2022).

In identifying the key socio-economic factors determining the inflow of migrants to Kazakhstan and quantitatively assessing their impact based on an analysis of time series for the period 2001–2024, particular attention is paid to the role of real household income as the primary indicator of living

standards and a factor in the country's migratory attractiveness.

The practical significance of this work lies in the potential to use the findings to develop state migration policy and socio-economic planning. Identifying the key determinants of migration attractiveness will enable the proposal of measures to attract a skilled workforce, raise the standard of living, and ensure sustainable economic development.

Previous empirical studies on Kazakhstan confirm the importance of income differentials and regional disparities in shaping migration flows (Aldashev & Dietz, 2012; Bokayev et al., 2021). However, most existing research focuses on descriptive analysis or cross-sectional comparisons and does not fully explore long-run relationships using time-series econometric techniques. In particular, issues related to stationarity, autocorrelation, and cointegration remain insufficiently addressed in the context of Kazakhstan's migration dynamics. The scientific novelty of the study lies in integrating international comparisons with the analysis of national time series, thereby enabling a more comprehensive identification of the mechanisms that shape migration processes. Unlike most existing studies, this study addresses multicollinearity and autocorrelation, enhancing the reliability of the results.

Thus, this study aims to analyze the dynamics and spatial disparities of external migration in Kazakhstan for 2001–2024 and to assess the role of socio-economic factors, particularly real household income, in shaping migration inflows. To achieve this objective, a comprehensive methodological approach is employed, combining comparative cross-country analysis and econometric modeling. Cross-country analysis allows us to determine Kazakhstan's place within the system of international migration flows and identify global trends in their evolution. In contrast, econometric analysis provides a quantitative assessment of the impact of economic factors on migration inflows.

LITERATURE REVIEW

The study of migration processes has evolved significantly over time, moving from simple explanations based on spatial and demographic factors to more complex, multidimensional frameworks that incorporate economic, institutional, and behavioral determinants. Early

migration theories primarily focused on individual decision-making driven by wage differentials and employment opportunities across regions. Lee (1966) conceptualized migration as a response to push and pull forces, emphasizing the role of unfavorable conditions in origin areas and attractive opportunities in destination regions. Building on this framework, Harris and Todaro (1970) formalized migration as an economically rational choice based on expected income differentials and labor market equilibrium, establishing the foundation for neoclassical migration theory.

In the 1990s and 2010s, migration studies became more empirically oriented. They began to take into account not only income differences, but also the quality of human capital, institutional conditions, migration policy, and spatial factors. Borjas (1994) systematized economic approaches to the study of immigration and showed that the effects of migration depend on the structure of migrants' skills, their adaptation to the labor market, and differences between countries of origin and destination. Zimmermann (1995) analyzed European migration processes, emphasizing that migration should be considered in close connection with employment, unemployment, regulatory policies, and integration of migrants in host countries. Taylor (2002) also emphasized the role of remittances within the New Economics of Labor Migration, arguing that migration may help households overcome market constraints and diversify income sources.

Furthermore, Chiswick (1999) developed the idea of migrant selectivity, showing that economic migrants often have higher motivation, entrepreneurial qualities, and a focus on success in the labor market. Karemera et al. (2000), using a modified gravity model, proved that international migration flows depend on political, economic, and demographic factors, as well as on the characteristics of the countries of origin and destination. Clark et al. (2007), using the example of immigration to the United States, showed that migration flows are determined not only by the levels of income and education in the countries of origin, but also by existing migration networks and migration policy restrictions. Lewer and Van den Berg (2008) confirmed the applicability of the gravity approach to immigration analysis by showing that migration flows between countries are explained by economic size, distance, and other factors of attraction. These

studies confirm that migration is a multifactorial process in which income, employment, human capital, migration networks, politics, and spatial characteristics work together.

A major development in migration literature was the emergence of the human capital approach. Within this framework, migration is interpreted as an investment decision in which individuals compare expected lifetime returns across alternative locations. Castles et al. (2014) argue that differences in wages, education returns, and skill transferability are key determinants of migration behavior. This shift in perspective expanded migration theory beyond simple income differentials, incorporating education, skill composition, and labor market structure as central explanatory factors. Subsequently, the New Economics of Labour Migration introduced a household-based perspective, challenging the assumption that migration decisions are made solely at the individual level. In this approach, migration is viewed as a collective strategy to diversify income sources, reduce risks, and overcome market imperfections. Migration decisions are therefore influenced not only by wage gaps but also by access to credit markets, income instability, and household risk management strategies. In addition, employment conditions and access to information infrastructure are increasingly considered important elements of socio-economic development that can influence population mobility. Salmanova (2022), using the case of Azerbaijan, shows that employment is closely linked to the development and accessibility of the information society, which is relevant to understanding how labor market conditions and access to modern infrastructure may affect migration-related decisions.

In the international empirical literature, migration flows are considered the result of the interaction among economic, demographic, institutional, and spatial factors. Mayda (2010), using panel data on migration inflows to OECD countries, shows that income differences between countries of origin and destination are among the key factors driving international migration. Similar conclusions are presented in the work of Ortega and Peri (2013), which proves that growth in per capita income in the destination country increases migration inflows, and that immigration policy can both stimulate and limit international mobility of the population.

Grogger and Hanson (2011) complement this approach by showing that migration is related not only to income levels but also to differences in earnings by skill level, which affects the selection and distribution of migrants between destination countries. A broader approach is proposed by Docquier et al. (2014), who distinguish between potential and actual migration. More recent studies emphasize the multidimensional nature of migration determinants, highlighting the role of economic performance, policy regimes, and global shocks in shaping migration dynamics (Czaika & Reinprecht, 2022). Their results show that individual and country characteristics shape the desire to migrate, whereas actual migration depends on conditions in the destination country, migration restrictions, distance, and existing migration networks.

In parallel with microeconomic approaches, spatial and macro-structural frameworks have become increasingly important in migration research. Gravity models are a key analytical tool in this context, where migration flows are determined by population size, distance, and the socioeconomic characteristics of the origin and destination regions. Recent extensions of the gravity framework incorporate additional explanatory variables such as income levels, unemployment rates, migration networks, and institutional conditions (Backhaus et al., 2015; Cameron & Poot, 2019). More advanced models, including generalized gravity and radiation models, further improve explanatory accuracy by accounting for heterogeneous population structures, spatial constraints, and mobility costs (Park et al., 2018; Alis et al., 2021; Kotsubo & Nakaya, 2021; Caballero Reina et al., 2024).

Recent studies on immigrant entrepreneurship also emphasize the importance of knowledge exchange, social networks, and adaptation mechanisms in shaping migrants' economic integration. For example, Jamaludin et al. (2023), in a qualitative study of immigrant entrepreneurs in Malaysia, show that the distribution of knowledge among immigrant entrepreneurs plays an important role in business development, opportunity recognition, and integration into the host economy.

Another important stream of literature focuses on migration as part of labor market adjustment and urbanization processes. Migration is closely linked to structural changes in employment, wage formation, and sectoral transformation. Urban areas act as

major centers of labor demand, attracting population inflows due to higher wages, better employment opportunities, and improved access to public services. As a result, migration contributes to both regional convergence and divergence, reinforcing spatial inequalities between urban and rural areas.

In the context of Central Asia, migration is strongly shaped by post-Soviet economic transformation, regional disparities, and labor market restructuring. Persistent income differences, uneven development, and strong cross-border labor mobility characterize the region. These structural conditions generate stable migration corridors, particularly toward economically more developed urban and industrial centers. Migration in this context functions both as a mechanism of labor redistribution and as a response to regional inequality.

In studies on Kazakhstan and Central Asia, migration is considered as a result of the interaction of economic, institutional, and spatial factors. Aldashev and Dietz (2012) analyze inter-regional migration in Kazakhstan and show the role of income, unemployment, distance, and population size. Ryazantsev et al. (2017) show that Kazakhstan, together with Russia, is one of the key centers of attraction for labor migrants from Central Asian countries within the Eurasian migration area. Amrin et al. (2020) examine migration processes in Kazakhstan in the context of the formation of the Silk Road Economic Belt and emphasize that international mobility of the population is associated not only with economic opportunities, but also with the geographical location of the country, transport connectivity, and regional integration. Bodaughan et al. (2020) analyze migration from southern to northern Kazakhstan and show that migration flows are associated with differences in employment, demographic burden, labor availability, and the effectiveness of government resettlement programs. Based on a sociological survey and expert interviews, Bokayev et al. (2021) show that the reasons for emigration from Kazakhstan include not only income levels, but also quality of life, professional opportunities, access to education, the state of social services, and trust in institutions. Thus, existing studies confirm that migration processes in Kazakhstan are multifactorial.

A summary of the key areas of migration research and their relationship to this study is presented in Table 1.

Table 1. Main directions of migration research and their relevance to the present study

Research direction	Authors	Main focus
Classical migration theories	Lee (1966); Harris and Todaro (1970)	Push-pull factors, wage differentials, expected income, and employment opportunities
Human capital and household approaches	Borjas (1994); Chiswick (1999); Taylor (2002); Castles et al. (2014)	Migration as an investment decision and a household strategy for risk diversification
International empirical studies	Mayda (2010); Grogger and Hanson (2011); Ortega and Peri (2013); Docquier et al. (2014); Czaika and Reinprecht (2022)	Income differences, migration policy, demographic factors, migrant networks, destination-country conditions
Spatial and gravity models	Karemera et al. (2000); Clark et al. (2007); Lewer and Van den Berg (2008); Backhaus et al. (2015); Cameron and Poot (2019); Caballero Reina et al. (2024)	Distance, population size, economic size, migration networks, spatial interaction
Employment, infrastructure, and migrant integration	Salmanova (2022); Jamaludin et al. (2023)	Employment conditions, information infrastructure, knowledge exchange, and migrant entrepreneurship
Central Asia and Kazakhstan	Aldashev and Dietz (2012); Ryazantsev et al. (2017); Amrin et al. (2020); Bodaukhan et al. (2020); Bokayev et al. (2021)	Regional disparities, labor migration, migration corridors, causes of emigration, and state policy

Note: compiled by the authors

Summarizing the presented research shows that migration is a multifactorial process shaped by economic, demographic, institutional, and spatial conditions. Classical theories explain migration through differences in wages, expected incomes, and employment opportunities. More recent approaches expand this understanding by focusing on human capital, household strategies, migration networks, and the quality of institutions.

Despite the growing body of literature, several important gaps remain. First, there is limited evidence from time-series econometric analyses that account for non-stationarity and dynamic relationships in migration data. Second, existing studies rarely examine both short-run and long-run relationships simultaneously using cointegration techniques. Third, there is a lack of integrated approaches that combine international comparative analysis with national-level econometric modeling.

Accordingly, this study addresses these gaps by integrating comparative cross-country evidence with time-series econometric analysis for Kazakhstan over the period 2001–2024. The focus is on identifying the role of macroeconomic conditions, particularly real household income, in shaping migration inflows, while also testing for both short-run dynamics and long-run equilibrium relationships.

RESEARCH METHODS

The methodological complexity of analyzing migration processes lies in the high interdependence of economic indicators such as GDP, investment, and household income. The presence of multicollinearity complicates the interpretation of results and reduces the reliability of estimates, necessitating the use of modern econometric methods that account for time-series characteristics, including autocorrelation and heteroscedasticity (Gujarati & Porter, 2009). The methodology of this study is based on a combination of comparative statistical and econometric approaches, which allowed for a comprehensive analysis of migration processes in Kazakhstan. The study distinguishes between two migration indicators. The external migration balance is used for cross-country and regional analyses, enabling the identification of spatial differences and the dynamics of net migration. The number of migrants arriving is used in econometric analysis, as this indicator captures migration inflows and allows us to assess its relationship with the population's real incomes.

At the first stage, a spatio-temporal analysis of external migration balances was conducted at both the national and regional levels for 2000, 2010, 2020, and 2024. This indicator was used to assess net migration dynamics and regional migration

disparities. To assess long-term changes and identify persistent regional imbalances, indicators of migration balance dynamics and relative change were applied. The selection of countries includes Kazakhstan, Central Asian states, the Russian Federation, and developed economies in Europe, Asia, and North America. This made it possible to determine Kazakhstan's place within the system of international migration flows. The World Bank database served as the data source.

To examine the determinants of migration attractiveness, a system of socio-economic and demographic indicators was developed based on classical migration theories, including the push-pull framework, neoclassical migration theory, and human capital theory. The selected variables include indicators of economic development, labor market conditions, population welfare, demographic structure, and social infrastructure. The analysis includes the following variables: gross domestic product (GDP); investment in fixed capital; volume of construction works; employment level; average monthly wage; real household income; share of population with incomes below the subsistence minimum; population size; urbanization level; and number of physicians.

To identify the direction and strength of relationships between migration inflows and socio-economic conditions, Pearson correlation analysis was employed for the period 2003–2024. Correlation coefficients were calculated to assess the degree of association between migrant inflows and indicators of regional socio-economic development.

The Pearson correlation coefficient can be represented by formula (1):

$$r_{xy} = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum(x_i - \bar{x})^2 \sum(y_i - \bar{y})^2}} \quad (1)$$

where:

x_i, y_i – observed values of variables X and Y;

$\bar{x}, \bar{y}$ – mean values;

n – sample size;

r_{xy} – correlation coefficient.

In the second stage, an econometric analysis of time series for Kazakhstan for 2001–2024 was conducted. The number of arriving migrants was used as the dependent variable, while macroeconomic indicators, including real household income, employment, investment, urbanization level, and inflation, were considered as explanatory variables.

To avoid spurious regression and ensure the validity of the econometric analysis, the stationarity of the time series was tested using the Augmented Dickey–Fuller (ADF) test. The test results showed that both the number of arriving migrants and real household income are non-stationary in levels. Therefore, the estimated relationships should be interpreted primarily as long-run statistical associations.

In the initial stage, multicollinearity was diagnosed using the correlation matrix and the variance inflation factor (VIF). Due to the high correlation between several variables (above 0.95), redundant predictors were excluded from the model. The final model specification was formed based on the principle of parsimony.

Regression analysis was subsequently applied to quantitatively estimate the impact of socio-economic conditions on migration inflows. The baseline regression model is specified by formula (2):

$$Migration_t = \beta_0 + \beta_1 Income_t + \varepsilon_t \quad (2)$$

where:

$Migration_t$ – number of arriving migrants;

$Income_t$ – average per capita real income of the population;

β_0 – constant term;

β_1 – coefficient reflecting the association between real household income and migration inflows;

ε_t – random error terms.

The stationarity of the variables was tested using the ADF test. The results are presented in Table 2.

Table 2. Results of the ADF test for variables in levels

Variable	Model	t-statistic	p-value	Conclusion
migrants	with constant	1,98082	0,9999 > 0.05	Non-stationary in levels
real income	with constant	-1,36696	0,6001 > 0.05	Non-stationary in levels

Note: compiled by the authors

The ADF test results indicate that both variables are non-stationary in levels. Therefore, regression results based on level values should be interpreted with caution, as non-stationary time series may yield spurious regression results. To address this issue, cointegration analysis and a first-difference model were additionally applied.

Newey–West is used only to correct for standard errors in autocorrelation and heteroscedasticity. However, due to the non-stationarity, it is impossible to assert a causal effect, so the OLS results should be interpreted as a statistical relationship. To further assess the validity of the relationship, ADF tests, cointegration analysis, and a first-difference model were additionally applied.

Several limitations of the study should also be acknowledged. First, the analysis is based on aggregated macroeconomic indicators and does not account for migrants' individual behavioral motivations. Second, institutional, political, and cultural determinants of migration are not directly incorporated into the econometric specification. Third, the relatively small sample size limits the application of more complex multifactor models. Nevertheless, the selected methodological approach provides a robust framework for identifying the long-

term patterns and socio-economic determinants of external migration in Kazakhstan.

RESULTS

An empirical analysis of migration processes in Kazakhstan shows that the country's position in the international migration system and its internal spatial structure are changing simultaneously. The results of the study reveal that migration dynamics are not merely a demographic movement but a complex phenomenon closely linked to socio-economic attractiveness, regional development inequality, and structural changes in the labor market.

At the first stage of the analysis, Kazakhstan's migration balance indicators were compared with those of selected countries. This comparison enabled the determination of the country's relative position in global and regional migration flows. Data for 2018 and 2022 revealed clear differences between the migration trajectories of developed countries and post-Soviet countries. To assess changes in migration flows during the post-pandemic period, the net migration balance between 2018 and 2022 was calculated. This made it possible to evaluate the extent of recovery in international mobility after the COVID-19 restrictions (Figure 1).

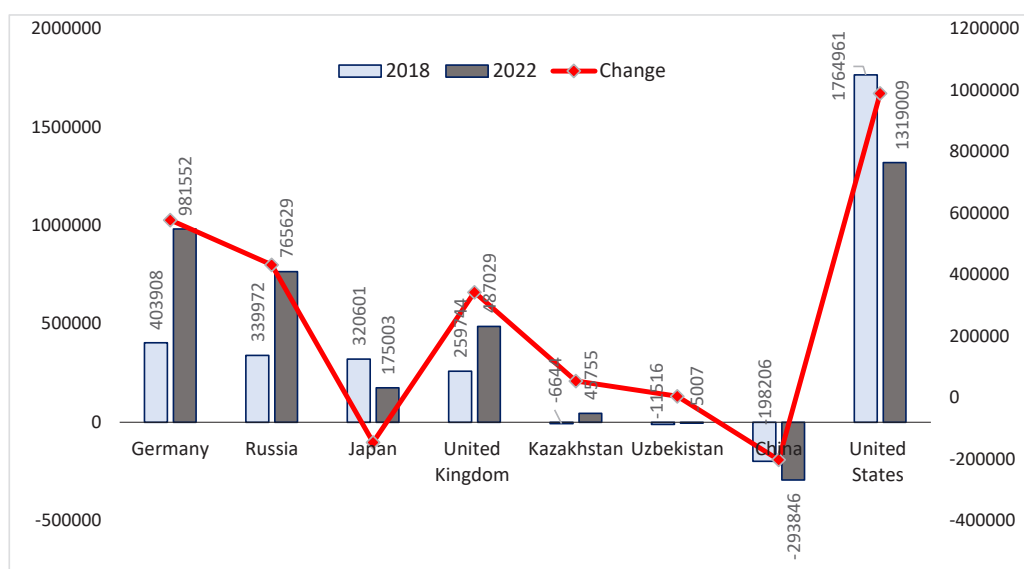


Figure 1. Change in the migration balance in selected countries in 2022 compared to 2018

The results show that migration dynamics in different countries varied during the post-pandemic period. The largest increases in the migration

balance are observed in Germany (+577.6 thousand people), Russia (+425.7 thousand people), and the United Kingdom (+277.3 thousand people). This

indicates their continued role as major centers of attraction for international migrants. At the same time, Japan, China, and the United States are experiencing declines in their migration balances. A particularly noticeable decrease was recorded in the United States (-446.0 thousand people), however, despite this, the absolute value of the migration balance in 2022 remains high. China maintains a negative migration balance, reflecting the predominance of emigration processes.

Positive changes have also been observed in Kazakhstan. If the migration balance was negative

in 2018, then in 2022, a positive indicator was recorded. This situation indicates an increase in the country's attractiveness as a migration destination and a resurgence of international mobility in the post-pandemic period. At the same time, the rate of growth in Kazakhstan remains low compared with developed migration centers, attributable to differences in labor market size and levels of socio-economic development.

To systematize different migration trajectories, Table 3 groups countries according to the main models of migration development.

Table 3. Country typology by migration dynamics in 2018-2022

Migration model	Country	Description
Stable centers of migration attraction	Germany, United Kingdom, Russian Federation	Positive net migration balance and growth in 2022 compared with 2018
Countries with improving migration dynamics	Kazakhstan, Uzbekistan	Improvement in net migration balance, including Kazakhstan's transition from negative to positive values
Countries with a declining positive migration balance	Japan, United States	Positive net migration balance in both years, but a decrease in 2022 compared with 2018
Countries with a persistent negative migration balance	China	Negative net migration balance in both years, with further deterioration in 2022

Note: compiled by the authors

The conducted typology showed that Kazakhstan occupies an intermediate position in the international migration system. On the one hand, the country is not among traditional immigration States; on the other hand, improvements in migration indicators in recent years indicate that its role as a regional migration center is growing. This trend is associated with the revival of economic growth, the expansion of the labor market, and the increase in the country's economic importance in Central Asia.

Therefore, when assessing the dynamics of migration in Kazakhstan, it is important to supplement the international comparison with internal changes at the national and regional levels. This approach allows us to determine not only the country's overall

migration position, but also which territories the migration flows are concentrated in and which regions experience a constant population outflow.

At the next stage of the study, the spatial structure of migration processes within Kazakhstan was analyzed. To assess long-term differences between regions, the dynamics of the external migration balance from 2000 to 2024 were examined. Such an approach makes it possible to determine not only changes in migration flow over time, but also which regions the population is concentrated in and from which territories it is steadily leaving.

Changes in the external migration balance for Kazakhstan's regions during the main periods are presented in Table 4.

Table 4. Balance of external migration by regions of Kazakhstan in 2000, 2010, 2020 and 2024

Region	2000	2010	2020	2024	Growth
Kazakhstan	-108307	15516	-17718	16550	124857
Abay	-	-71	-973	-436	-365
Akmola	-11874	1	-1738	471	12345
Aktobe	-8687	17	-1336	636	9323
Almaty	-6151	2466	-166	4367	10518
Atyrau	-168	1826	-2	677	845
West Kazakhstan	-7078	599	-1005	406	7484

REGIONAL ECONOMY

Zhambyl	-4959	57	-838	-268	4691
Tokens	-	-219	21	65	284
Karaganda	-14827	-882	-3464	-485	14342
Kostanay	-18890	-1051	-2542	549	19439
Kyzylorda	-1629	175	-8	28	1657
Mangystau	1163	6760	2450	3606	2443
Pavlodar	-15924	-403	-2788	370	16294
North Kazakhstan	-6938	-973	-1759	-1692	5246
Turkestan	12286	3696	500	491	-11795
Ulytau	-	-346	-307	-16	330
East Kazakhstan	-10153	302	-2362	-584	9569
Astana c.	-6406	715	-742	2616	9022
Almaty c.	-8072	342	-960	5123	13195
Shymkent c.	-	2505	301	626	-1879

*For newly established regions, including Abay, Ulytau, and Zhetysu, the data should be interpreted with caution due to administrative-territorial changes. Their indicators are not fully comparable to those of regions that existed within stable boundaries throughout the entire period.

Note: compiled by the authors

The data show that migration processes in Kazakhstan are developing unevenly across space. Although the external migration balance in Kazakhstan has improved from -108,307 people in 2000 to +16,550 people in 2024, there remains clear regional polarization. In 2024, the highest positive balances were recorded in Almaty city (+5123 people), Almaty region (+4367 people), Mangystau region (+3606 people), and Astana (+2616 people), indicating the attractiveness of these territories for the labor market, economic activity, and social infrastructure. On the contrary, in North

Kazakhstan (-1692 people), East Kazakhstan (-584 people), Karaganda (-485 people), Abay (-436 people), Zhambyl (-268 people), and Ulytau (-16 people) regions, a negative balance remains, which determines the tendency for the population to shift from peripheral and industrial regions to large ones. agglomeration centers.

Based on the data presented, the regions were grouped according to direction, long-term stability of the migration balance, and the final value for 2024. The results of this classification are presented in Table 5.

Table 5. Typology of regions of Kazakhstan by migration dynamics

Region type	Classification criteria	Regions
Stable centers of migration attraction	Long-term maintenance of a positive balance or formation of a high positive value in 2024	Almaty c., Astana c., Mangystau region
Regions of average migration attraction	In 2024, there was a positive balance, but long-term stability was not fully formed	Almaty, Atyrau, Aktobe, Akmola, West Kazakhstan, Kostanay, Pavlodar regions
Regions with volatile migration dynamics	Changes in the direction of the migration balance at each stage and the absence of a stable trend	Kyzylorda, Turkestan, Zhetysu regions and the Shymkent c.
Regions with constant migration losses	Maintaining a negative migration balance for most of the study period or in 2024	North Kazakhstan, East Kazakhstan, Karaganda, Abay, Ulytau, Zhambyl regions

Note: compiled by the authors

The results show a clear spatial polarization of migration flows in Kazakhstan. The cities of Almaty, Astana, and the Mangystau region stand out as the main centers of population attraction, which is associated with their economic activity, labor market capacity, concentration of social infrastructure, and

resource specialization. Although there is a positive balance in regions of moderate attraction, their long-term stability is not yet fully established, and in regions with volatile dynamics, migration indicators depend on changes in economic conditions and the labor market. In regions experiencing constant

population loss, population outflows increase long-term risks, including weakened human capital, reduced labor resources, and decreased regional competitiveness. Thus, Tables 4 and 5 indicate the formation of a “center-periphery” migration structure in Kazakhstan and the need to strengthen efforts to ensure demographic stability and preserve labor potential in regional policy.

All variables included in the econometric analysis were derived from official statistical data of the Bureau of National Statistics of the Republic of Kazakhstan for 2001-2024. To assess the relationship between variables, a correlation analysis was conducted. The results are shown in Figure 2 as a heatmap.



Figure 2. Correlation links between migration and socio-economic indicators

The heatmap shows a strong relationship between migration indicators and socio-economic factors. The strongest positive correlation is observed between migration and gross domestic product ($r=0.92$), investment ($r=0.91$), construction volume ($r=0.90$), and the actual income of the population ($r=0.89$). This suggests that regions and periods with high levels of economic activity will also have high migration attractiveness. At the same time, the poverty level has a negative relationship with migration ($r=-0.81$), that is, as the well-being of the population decreases, migration indicators also deteriorate. Very high correlation coefficients (0.93–0.99) among the explanatory

variables indicate multicollinearity. In this regard, in the later econometric model, the population's real income was chosen as an integral indicator of migration attractiveness. In general, the results show that migration processes are closely related to the level of economic development and that increasing the population's well-being is one of the most important factors strengthening the country's attractiveness as a destination for migration.

To quantify the relationship between the population's real income and migration, the least squares method (OLS) was used with the Newey-West adjustment. The results of the assessment are presented in Table 6.

Table 6. Results of assessing the relationship between migration and real incomes (OLS, Newey-West)

Variable	Coefficient	SE	t-Statistic	p-Value	95% CI
Real income	37.824	8.806	4.30	< .001	[19.561, 56.086]
Constant	-111,573.960	154,346.370	-0.72	.477	[-431,668.740, 208,520.810]

Note: compiled by the authors

According to the results of the OLS regression with robust Newey-West standard errors, a statistically significant positive relationship between the population's real income and migration indicators was found. The coefficient for the variable "real income" was 37,824 ($p < 0.001$), indicating significance at the 1% level. This means that the growth of real income is accompanied by an increase in the migration rate by an average of 37.8 units. The 95% confidence interval for the coefficient is 19.561–56.086 and does not include

zero, further confirming the stability of the identified relationship. The model constant is statistically insignificant ($p = 0.477$), so its interpretative value is limited. Thus, real income can be considered a significant factor in migration processes. However, the results reflect a statistical association rather than a direct causal relationship.

Cointegration analysis and the first-difference model were also used to test the model's stability. The results are presented in Table 7.

Table 7. Results of checking the stability of the relationship between migration and real incomes

Variable	Specification	t-statistic	p-value	Conclusion
Residuals	Model with constant	-2.393	0.144	No cointegration confirmed

Note: compiled by the authors

Cointegration analysis showed that the long-term model residuals are unstable ($t = -2.393$; $p = 0.144$). Since the p-value exceeds the significance level of 0.05, the null hypothesis of the presence of a single root is not rejected. This indicates the absence of a statistically confirmed cointegration relationship between migration and the population's real income. Although the OLS regression results revealed a statistically significant relationship among the indicators considered, the verification does not confirm the existence of a stable long-term equilibrium relationship between them. Consequently, the impact of real incomes on migration processes is not stable in the long term.

The results suggest that migration processes are determined not only by the population's income level but also by a broader range of socio-economic

factors. These include the state of the labor market, employment levels, urbanization, infrastructure development, the quality of life for the population, and the institutional conditions for regional development. Thus, the revealed relationship between income and migration reflects a short- or medium-term statistical relationship rather than a stable long-term pattern.

To assess short-term dynamics, a first-difference model was used. This approach reduces the effect of a common trend in the levels of variables and allows us to answer whether short-term changes in real incomes affect migration flows. The results of Table 8 show that there is no statistically significant correlation between short-term changes in real incomes and migration flows.

Table 8. First-difference model results

Variable	Coefficient	SE	t-statistic	p-value
Constant	97985.2	56325.9	1.740	0.0966
Δ Real income	-48.3966	50.1414	-0.965	0.3454

Note: compiled by the authors

According to the results of the first differences model, there is no statistically significant relationship between short-term changes in real incomes and migration flows. The coefficient for the variable Δ Real income is negative (-48.397), but its p-value is 0.345, which is significantly greater than the significance level of 0.05. This indicates that short-term fluctuations in real incomes do not have a statistically significant effect on changes in migration.

The model constant has a positive value (97985.2), but it is not statistically significant at the 5% level ($p = 0.097$). In general, the results of the first-difference analysis confirm the conclusions of the cointegration test and indicate the absence of a stable long-term or short-term relationship between migration and the population's real incomes. This suggests that migration processes are largely determined by socio-economic factors, including the labor market, urbanization levels, infrastructure

development, and regional differences in population quality of life.

The empirical analysis showed that migration processes in Kazakhstan are multi-level and multifactorial. Although Kazakhstan is one of the countries where the migration balance improved in the post-pandemic period, this change does not mean that a stable immigration model is fully formed. At the regional level, migration flows are concentrated in large agglomerations and economically active territories, and the trend of population outflow continues in the northern, eastern, and several industrial regions. Econometric estimates revealed a positive and statistically significant relationship between real gains and migration attractiveness; however, cointegration and first-difference models showed that this relationship was not fully consistent with a long-term, permanent, or short-term direct effect. Therefore, it is not enough to explain the dynamics of migration in Kazakhstan solely by income levels; it should be considered a complex socio-economic process shaped by the structure of the labor market, urbanization, the quality of infrastructure, regional inequality, and institutional conditions.

DISCUSSION

The study confirmed the complex and multi-level nature of migration processes in Kazakhstan. An international comparative analysis showed that migration flows are closely related to countries' levels of economic development and labor market opportunities. A stable positive migration balance in Germany, Great Britain, and other developed states confirms the basic principles of the neoclassical Migration Theory, according to which people seek to migrate to territories that offer higher incomes and a higher quality of life (Lee, 1966). At the same time, the results obtained are also consistent with the concept of migration as an investment in human capital.

However, the study's results showed that under Kazakhstan's conditions, economic factors cannot fully explain migration dynamics. Although econometric estimates revealed a positive statistical relationship between actual gains and migration, cointegration analysis did not confirm a long-term stable relationship, and the first difference model showed that the short-term effect was not

significant. This suggests that migration decisions are influenced not only by personal income levels but also by household risk management strategies, social ties, and institutional settings. Such a result is consistent with the principles of the new theory of Migration Economics, which treats migration as a collective household-level decision (Hatton & Williamson, 2005).

In addition, the results obtained confirm the importance of institutional and social factors in modern migration literature. As Ortega and Peri (2013) and Czaika and Reinprecht (2022) show, migration flows are significantly influenced by factors such as access to the labor market, efficiency of public institutions, housing conditions, social infrastructure and quality of life. In Kazakhstan, the formation of migration attractiveness, along with the level of income, depends on employment opportunities, the quality of the education system, the development of the housing market and the state of regional infrastructure.

The regional analysis showed that the concentration of population in the cities of Almaty and Astana, as well as in the Mangystau region, is increasing. These regions are distinguished by the concentration of high-performance jobs, investment resources, financial institutions, universities and innovative infrastructure. Such a trend confirms the basic principles of the theory of new economic geography, according to which economic activity and labor resources accumulate in centers with high agglomeration advantages (Aldashev & Dietz 2012). At the same time, the results also align with the theory of cumulative causality, as the concentration of population and capital further strengthens the region's attractiveness and generates new migration flows (Harris & Todaro, 1970).

On the contrary, constant migration losses in the northern and eastern regions indicate that regional development inequality remains. This phenomenon leads not only to a reduction in the population, but also to a weakening of human capital, a decrease in labor resources, and a decrease in the competitiveness of the regional economy. Similar trends are observed in many transition economies and are explained by increased spatial polarization (Alis et al., 2021). From this perspective, migration flows in Kazakhstan are an important indicator of socio-economic differences between regions.

Another important result of the study is

methodological in nature. Although correlation analysis has shown a strong correlation between migration and macroeconomic indicators, subsequent cointegration and first-difference models have shown that a significant part of this relationship can be explained by general long-term trends. This highlights the importance of studying stationarity and accounting for the problem of false regression in time-series migration studies (Gujarati & Porter, 2009).

From a practical point of view, the results show that the policy of increasing the attractiveness of migration should not be aimed solely at increasing the population's income. To reduce migration imbalances between regions, it is necessary to diversify the labor market, create quality jobs, increase housing affordability, improve education and health infrastructure, and reduce disparities in regional development policy. Especially in the northern and eastern regions, where there is a constant population outflow, measures aimed at preserving human capital are becoming increasingly important.

In general, the study found that migration processes in Kazakhstan arise from the interaction of economic, demographic, institutional, and spatial factors. Therefore, migration should be considered not only a demographic movement but also an important indicator of regional competitiveness, quality of life, and balanced territorial development.

CONCLUSION

The study enabled a comprehensive assessment of migration processes in Kazakhstan at the international, regional, and national levels. The results of the analysis showed that the dynamics of migration are closely related not only to economic factors, but also to the peculiarities of Spatial Development, regional inequality, and institutional conditions. An international comparative analysis showed that Kazakhstan has improved its migration position in recent years and achieved a positive migration balance in the post-pandemic period. However, the country's attractiveness as a destination for migration remains low compared to traditional immigration centers. This is explained by differences in indicators of the size of the labor market, the level of economic development and the quality of life. Regional analysis revealed

that migration flows are unevenly distributed throughout Kazakhstan. The cities of Almaty and Astana, as well as the Mangystau region, serve as the main centers of population attraction, while the northern and eastern regions experience constant population losses. This situation indicates an increase in spatial polarization in the country in the "center-periphery" pattern. The concentration of the population and human capital in economically active centers, although accelerating agglomeration development, increases the risk of weakening the demographic and labor potential of peripheral regions. The results of the econometric assessment showed a positive statistical relationship between the population's real income and migration. At the same time, cointegration analysis showed a long-term stable relationship, and the first model of differences did not confirm the short-term effect. This proves that it is not enough to explain migration processes only by the level of income, and their formation is influenced by the state of the labor market, the level of urbanization, the quality of social infrastructure, housing affordability and institutional factors.

The scientific novelty of the study lies in the empirical justification of the dependence of migration attractiveness in Kazakhstan on income levels, regional development inequality, and agglomeration effects. The results obtained indicate the need to consider migration not only as a demographic phenomenon, but also as an important indicator of regional competitiveness, quality of life and balance of territorial development.

From a practical point of view, in order to reduce migration imbalances, along with measures to increase incomes of the population, it is necessary to strengthen the policy in the direction of developing regional labor markets, creating quality jobs, improving social and engineering infrastructure, ensuring housing affordability and stimulating the preservation of human capital in the regions. Improving the effectiveness of regional development policy is of strategic importance, especially in regions experiencing a constant population outflow.

There are also certain limitations to the study. The analysis relied mainly on aggregated macroeconomic indicators and did not include migration decisions at the individual level, institutional indicators, and the impact of migration networks. The introduction

of regional panel data, institutional indicators and qualitative characteristics of the labor market in future studies will allow for a deeper interpretation of migration determinants.

Thus, migration processes in Kazakhstan are the result of the interaction of economic, demographic, institutional and spatial factors. Therefore, effective migration management should be considered as an important area of regional policy, human capital development, and ensuring territorial balance.

AUTHOR CONTRIBUTIONS

Conceptualization and theory: SK and SS; research design: SK, IS, ST and SS; data collection: IS and SS; analysis and interpretation: SK, ST and SS; writing draft preparation: ST and SS; supervision: SK and SS; correction of article: SK, IS and SS; proofread and final approval of article: SK, IS, ST and SS. All authors have read and agreed to the published version of the manuscript.

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Determinants of Wage Differentiation in Kazakhstan: Interregional and Sectoral Analysis

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ABSTRACT

The wage inequality remains one of the key problems of the Kazakh labor market, as wage differences are formed not only by individual characteristics of employees, but also by regional, sectoral, and gender employment patterns. The aim of the study is to quantify the relative contribution of the region of employment and the type of economic activity to the intergroup wage differentiation in Kazakhstan, as well as to determine the dominant factor based on the decomposition of the explained variance. The research methods include a semi-logarithmic regression model with dummy variables of the region and industry, employee weighting, robust standard errors, and Shapley decomposition. The results showed that the selected factors explain 75% of the wage variation between the analyzed groups. In 15 of the 20 regions, wages are statistically significantly lower than in Almaty. The largest industry premium relative to education was found in the mining industry (+111%) and financial activities (+101%), while the negative discount ranges from 11% to 18%. After accounting for the region and industry, the gender pay gap is estimated at about 12%. Shapley's decomposition showed that the regional factor explains 21% of the variance of the logarithm of wages, and the industry factor explains 45%. The results of the study can be used by government agencies to adjust employment promotion, retraining, and regional development programs.

KEYWORDS: Regional Economics, Sectoral Economics, Wage Differentiation, Segregation, Labor Market, Human Capital, Remuneration

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Детерминанты дифференциации заработных плат в Казахстане: межрегиональный и отраслевой анализ

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АННОТАЦИЯ

Неравномерность оплаты труда остаётся одной из ключевых проблем рынка труда Казахстана, поскольку различия в заработной плате формируются не только индивидуальными характеристиками работников, но и региональной, отраслевой и гендерной структурой занятости. Целью исследования является количественная оценка относительного вклада региона трудоустройства и вида экономической деятельности в межгрупповую дифференциацию заработной платы в Казахстане, а также определение доминирующего фактора на основе декомпозиции объяснённой дисперсии. Методы исследования включают полупологарифмическую регрессионную модель с дамми-переменными региона и отрасли, взвешивание по численности работников, робастные стандартные ошибки и декомпозицию Шепли. Результаты показали, что выбранные факторы объясняют 75% вариации заработной платы между анализируемыми группами. В 15 из 20 регионов заработная плата статистически значимо ниже, чем в г. Алматы. Наибольшая отраслевая премия относительно образования выявлена в горнодобывающей промышленности (+111%) и финансовой деятельности (+101%), тогда как отрицательный дисконт составляет от 11% до 18%. После учёта региона и отрасли гендерный разрыв в оплате труда оценивается на уровне около 12%. Декомпозиция Шепли показала, что региональный фактор объясняет 21% дисперсии логарифма заработной платы, а отраслевой фактор – 45%. Результаты исследования могут быть использованы органами государственного управления при корректировке программ содействия занятости, переобучения и регионального развития.

КЛЮЧЕВЫЕ СЛОВА: региональная экономика, отраслевая экономика, отраслевая дифференциация, сегрегация, рынок труда, человеческий капитал, оплата труда

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ВВЕДЕНИЕ

Трудовой доход в форме ежемесячной заработной платы остаётся основным источником денежного обеспечения домохозяйств в Казахстане. Ввиду относительно низкого уровня вовлечённости населения в инвестирование на фондовом рынке, при котором число брокерских счетов растёт номинально, а реально инвестирует лишь незначительная часть населения, роль традиционных способов получения дохода посредством занятости по найму остаётся высокой.

Для домохозяйств, которые стремятся к максимизации совокупного годового дохода, напрямую влияющего на величину их сбережений и/или инвестиций, необходимо принятие решений, направленных на увеличение доходов и/или сокращение расходов. Однако следует учитывать, что снижать расходы возможно лишь до определённого предела, поэтому необходимо смещение фокуса в сторону увеличения доходов. Индивиды, стремясь увеличить свои доходы в найме, могут выбрать повышение квалификации с дальнейшим ростом по карьерной лестнице, обучение новым навыкам и наращивание экспертизы в смежных областях, смену географического местоположения (например, из сельской местности в город, из города в административный центр области, отсюда в города республиканского значения), либо переход из привычной отрасли в новую для себя со сменой местожительства и переходом на вахтовый метод при необходимости.

Вопрос неравенства в оплате труда остаётся одним из ключевых в экономической политике Казахстана, и его изучение является актуальным как с научной, так и с практической точки зрения. В научной литературе для объяснения данной проблемы используются конкурентная и неконкурентная теории заработной платы. Огромный интерес представляет неконкурентная теория, которая стремится объяснить существование скрытой премии на некоторых рынках для определённых категорий работников. Инициативы по сокращению неравенства в оплате труда поддерживаются Организацией Объединённых Наций (ООН) на глобальном уровне. Вместе с тем изучение научных работ последних лет позволяет сделать вывод о том,

что в той или иной форме подобное неравенство существует как в развитых, так и в развивающихся регионах. Казахстанский рынок труда не является исключением. Понимание причин дифференциации заработных плат между регионами и отраслями позволит более точно и эффективно направлять бюджетные ресурсы на преодоление структурного неравенства при разработке государственных программ и дорожных карт регионального развития.

Таким образом, целью исследования является количественная оценка относительного вклада региона трудоустройства и вида экономической деятельности в межгрупповую дифференциацию заработной платы в Казахстане, а также определение доминирующего фактора на основе декомпозиции объяснённой дисперсии. На основе поставленной цели сформулированы следующие гипотезы исследования:

Н1: размер заработной платы различается в зависимости от региона трудоустройства.

Н2: отраслевая принадлежность работников детерминирует размер их заработной платы.

Н3: отраслевая принадлежность работников сильнее связана с размером заработной платы, чем регион трудоустройства.

ЛИТЕРАТУРНЫЙ ОБЗОР

На рубеже 80-х годов XX века сформировались две теории, которые лежат в основе объяснения динамики уровня оплаты труда в зависимости от отраслевых или индивидуальных характеристик работников (Dickens & Katz, 1986). Стандартная конкурентная теория предполагает равенство заработных плат для идентичных работников в одинаковых отраслях. Это говорит о том, что в среднем уровень оплаты труда будет тем выше, чем больше индивидуальная продуктивность работников, которая, в свою очередь, положительно коррелирует с профессиональным опытом, навыками, возрастом (усреднёнными характеристиками работников), количеством рабочих часов, степенью опасности условий труда (атрибутами отрасли). Если эти характеристики и атрибуты контролировать, при прочих равных не должно наблюдаться значимых отклонений среди заработных плат (Haworth & Reuther, 1978; Hodson & England, 1986; Heywood, 1987).

В свою очередь, сторонники неконкурентной теории включили в анализ отраслевые переменные, что позволило оценить самостоятельный вклад отраслевых факторов в дифференциацию оплаты труда (Dalton & Ford, 1977; Jenny, 1978; Mellow, 1982; Long & Link, 1983; Podgursky, 1986; Haltiwanger & Spletzer, 2020). Особого внимания заслуживает работа Крюгера и Саммерса, в которой было установлено, что в отдельных отраслях США заработная плата более чем на 20% превышала средний уровень (Krueger & Summers, 1988). Результаты этих исследований позволяют предположить, что наряду с условиями труда и характером выполняемой деятельности важную роль играют отраслевые характеристики. Их влияние может ослаблять прямую связь между оплатой труда и индивидуальной производительностью работников, а также обуславливать наличие отраслевой премии в заработной плате.

Существование отраслевой премии на рынке труда может быть объяснено несколькими факторами. Во-первых, фирмы могут устанавливать более высокую заработную плату, стремясь повысить лояльность и производительность работников, сократить текучесть кадров и затраты на поиск и обучение нового персонала. Такой подход соответствует теории эффективной заработной платы. Во-вторых, отраслевая премия может быть обусловлена сильной переговорной позицией работников в отдельных отраслях, связанной с деятельностью профессиональных союзов или высокой ценностью ключевых специалистов для работодателей.

Проблема неравенства в оплате труда на региональном уровне сохраняет актуальность. Исследования охватывают как развитые страны, включая США и государства Европы, так и развивающиеся экономики, в частности Китай, Индию и страны Латинской Америки. При изучении дифференциации оплаты труда авторы рассматривают её региональные, отраслевые, технологические и институциональные аспекты.

Исследования показывают, что уровень неравенства на рынке труда имеет тенденцию возрастать по мере увеличения размера города. К такому выводу независимо друг от друга пришли авторы исследований, выполненных на данных США (Florida & Mellander, 2016),

Канады (Bolton & Breau, 2012) и Великобритании (McCann, 2019). Масштаб и экономическая структура региона часто связаны с уровнем его технологического развития и инновационного потенциала, что может влиять на неравномерность распределения доходов (Lee & Rodríguez-Pose, 2013; Lee et al., 2016). Высокодоходные регионы, в свою очередь, располагают более широкими возможностями для диверсификации экономики, развития технологически сложных видов экономической деятельности и привлечения высококвалифицированных специалистов (Iammarino et al., 2019; Balland et al., 2020; Pinheiro et al., 2022).

Однако характер взаимосвязи между экономической сложностью и неравенством доходов различается в зависимости от страны. В США и Испании установлено, что повышение уровня экономической сложности сопровождается ростом неравенства в оплате труда (Heinrich Mora et al., 2021; Marco et al., 2022). В Китае, напротив, была выявлена обратная зависимость (Gao & Zhou, 2018; Zhu et al., 2020). В Бразилии взаимосвязь между экономической сложностью и неравенством доходов имеет перевернутую U-образную форму: на первоначальном этапе повышение экономической сложности усиливает неравенство, однако после достижения определённого уровня способствует более равномерному распределению доходов между населением бразильских штатов (Moraes et al., 2021).

Значительное число исследований посвящено объяснению межотраслевой дифференциации заработной платы. Анализ данных по 14 странам ОЭСР за 1970–1985 гг. выявил положительную связь межотраслевых различий в заработной плате с ростом производительности труда, ВВП на душу населения и эффективности использования капитала, а также отрицательную связь с долей импорта во внешней торговле (Gittleman & Wolff, 1993). Результаты исследования, охватывающего 20 стран в период с 1970 по 1992 год, показывают, что структура межотраслевой дифференциации заработной платы во многом сходна в развитых и развивающихся странах, однако факторы, определяющие её динамику, могут различаться между этими группами стран (Erdil & Yetkiner, 2001).

Несмотря на различия в уровне экономического развития европейских стран, исследова-

ния показывают, что ранжирование отраслей по уровню заработной платы в западноевропейских и восточноевропейских странах во многом сходно. К числу высокооплачиваемых относятся энергетическая, химическая, финансовая и технологическая отрасли, тогда как лёгкая промышленность, а также деятельность в сфере гостиничных услуг и общественного питания входят в группу отраслей с относительно низким уровнем оплаты труда. Межотраслевая дифференциация заработной платы выражена сильнее в странах, где роль профсоюзов и переговорная позиция работников слабее (Magda et al., 2008). Важность институциональной защиты интересов работников подтверждается и результатами исследования рынка труда Китая, проведённого на данных за 2004, 2008 и 2013 годы и охватывающего 15 отраслей в четырёх провинциях. Установлено, что заработная плата в государственных организациях, характеризующихся более высоким уровнем административного регулирования и профсоюзного влияния, выше, чем в частных компаниях (Li, 2022).

Рынок труда Казахстана также имеет свою специфику и характеризуется выраженной региональной и отраслевой дифференциацией заработной платы. Исследования показывают, что её уровень связан с минимальной заработной платой, ВВП на душу населения, численностью населения и инновационной активностью предприятий (Yeralina & Alshanov, 2023). Высшее образование положительно связано с оплатой труда, а максимальный уровень заработной платы наблюдается у работников со стажем около 24 лет (Yemelina et al., 2018). Гендерные различия обусловлены профессионально-образовательной сегрегацией и ограниченными возможностями карьерного продвижения женщин (Nyussupova et al., 2024). Значительная региональная и структурно-отраслевая дифференциация подтверждается также результатами анализа данных за 2015 г. и 2022 г. (Nurlanova et al., 2024).

Исследования региональных рынков труда Казахстана выявляют существенные территориальные различия. В Карагандинской области сокращение рабочей силы и рост молодёжной безработицы в 2015–2019 гг. сопровождалось усилением трудовой миграции, что подтверждает значимость молодёжной занятости для го-

сударственной политики (Khishauyeva, 2020; Beisembina et al., 2025). В Акмолинской области отмечались сокращение занятости в сельском хозяйстве, дефицит квалифицированных кадров и старение населения (Belgibayeva et al., 2021). Доходы сельских домохозяйств Туркестанской области зависели от сельского хозяйства, денежных переводов и государственной поддержки, а снижение их уязвимости связывается с развитием инфраструктуры, образования и налоговых инструментов (Maulenberdieva et al., 2025). Кластерный анализ регионов за 2016–2022 гг. показал усиление неравенства трудовых доходов: лидирующие позиции заняли нефтедобывающие регионы, тогда как к отстающим преимущественно относились южные регионы с низким ВРП на душу населения и незначительной долей крупных квазигосударственных предприятий (Nurlanova & Tleuberdinova, 2024).

Большинство исследований в части изучения влияния регионов и отраслей на уровень дифференциации заработной плат в Казахстане носит фрагментарный характер, фокусируясь либо на одном регионе, либо отдельно на ряде регионов или ряде отраслей, с использованием описательного анализа и/или применением базового инструментария. Данное исследование привносит необходимый уровень синтеза, когда в модели одновременно присутствуют и региональные, и отраслевые переменные, вплоть до учёта фактического количества работников в каждом регионе внутри каждой отрасли. Период исследования охватывает 2025 г. как наиболее актуальный из имеющихся, а эконометрический анализ проведён в пакете STATA.

МЕТОДОЛОГИЯ

На основе первичного анализа данных Бюро национальной статистики Республики Казахстан (далее – БНС АСПИР) сформирован массив данных о среднемесячной номинальной заработной плате мужчин и женщин, охватывающий более 3,5 млн наёмных работников в разрезе 19 видов экономической деятельности и 20 регионов Казахстана. При таком подходе объём выборки должен был быть 760 точек наблюдений (оба пола на 19 отраслей на 20 регионов), однако из-за того, что в некоторых регионах и отраслях отсутствовали работники, финальная

выборка состоит из 755 точек наблюдений. Все необходимые расчёты выполнены в программном пакете STATA.

Регрессионная модель имеет следующий полулוגарифмический вид согласно формуле (1):

$$\ln(Wage) = \beta_1 + \beta_g \times Gender + \sum \beta_i \times Region_i + \sum \beta_j \times Industry_j + \varepsilon \quad (1)$$

где:

$\ln(Wage)$ – логарифм среднемесячной номинальной заработной платы;

β_1 – свободный член регрессии;

$Gender$ – пол работника (мужчина или женщина), бинарная переменная;

$Region$ – i -ый регион;

$Industry$ – j -ая отрасль.

Логарифмирование среднемесячной номинальной заработной платы было проведено для снижения асимметрии её распределения и обеспечения более корректной спецификации регрессионной модели. Использование логарифма заработной платы также соответствует сложившейся практике эмпирических исследований оплаты труда, основанных на положениях теории человеческого капитала. Учёт пола работников имеет принципиальное значение для исследования гендерных различий в оплате труда. Включение в модель бинарной переменной пола позволяет оценить направление и статистическую значимость различий в заработной плате мужчин и женщин при прочих равных условиях, то есть после учёта региональной и отраслевой принадлежности.

Включение в модель данных по всем 20 регионам Казахстана, в том числе по областям Абай, Жетысу и Улытау, образованным в 2022 г., обеспечивает полный территориальный охват и позволяет выявить региональную специфику формирования заработной платы. Под отраслью в исследовании понимается вид экономической деятельности в соответствии с Общим классификатором видов экономической деятельности, включающим секции от А до S.

С помощью метода наименьших квадратов проведён регрессионный анализ связи объясняющих переменных с $\ln(Wage)$. Для выявления специфических различий переменные регионов

и отраслей взяты в качестве дамми-переменных. Во избежание абсолютной коллинеарности исключается одна дамми-переменная в каждом наборе факторов, а коэффициенты интерпретируются относительно базовой группы (Greene, 2019).

В качестве аналитических весов использовалась фактическая численность мужчин и женщин, занятых в соответствующем виде экономической деятельности в каждом регионе. Применение взвешивания позволяет учитывать неодинаковую численность работников, представленную каждым агрегированным наблюдением. Без использования весов наблюдения, представляющие существенно различающиеся по численности группы работников, оказывали бы одинаковое влияние на результаты оценивания, что могло привести к смещению итоговых выводов в пользу малочисленных групп. Информация, необходимая для формирования весов, была получена из региональных таблиц Бюро национальной статистики РК, содержащих сведения о численности наёмных работников и среднемесячной номинальной заработной плате по видам экономической деятельности и полу (Bureau of National Statistics, 2025).

Поскольку зависимая переменная представлена в логарифмическом виде, для содержательной интерпретации оценённые коэффициенты необходимо преобразовать в процентные значения. Для этого используется формула (2):

$$ПД = (e(\beta_{cap}) - 1) \times 100\% \quad (2)$$

где:

ПД – величина премии или дисконта;

e – экспонента числа;

β_{cap} – оценочный коэффициент при переменных.

Полученный результат показывает процентное различие в заработной плате по сравнению с базовой группой при прочих равных условиях. Для определения вклада региональных и отраслевых факторов в объяснение вариации заработной платы проведена декомпозиция коэффициента детерминации. На первом этапе использован инкрементальный метод, при котором блоки объясняющих переменных последовательно включались в регрессионную модель.

Прирост коэффициента детерминации после добавления очередного блока переменных отражает дополнительную долю вариации зависимой переменной, объясняемую соответствующим фактором.

Для устранения зависимости результатов от порядка включения переменных в качестве основного метода применена декомпозиция Шепли. Данный метод учитывает все возможные последовательности включения блоков переменных в модель и рассчитывает их усреднённый предельный вклад в общий коэффициент детерминации. В результате для каждого фактора формируется единственная оценка его вклада в объяснённую вариацию заработной платы. Для оценки корректности спецификации модели проведена диагностика мультиколлинеарности и гетероскедастичности. Наличие мультиколлинеарности между объясняющими переменными проверялось с помощью коэффициентов инфляции дисперсии (VIF). Гетероскедастичность, то есть непостоянство дисперсии случайных ошибок, оценивалась с использованием соответствующего статистического теста. Поскольку исследование основано на пространственных

данных за 2025 г., проблема временной автокорреляции для данной модели не рассматривается.

РЕЗУЛЬТАТЫ

В данном разделе представлены результаты регрессионного анализа, направленного на оценку связи региональной и отраслевой принадлежности, а также пола работников с различиями в уровне среднемесячной заработной платы в Республике Казахстан. Модель демонстрирует высокую объяснительную способность: включённые в неё факторы в совокупности объясняют 75% вариации среднемесячной заработной платы между анализируемыми группами. Сначала представлены описательная статистика и графическое распределение исследуемых показателей, затем приведена экономическая интерпретация коэффициентов регрессии и рассмотрены результаты проверки выдвинутых гипотез.

На основе данных о среднемесячной номинальной заработной плате построено распределение данного показателя, представленное на рисунке 1.

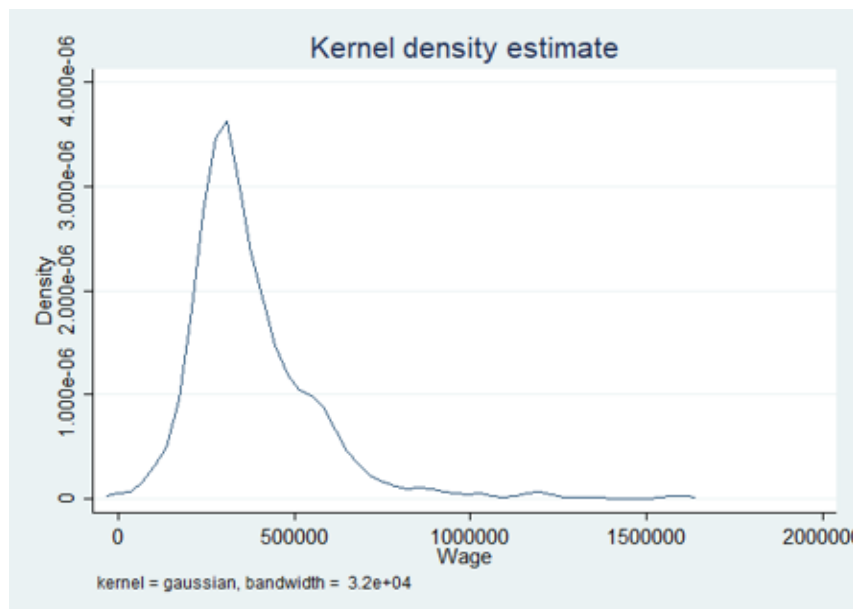


Рисунок 1. Распределение среднемесячных номинальных заработных плат
Figure 1. Distribution of average monthly nominal wages

Как видно из рисунка 1, распределение среднемесячной номинальной заработной платы по группам «регион × вид экономической деятель-

ности × пол» характеризуется выраженной правосторонней асимметрией и существенно отличается от нормального распределения. Основная

часть наблюдений сосредоточена в диапазоне от 250 до 500 тыс. тенге, тогда как небольшое число высоких значений формирует длинный правый хвост, что обосновывает логарифмирование заработной платы при проведении регрессионного анализа.

Для уменьшения правосторонней асимме-

трии распределения среднемесячная номинальная заработная плата была логарифмирована. Такой подход соответствует общепринятой практике моделирования заработной платы в рамках теории человеческого капитала. Распределение показателя после логарифмического преобразования представлено на рисунке 2.

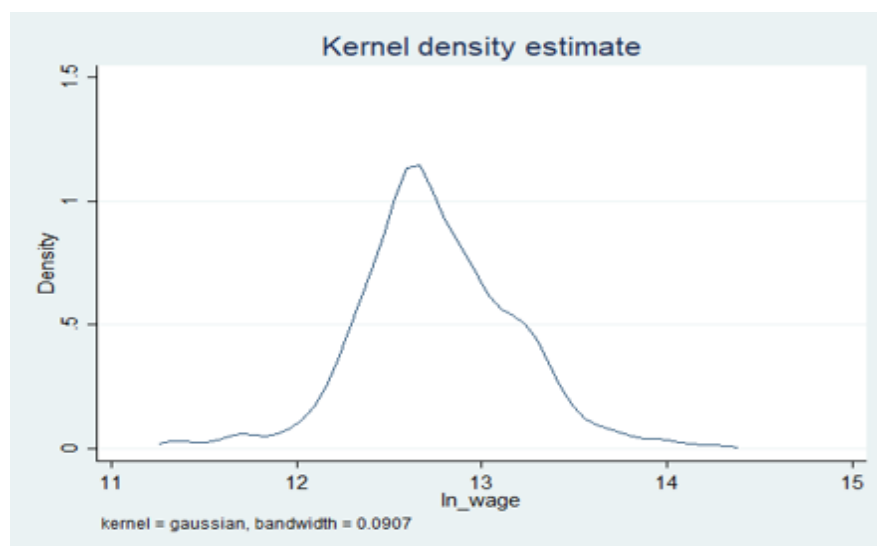


Рисунок 2. Распределение логарифма среднемесячных номинальных заработных плат

Figure 2. Distribution of the logarithm of average monthly nominal wages

Как видно из рисунка 2, после логарифмирования распределение заработной платы стало более симметричным, а выраженность правого хвоста существенно уменьшилась. Основная часть наблюдений сосредоточена в диапазоне значений $\ln(\text{Wage})$ от 12,3 до 13,3. Полученное распределение в большей степени приближено к нормальному, поэтому логарифм среднемесячной номинальной заработной платы по группам «регион $\times$ вид экономической деятельности $\times$ пол» использован в модели в качестве зависимой переменной.

В Казахстане уровень среднемесячной номинальной заработной платы существенно различается в зависимости от региона и вида экономической деятельности. Для оценки статистической значимости этих различий проведён регрессионный анализ с учётом региональной и отраслевой принадлежности, а также пола работников. Описательная статистика переменных, включённых в модель, представлена в таблице 1.

Таблица 1. Описательная статистика переменных
Table 1. Descriptive statistics of variables

Переменная	Число наблюдений	Среднее значение	Стандартное отклонение	Мин	Макс
Логарифм зарплат	755	12,76	0,42	11,35	14,29
В разрезе пола					
Мужчины	378	12,83	0,44	11,36	14,29
Женщины	377	12,69	0,39	11,35	14,27
В разрезе региона					
г. Астана (топ-1)	38	13,17	0,34	12,58	13,98
г. Алматы (топ-2)	38	13,16	0,35	12,60	14,00
Атырауская (топ-3)	38	12,97	0,53	11,76	14,29
Мангистауская (топ-4)	36	12,91	0,42	12,04	13,99
Карагандинская (топ-5)	38	12,84	0,35	12,17	13,44
Прочие 10 регионов	379	12,73	0,36	11,91	13,58
Абай (низ-5)	38	12,63	0,44	11,35	13,53
Кызылординская (низ-4)	38	12,59	0,42	11,62	13,40
Туркестанская (низ-3)	37	12,55	0,37	11,35	13,33
Жетысу (низ-2)	38	12,53	0,43	11,35	13,48
Северо-Казахстанская (низ-1)	37	12,51	0,42	11,35	13,22
В разрезе видов экономической деятельности					
Горнодобывающая промышленность и разработка карьеров (топ-1)	39	13,37	0,36	12,84	14,29
Финансовая и страховая деятельность (топ-2)	40	13,15	0,33	12,64	14,00
Строительство (топ-3)	40	13,03	0,28	12,48	13,55
Обрабатывающая промышленность (топ-4)	40	13,01	0,31	12,35	13,66
Транспорт и складирование (топ-5)	40	12,99	0,26	12,29	13,45
Прочие 9 отраслей	360	12,74	0,27	12,27	13,39
Водоснабжение; водоотведение; сбор, обработка и удаление отходов, деятельность по ликвидации загрязнений (низ-5)	40	12,53	0,29	11,89	13,22
Искусство, развлечения и отдых (низ-4)	40	12,47	0,24	12,20	13,12
Сельское, лесное и рыбное хозяйство (низ-3)	37	12,46	0,34	11,35	13,39
Деятельность в области административного и вспомогательного обслуживания (низ-2)	40	12,34	0,43	11,59	13,28
Операции с недвижимым имуществом (низ-1)	39	12,30	0,57	11,35	13,26

Примечание: составлено автором на основе данных (Bureau of National Statistics, 2025)

Данные показывают заметные различия в уровне заработной платы по полу, регионам и видам экономической деятельности. Среднее значение логарифма заработной платы у мужчин выше, чем у женщин. Среди регионов наиболее высокие значения отмечаются в Астане, Алматы и Атырауской области, а наиболее низкие – в Северо-Казахстанской, Жетысу и Туркестанской областях. В отраслевом разрезе

лидируют горнодобывающая промышленность, финансовая деятельность и строительство, тогда как самые низкие значения характерны для операций с недвижимостью, административного обслуживания и сельского хозяйства.

Для более полного представления региональных различий на рисунке 3 показано распределение фактической численности работников по регионам Казахстана.

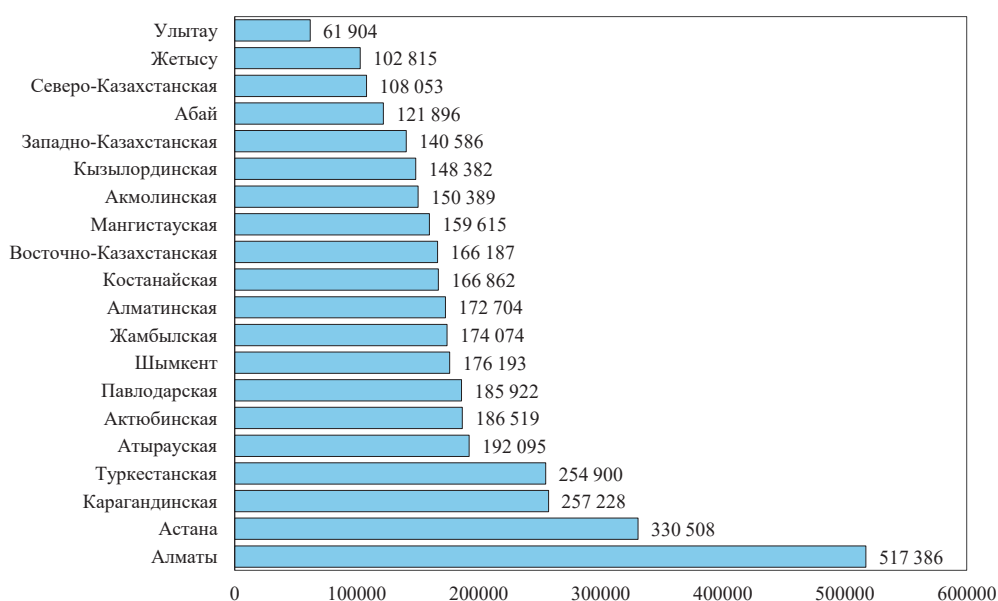


Рисунок 3. Фактическая численность работников по регионам Казахстана

Figure 3. Actual number of employees by region of Kazakhstan

Наибольшая численность работников сосредоточена в г. Алматы – 517,4 тыс. человек, или около 14% их общей численности. Далее следуют г. Астана – 330,5 тыс. человек (9%), Карагандинская – 257,2 тыс. человек (7%) и Туркестанская области – 254,9 тыс. человек (7%). Наименьшая численность работников отмечается в области Улытау – 61,9 тыс. человек, а так-

же в областях Жетысу и Северо-Казахстанской – 102,8 и 108,1 тыс. человек соответственно. В целом данные свидетельствуют о значительной неравномерности распределения работников по регионам.

Распределение фактической численности работников по видам экономической деятельности представлено на рисунке 4.

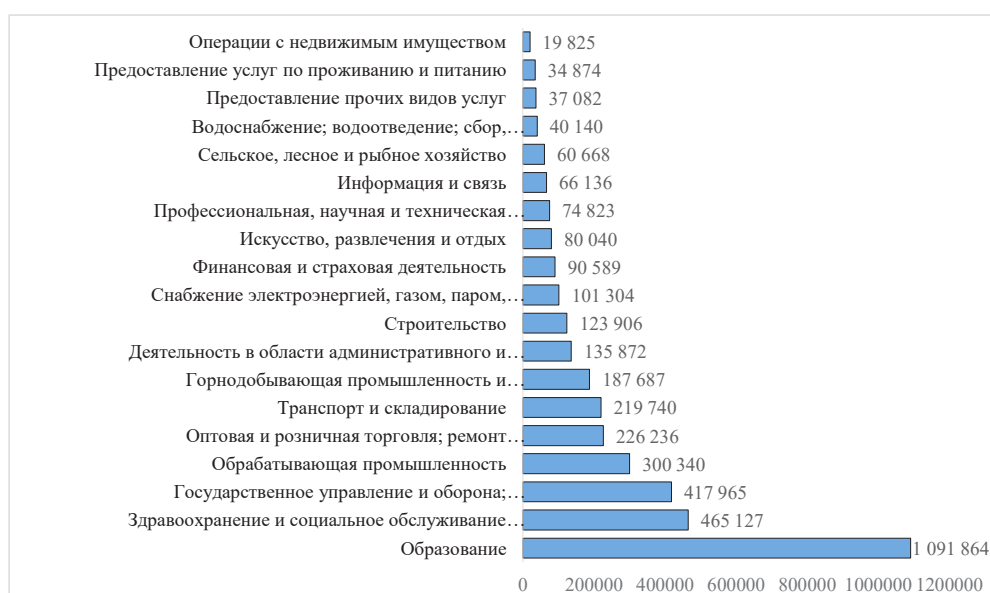


Рисунок 4. Фактическая численность работников в разрезе видов экономической деятельности

Figure 4. Actual number of employees by types of economic activity

Наибольшая численность работников сосредоточена в сфере образования – 1,09 млн человек. Далее следуют здравоохранение и социальное обслуживание – 465,1 тыс. человек, государственное управление и оборона – 418,0 тыс., а также обрабатывающая промышленность – 300,3 тыс. человек. Наименьшая численность работников отмечается в операциях с недвижимым имуществом – 19,8 тыс. человек,

сфере проживания и питания – 34,9 тыс. и предоставлении прочих услуг – 37,1 тыс. человек. Таким образом, распределение работников по видам экономической деятельности является крайне неравномерным.

Для характеристики гендерной структуры занятости в таблице 2 представлено распределение мужчин и женщин по 19 видам экономической деятельности.

Таблица 2. Гендерная структура занятости по видам экономической деятельности в Казахстане

Table 2. Gender composition of employment by economic activity in Kazakhstan

Вид экономической деятельности	Доля женщин, %	Доля мужчин, %
Преимущественно женские		
Здравоохранение и социальное обслуживание	77,31	22,69
Образование	75,41	24,59
Финансовая и страховая деятельность	61,46	38,54
Предоставление услуг по проживанию и питанию	61,17	38,83
Смешанные		
Оптовая и розничная торговля; ремонт автомобилей и мотоциклов	51,39	48,61
Предоставление прочих видов услуг	51,24	48,76
Операции с недвижимым имуществом	50,11	49,89
Искусство, развлечения и отдых	49,46	50,54
Профессиональная, научная и техническая деятельность	40,78	59,22
Преимущественно мужские		
Строительство	13,38	86,62
Горнодобывающая промышленность и разработка карьеров	17,15	82,85
Деятельность в области административного и вспомогательного обслуживания	23,19	76,81
Транспорт и складирование	24,00	76,00
Обрабатывающая промышленность	28,66	71,34
Снабжение электроэнергией, газом, паром, горячей водой и кондиционированным воздухом	28,82	71,18
Водоснабжение; водоотведение; сбор, обработка и удаление отходов; деятельность по ликвидации загрязнений	29,90	70,10
Сельское, лесное и рыбное хозяйство	30,02	69,98
Государственное управление и оборона; обязательное социальное обеспечение	35,35	64,65
Информация и связь	37,48	62,52

Примечание: составлено автором на основе данных (Bureau of National Statistics, 2025)

Данные показывают выраженные гендерные различия в отраслевой структуре занятости. Женщины преобладают в здравоохранении и социальном обслуживании, образовании, финансовой деятельности, а также в сфере проживания и питания. Наиболее сбалансированное соотношение мужчин и женщин наблюдается в торговле, операциях с недвижимостью, сфере прочих услуг, искусства и развлечений. Мужчины составляют большинство работников в

строительстве, горнодобывающей промышленности, транспорте, обрабатывающей промышленности, энергетике и сельском хозяйстве. Полученные результаты свидетельствуют о сохранении отраслевой гендерной сегрегации на рынке труда Казахстана.

На основе оценки регрессионной модели получены результаты, представленные в таблице 3.

Таблица 3. Результаты регрессионной модели связи пола, региона и вида экономической деятельности с логарифмом среднемесячной номинальной заработной платы (755 наблюдений)**Table 3.** Regression results for the association of gender, region and economic activity with the logarithm of average monthly nominal wages (755 observations)

Переменная	Коэффициент (робастные стандартные ошибки)	Значимость коэффициента	VIF
Пол	0,1167616 (0,0196844)	***	1,27
Регион			
Астана	- 0,0132872 (0,0468954)	-	1,52
Атырауская	- 0,0480245 (0,0844212)	-	1,38
Мангистауская	- 0,1533829 (0,0789655)	-	1,32
Улытау	- 0,1501983 (0,1154877)	-	1,14
Абай	- 0,3783478 (0,0487277)	***	1,23
Акмолинская	- 0,3316147 (0,0504982)	***	1,29
Актюбинская	- 0,4163397 (0,0487422)	***	1,34
Алматинская	- 0,2900356 (0,0555795)	***	1,33
Восточно-Казахстанская	- 0,3096603 (0,059396)	***	1,31
Жамбылская	- 0,3939907 (0,0556632)	***	1,33
Жетысу	- 0,4275212 (0,0586936)	***	1,20
Западно-Казахстанская	- 0,3613628 (0,0542773)	***	1,26
Карагандинская	- 0,3035505 (0,0463178)	***	1,47
Костанайская	- 0,3776314 (0,0505299)	***	1,32
Кызылординская	- 0,3763118 (0,0635744)	***	1,28
Павлодарская	- 0,3136305 (0,0518833)	***	1,35
Северо-Казахстанская	- 0,4683986 (0,0531618)	***	1,22
Туркестанская	- 0,4167388 (0,058758)	***	1,50
Шымкент	- 0,3991685 (0,0474756)	***	1,31
Вид экономической деятельности			
Горнодобывающая промышленность и разработка карьеров	0,7462409 (0,0758126)	***	1,27
Финансовая и страховая деятельность	0,6987871 (0,0690968)	***	1,10
Информация и связь	0,4708997 (0,0761998)	***	1,10
Профессиональная, научная и техническая деятельность	0,4525954 (0,0756718)	***	1,07
Обрабатывающая промышленность	0,3857365 (0,0466461)	***	1,31
Транспорт и складирование	0,3658311 (0,0310886)	***	1,23
Строительство	0,3568113 (0,0374101)	***	1,18
Предоставление прочих видов услуг	0,2795127 (0,0832623)	***	1,03
Снабжение электроэнергией, газом, паром, горячей водой и кондиционированным воздухом	0,2209616 (0,0428793)	***	1,10
Государственное управление и оборона; обязательное социальное обеспечение	- 0,1143413 (0,0287928)	***	1,33
Водоснабжение; водоотведение; сбор, обработка и удаление отходов, деятельность по ликвидации загрязнений	- 0,1270375 (0,0528573)	*	1,04
Деятельность в области административного и вспомогательного обслуживания	- 0,1866893 (0,0848733)	*	1,17
Искусство, развлечения и отдых	- 0,1958614 (0,0417568)	***	1,06
Здравоохранение и социальное обслуживание населения	0,0273821 (0,0293351)	-	1,26
Операции с недвижимым имуществом	- 0,1331644 (0,0683563)	-	1,02
Оптовая и розничная торговля; ремонт автомобилей и мотоциклов	0,0998844 (0,0523086)	-	1,21
Предоставление услуг по проживанию и питанию	0,0571608 (0,0464014)	-	1,04
Сельское, лесное и рыбное хозяйство	-0,0964045 (0,0564361)		1,09
Свободный член регрессии	12,92308 (0,0407358)	***	
* p < 0,05; ** p < 0,01; *** p < 0,001			

Примечание: составлено автором на основе результатов моделирования

Результаты показывают, что в 15 регионах Казахстана среднемесячная номинальная заработная плата статистически значимо ниже, чем в г. Алматы, при прочих равных условиях, то есть после учёта пола работников и вида экономической деятельности. На это указывают отрицательные и статистически значимые коэффициенты региональных переменных. В то же время для г. Астаны, Атырауской, Мангистауской областей и области Улытау статистически значимых различий по сравнению с г. Алматы не выявлено. В то же время для г. Астаны, Атырауской, Мангистауской областей и области Улытау статистически значимых различий по сравне-

нию с г. Алматы не выявлено. Таким образом, на основе имеющихся данных нельзя утверждать о наличии устойчивого отличия заработной платы в этих регионах от уровня г. Алматы. Вместе с тем отсутствие статистической значимости не следует трактовать как доказательство полного равенства заработных плат, поскольку оно может быть связано с более широкими доверительными интервалами и меньшей точностью отдельных оценок.

На рисунке 5 представлены доверительные интервалы оценённых коэффициентов региональных переменных, рассчитанные на основе робастных стандартных ошибок.

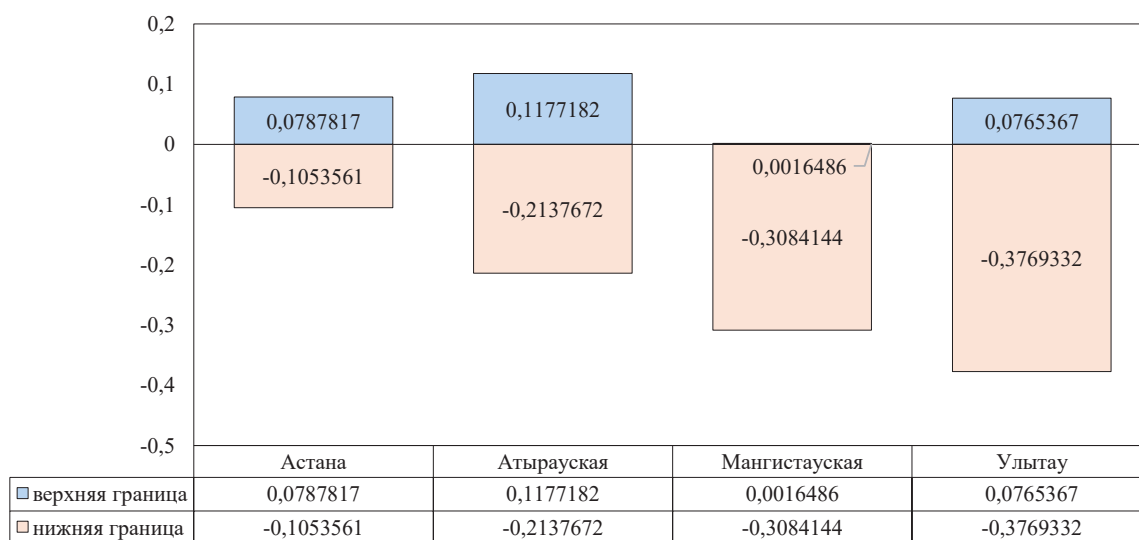


Рисунок 5. Доверительные интервалы оценок региональных различий в заработной плате

Figure 5. Confidence intervals for estimated regional wage differences

Как видно из рисунка 5, доверительный интервал для г. Астаны включает нулевое значение, что указывает на отсутствие значимого отличия от г. Алматы. Аналогичная ситуация наблюдается для Атырауской, Мангистауской областей и области Улытау. При этом интервалы для Атырауской, Мангистауской областей и особенно области Улытау являются более широкими, что свидетельствует о большей неопределённости оценок и требует осторожности при интерпретации результатов. В целом по данным регионам устойчивое отставание от г. Алматы не подтверждается. Вместе с тем наличие зна-

чимых отрицательных коэффициентов по большинству других регионов позволяет сделать вывод, что гипотеза H1 не отвергается: уровень заработной платы в Казахстане связан с региональным трудоустройством.

После преобразования коэффициентов регрессии в величину премии или дисконта видно, что отраслевой рынок труда Казахстана также характеризуется значительной неоднородностью. В таблице 4 представлена группировка видов экономической деятельности по уровню заработной платы относительно базовой отрасли – образования.

Таблица 4. Группировка видов экономической деятельности по уровню заработной платы относительно образования**Table 4.** Grouping economic activities by wage level relative to education

Группа отраслей	Вид экономической деятельности	Премия или дисконт по отношению к образованию (ПД)	Комментарии
Группа лидеров (значимы положительно на 5%)	Горнодобывающая промышленность и разработка карьеров	+111%	Отрасли с высокой добавленной стоимостью или экспортной составляющей.
	Финансовая и страховая деятельность	+101%	
	Информация и связь	+60%	
	Профессиональная, научная и техническая деятельность	+57%	
	Обрабатывающая промышленность	+47%	
	Транспорт и складирование	+44%	
	Строительство	+43%	
	Предоставление прочих видов услуг	+29%	
Группа аутсайдеров (значимы отрицательно на 5%)	Снабжение электроэнергией, газом, паром, горячей водой и кондиционированным воздухом	+25%	Средние заработные платы ассоциируются с более низким уровнем оплаты относительно отрасли образования.
	Государственное управление и оборона; обязательное социальное обеспечение	– 11%	
	Водоснабжение; водоотведение; сбор, обработка и удаление отходов; деятельность по ликвидации загрязнений	– 12%	
	Деятельность в области административного и вспомогательного обслуживания	– 17%	
Группа «ловушки низких доходов» (не значимы на 5%)	Искусство, развлечения и отдых	– 18%	Средние заработные платы прижаты к уровню оплаты труда в образовании.
	Здравоохранение, операции с недвижимым имуществом, оптовая и розничная торговля, проживание и питание, сельское, лесное и рыбное хозяйство	Неприменимо	

Примечание: составлено автором на основе результатов моделирования

Данные показывают, что отраслевые различия в заработной плате остаются существенными даже после учёта региона и пола работников. Наиболее высокая премия по отношению к образованию наблюдается в горнодобывающей промышленности и финансовой деятельности: заработная плата в этих отраслях примерно в два раза превышает уровень базовой отрасли. В целом выделяется группа отраслей с положительной премией от 25% до 111% относительно образования, группа отраслей с отрицательным дисконтом от 11% до 18%, а также группа видов деятельности, по которым статистически значимых отличий от образования не выявлено. Таким образом, гипотеза H2 не отвергается.

Модель демонстрирует высокую объяснительную способность: скорректированный коэффициент детерминации составляет 75%.

Использование скорректированного (R^2) оправдано, поскольку он учитывает число объясняющих переменных и степеней свободы модели (Greene, 2019). Тест на гетероскедастичность подтвердил необходимость применения робастных стандартных ошибок, которые приведены в таблице 3 в скобках под коэффициентами. Проверка на мультиколлинеарность не выявила данной проблемы: значения VIF по всем переменным находятся ниже 2.

Для оценки вклада регионального и отраслевого факторов в объяснение вариации среднемесячной заработной платы между группами «регион × вид экономической деятельности × пол» проведена декомпозиция коэффициента детерминации. Метод декомпозиции Шепли показал, что региональный фактор отдельно объясняет 21% дисперсии логарифма среднемесячной за-

рабочей платы, тогда как отраслевой фактор – 45%. Преимущество данного подхода заключается в том, что он учитывает все возможные порядки включения факторов в модель и позволяет получить оценку вклада каждого фактора, не зависящую от последовательности их добавления (Sharapov et al., 2021). Полученные результаты показывают, что отраслевая принадлежность является более значимым фактором дифференциации заработных плат, чем регион трудоустройства. Следовательно, гипотеза Н3 не отвергается.

ОБСУЖДЕНИЕ

Результаты исследования показывают, что рынок труда Казахстана характеризуется выраженной региональной неоднородностью. С одной стороны, выделяется группа регионов с более высоким уровнем заработной платы, с другой – значительная часть регионов демонстрирует статистически значимое отставание от г. Алматы. вывод согласуется с исследованиями, где подчёркивается наличие устойчивой региональной и структурно-отраслевой дифференциации заработной платы в Казахстане (Nurlanova et al., 2024; Nurlanova & Tleuberdinova, 2024). Горнодобывающая промышленность, особенно в Атырауской и Мангистауской областях, а также обрабатывающая промышленность в области Улытау оказывают заметное влияние на экономическую привлекательность отдельных территорий. При этом г. Астана и г. Алматы выступают крупнейшими центрами концентрации занятости и притяжения рабочей силы. В пяти лидирующих регионах сосредоточено 33% фактической численности работников, тогда как на остальные 15 регионов приходится 67%.

Такая концентрация занятости может усиливать нагрузку на городскую и региональную инфраструктуру. В более широком контексте это согласуется с выводами исследований, согласно которым рост размера города и концентрация экономической активности часто сопровождаются усилением различий на рынке труда и в доходах населения (Florida & Mellander, 2016; Bolton & Breau, 2012; McCann, 2019). С ростом числа работников (независимо от пола и отрасли) в ведущих регионах увеличивается потребность во вводе в эксплуатацию новой жилой и

коммерческой недвижимости, который не всегда происходит с учётом требований о плотности застройки. Текущие мощности инженерных сетей в регионах являются во многом устаревшим наследием советского периода и не рассчитаны на кратный рост потребления электроэнергии, тепловых сетей и водоснабжения. Замена изношенного оборудования и инфраструктурных объектов перераспределяется на население в форме растущих тарифов на жилищно-коммунальные услуги.

Неспособность значительной части регионов конкурировать с ведущими центрами по уровню заработной платы может сдерживать их дальнейшее развитие. Если работники с высоким уровнем человеческого капитала концентрируются в регионах с более высокими доходами и карьерными возможностями, то меры по повышению привлекательности отстающих регионов могут иметь ограниченный эффект. Подобная логика согласуется с исследованиями, показывающими, что высокодоходные и технологически более развитые регионы обладают большими возможностями для привлечения квалифицированных кадров и диверсификации экономики (Iammarino et al., 2019; Balland et al., 2020; Pinheiro et al., 2022). В казахстанском контексте территориальные различия на рынке труда также проявляются через миграционные процессы, дефицит кадров и различия в структуре занятости между регионами (Khishauyeva, 2020; Belgibayeva et al., 2021; Maulenberdieva et al., 2025).

В силу того, что экономика Казахстана является ориентированной на добычу и реализацию сырья, горнодобывающая промышленность предлагает самую высокую отраслевую премию по отношению к образованию. Доходы нефтегазовых компаний являются ключевым ресурсом в пополнении республиканского бюджета, и отсюда значение, которое придаёт правительство реализации проектов в данной отрасли. При этом очевидно, что устойчивое развитие экономики возможно лишь при наличии диверсификации в денежных поступлениях. Фокус на формировании доходов из не сырьевого сектора позволит конкурировать с сырьевыми регионами в будущем. Зависимость от единственного вида экономической деятельности делает позицию страны уязвимой к возможным геополитическим сдвигам.

литическим потрясениям и скачкам мировых цен на сырую нефть. Строительство объектов обрабатывающей промышленности придаст дополнительную стоимость товарам, сделанным в Казахстане. А выгодное расположение на пересечении многих транзитных маршрутов создаёт предпосылки для активного развития отрасли транспортировки грузов и их складирования в специализированных логистических хабах. Ассоциация отраслевой принадлежности с уровнем заработной платы свидетельствует о значимости структурных факторов рынка труда.

По величине отраслевой премии финансовая и страховая деятельность лишь немного уступает горнодобывающей промышленности, что подчёркивает роль финансового сектора как одного из наиболее доходных сегментов экономики услуг. Концентрация высокооплачиваемых руководителей и специалистов в данной сфере может быть связана с развитием инвестиционной активности, перераспределением потоков капитала и расширением международного сотрудничества. О значимости сырьевого и финансового секторов также можно судить по структуре представительского списка индекса KASE, где существенную долю занимают акции сырьевых компаний и банковского сектора. В этом смысле фондовый индекс может служить не только ориентиром для внешних инвесторов, но и косвенным индикатором наиболее привлекательных секторов занятости внутри страны.

Отдельного внимания заслуживает гендерный аспект дифференциации заработной платы. Сохранение разрыва на уровне 12% после учёта региона и отрасли может указывать на возможное влияние вертикальной сегрегации, включая так называемый «стеклянный потолок» (Nyusupova et al., 2024), а также на различия в найме, должностной структуре и карьерном продвижении. При этом причинно-следственные связи в вопросе гендерного неравенства в оплате труда требуют более детального анализа, в том числе с использованием декомпозиции Оаксаки — Блайндера.

Настоящее исследование имеет ряд ограничений, снижающих возможность каузальной интерпретации результатов. Во-первых, использование агрегированных ячеек «регион-отрасль-пол» вместо индивидуальных данных ограничивает выводы вариацией средних

зарплат между группами и сопряжено с риском экологического заблуждения. Во-вторых, отсутствие контролей человеческого капитала (образования, опыта) и невозможность учёта самоотбора работников означают, что региональные и отраслевые коэффициенты носят описательный характер, так как могут абсорбировать ненаблюдаемые характеристики и различия в составе рабочей силы. Наконец, одномоментный срез за 2025 г. фиксирует актуальную структуру дифференциации заработной платы, но не позволяет проследить её динамику во времени. Преодоление этих ограничений путем перехода к панельным микроданным и использованию инструментальных переменных составляет перспективное направление дальнейших исследований.

ЗАКЛЮЧЕНИЕ

Рынок труда Казахстана в части оплаты труда характеризуется выраженной неоднородностью. Регрессионный анализ агрегированных данных о среднемесечной номинальной заработной плате в разрезе 19 видов экономической деятельности и 20 регионов, охватывающих более 3,5 млн работников, позволил не отвергнуть три выдвинутые гипотезы.

Выбранные факторы объясняют 75% вариации средних заработных плат между группами, сформированными по региону, отрасли и полу, что подтверждает их значимую роль в формировании различий в оплате труда.

По уровню заработной платы выделяется группа высокодоходных регионов, включающая города Алматы и Астану, а также Атыраускую, Мангистаускую области и область Улытау. Остальные 15 регионов формируют группу регионов с более низким уровнем заработной платы. Это свидетельствует о пространственной концентрации заработных плат и региональной сегментации рынка труда.

В отраслевом разрезе выделяются три группы видов экономической деятельности: отрасли с положительной премией относительно образования, составляющей от 25% до 111%; отрасли с отрицательным дисконтом от 11% до 18%; а также виды деятельности, по которым статистически значимых отличий от образования не выявлено. В сравнении с региональным фактором отраслевая принадлежность вносит более

значительный вклад в объяснение вариации средних заработных плат между группами, что указывает на наличие выраженной межотраслевой сегментации рынка труда.

В качестве практических рекомендаций можно предложить разработку дорожной карты по снижению отраслевой сегрегации с расширением участия женщин в высокодоходных отраслях; пересмотр подходов к оплате труда в социально значимых отраслях и секторах с отрицательным дисконтом для ограничения оттока квалифицированных специалистов; а также децентрализацию экономической активности за счёт создания крупных производственных объектов в регионах за пределами пяти лидирующих территорий, в том числе с привлечением инвестиций.

Результаты исследования могут быть использованы органами государственного управления при корректировке программ содействия занятости, переобучения и регионального развития. Кроме того, они могут быть полезны HR-службам крупных холдинговых компаний при пересмотре систем компенсации и вознаграждения работников в различных регионах и структурных подразделениях.

AUTHOR CONTRIBUTIONS

Conceptualization and theory: AK; research design: AK; data collection: AK; analysis and interpretation: AK; writing draft preparation: AK; supervision: AK; correction of article: AK; proofread and final approval of article: AK. All authors have read and agreed to the published version of the manuscript.

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Socio-Economic Inequality and Differences in Life Expectancy

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ABSTRACT

In the context of increasing global risks, pandemics, urbanization and socio-economic polarization, the problem of mortality inequality is becoming one of the key problems of modern distributive and social science. The purpose of this study is to analyze the long-term evolution of life expectancy inequality and assess the impact of modern socio-economic imbalances and global risks on changing trends towards equalization of mortality. The article uses a mixed approach combining historical and comparative interpretation, life table-based distribution analysis, and qualitative institutional analysis. The study uses data from WHO, the OECD, and the results of international research in the 19th, 20th, and early 21st centuries. The results of the study showed that during the 20th century, the coefficient of life expectancy inequality in developed countries decreased significantly: in the USA – from 0.476 in 1852 to 0.099 in 2002, in England and Wales – from 0.443 to 0.094, in France – from 0.446 to 0.083. At the same time, in the 21st century, there is a slowdown in the processes of equalization of life expectancy and an increase in socio-economic stratification of survival rates. During the COVID-19 pandemic, global life expectancy decreased by 1.8 years, while excess mortality reached about 14.9 million people. The study showed that mortality inequality is formed through the mechanisms of unequal exposure to risks, vulnerability, institutional protection and access to medical technologies. Furthermore, the study shows that the distribution of medical resources and access to them directly influence differences in survival outcomes between countries and social groups.

KEYWORDS: Social Stratification, Social Strategy, Inequality, Socioeconomic Inequality, Risk Society, Global Risk, Life Expectancy, Healthcare Allocation

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Социально-экономическое неравенство и различия в продолжительности жизни

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АННОТАЦИЯ

В условиях усиления глобальных рисков, пандемий, урбанизации и социально-экономической поляризации проблема неравенства смертности становится одной из ключевых проблем современной распределительной и социальной науки. Целью данного исследования является анализ долгосрочной эволюции неравенства в продолжительности жизни и оценка влияния современных социально-экономических диспропорций и глобальных рисков на изменение тенденций к выравниванию смертности. В статье используется смешанный подход, сочетающий историко-сравнительную интерпретацию, анализ распределения на основе таблицы жизни и качественный институциональный анализ. В исследовании использованы данные ВОЗ, ОЭСР и результаты международных исследований в XIX, XX и начале XXI века. Результаты исследования показали, что в течение XX века коэффициент неравенства продолжительности жизни в развитых странах существенно снизился: в США — с 0.476 в 1852 г. до 0.099 в 2002 г., в Англии и Уэльсе — с 0.443 до 0,094, во Франции — с 0.446 до 0.083. Вместе с тем в XXI веке наблюдаются замедление процессов выравнивания продолжительности жизни и усиление социально-экономической стратификации показателей выживаемости. В период пандемии COVID-19 глобальная ожидаемая продолжительность жизни сократилась на 1,8 года, тогда как объем избыточной смертности достиг около 14,9 млн человек. Исследование показало, что неравенство продолжительности жизни формируется под воздействием механизмов неравномерного распределения рисков, различий в уровне уязвимости, институциональной защиты и доступа к современным медицинским технологиям. Сделан вывод о том, что смертность должна рассматриваться не только как демографический или медицинский показатель, но и как итог распределительных процессов, связанных с институциональной организацией защиты, доступом к ресурсам и управлением глобальными рисками. Кроме того, исследование показывает, что распределение медицинских ресурсов и доступ к ним напрямую влияют на различия в показателях выживаемости между странами и социальными группами.

КЛЮЧЕВЫЕ СЛОВА: социальная стратификация, социальная стратегия, неравенство, социально-экономическое неравенство, общественный риск, глобальный риск, продолжительность жизни, распределение ресурсов здравоохранения

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INTRODUCTION

In classical social and economic analysis, scholarly attention has been directed primarily toward inequalities in income, capital, healthcare, education, and social opportunity. Yet beneath these familiar domains lies a more fundamental dimension of inequality: unequal survival itself. Every society shapes not only access to material and social resources, but also the chances of living longer, healthier, and safer lives. From this perspective, mortality inequality is not merely a public health outcome; it reflects the translation of social asymmetries into unequal years of life and unequal exposure to premature death (Banks et al. 2021). As Peltzman's landmark formulation suggests, lifespan inequality represents a crucial but often underexamined dimension of welfare that has historically evolved alongside modernization and transformations in public health systems.

Over the long twentieth century, many industrial and postindustrial societies experienced a substantial reduction in mortality inequality. Similar long-term dynamics of mortality inequality evolution across OECD countries are discussed by Banks et al. (2021). Improvements in sanitation, vaccination, nutrition, maternal and child health, and later the expansion of social insurance and medical care contributed not only to rising life expectancy but also to a narrowing of lifespan disparities. Peltzman demonstrates that mortality inequality declined markedly during the modern era, particularly in high-income countries, as early-life mortality decreased and the age distribution of deaths became less dispersed. This historical trajectory suggests that longer and healthier lives gradually became more broadly accessible through advances in medical knowledge, institutional development, and public health protection (Sasson, 2025; Muszyńska-Spielauer et al., 2025).

However, the equalization of survival was never linear, natural, or complete. It was historically contingent, politically mediated, and unequally secured across class, race, gender, region, and nation. More importantly, the conditions of late modernity have altered the very architecture through which inequality becomes embodied. Beck's concept of the risk society remains especially powerful here because it shifts attention from the distribution of goods to the distribution of hazards generated

by modern systems themselves. In risk society, technological progress and economic growth do not simply create prosperity; they also produce new forms of vulnerability, including ecological disruption, pandemic exposure, toxic environments, and socially stratified institutional failures. Beck's central insight was that contemporary societies are increasingly organized around conflicts over the production, management, and risks.

This paper argues that mortality inequality must therefore be reconceptualized as a distributional outcome of global risk. As Figure 1 illustrates, unequal death emerges through a cumulative chain of mechanisms. Macro-level shocks such as climate change, urbanization, and pandemics intersect with preexisting socioeconomic stratification and are metabolized into mortality through four linked channels: unequal exposure, unequal vulnerability, unequal protection, and unequal access to advanced technologies. The poor and socially marginalized are more likely to inhabit polluted environments, face occupational danger, carry a heavier burden of chronic disease, experience weaker institutional protection, and encounter delayed or inferior access to life-saving innovations. Mortality inequality is thus not an accidental by-product of crisis, but a patterned consequence of how risks and protections are distributed across populations. This approach extends the scope of distribution science beyond markets in goods toward the political economy of survival itself. In this context, social strategy becomes an important instrument for reducing inequalities in survival and health protection.

The COVID-19 pandemic made this mechanism globally visible. The pandemic exposed and intensified preexisting asymmetries in labor precarity, housing density, comorbidity burdens, healthcare access, and vaccine availability (Wang et al., 2023). Rather than functioning as a great equalizer, the pandemic exposed and intensified preexisting asymmetries in labor precarity, housing density, comorbidity burdens, healthcare access, and vaccine availability. The World Health Organization (hereinafter – WHO) estimated approximately 14.9 million excess deaths worldwide in 2020 and 2021, underscoring that the pandemic's mortality burden far exceeded officially reported COVID-19 deaths and was mediated through both direct infection and indirect system disruption. At the same time, Oxfam's Inequality Kills report argued that

inequality contributed to at least one death every four seconds, framing the pandemic not simply as a biomedical emergency but as a distributional crisis in which wealth concentration, policy asymmetry, and institutional neglect translated into avoidable deaths. These findings sharpen the central question of this study: whether the long historical decline in mortality inequality has entered a period of reversal since the early twenty-first century, especially after 2019.

Accordingly, the aim of this study is to analyze the long-term evolution of mortality inequality and to evaluate the impact of contemporary socioeconomic disparities and global risks on the reversal of mortality equalization trends. The study approaches mortality inequality through the lenses of socioeconomic inequality, social stratification, and risk governance, emphasizing how changes in lifespan dispersion reflect not only health outcomes but also broader institutional and structural conditions that shape protection, vulnerability, and life chances. Empirically, the analysis draws on the mortality Gini coefficient to interpret both historical and contemporary mortality patterns. Ultimately, the paper argues that one of the central socioeconomic challenges of the twenty-first century concerns unequal survival conditions and the widening disparities in opportunities to live longer, healthier, and safer lives.

LITERATURE REVIEW

The nineteenth century represents a foundational distributive frontier in the history of human survival, characterized by a mortality regime defined not merely by high death rates, but by profound levels of mortality inequality. Within the framework of social and economic science, survival during this era can be interpreted as a scarce social resource allocated through institutions that were fundamentally stratified and only weakly universalistic. Unlike the modern era, in which death is increasingly concentrated in older age cohorts, the nineteenth-century mortality landscape was characterized by a high dispersion of ages at death. This dispersion was driven by the prevalence of infant and early-childhood mortality, an uneven burden of infectious diseases, and the concentration of environmental and occupational hazards that disproportionately affected the working-class populations compared to the elite.

Empirical evidence for this high-inequality regime is found in cohort-based mortality Gini values, which reflect the period's unequal mortality structure. In the mid-nineteenth century, countries such as the United States, England and Wales, and France exhibited Gini coefficients for mortality exceeding 0.44. These figures indicate an exceptionally high degree of lifespan dispersion, consistent with a regime in which a significant portion of the population died far below the mean age at death. The historical equalization narrative begins with interpreting the life-table Gini as more than an epidemiological indicator; rather, it represents a mean-standardized measure of the absolute difference in ages at death across individuals. This makes it possible to connect demographic outcomes to broader patterns of social and economic inequality, framing mortality as a consequence of institutional and socioeconomic conditions. Socio-economic inequality and differences in life expectancy have become increasingly interconnected across both national and global contexts (Chetty et al., 2016; Banks et al., 2021).

From a socio-political perspective, this period may be viewed as the prehistory of modern risk governance. While lethal risks were widespread, they were not yet systematically managed through large-scale state intervention. Instead, exposure to hazards remained deeply embedded within the industrial and urban political economy. Crowding, sanitation deficits, and workplace exposures ensured that mortality was shaped not only by biological factors but also by class-based living conditions and unequal infrastructures. These conditions influenced age-at-death patterns, as reflected in the high Gini values for mortality at the time. The subsequent century witnessed a sharp decline in these indicators, illustrating that historical mortality equalization was characterized not only by rising life expectancy but also by a growing concentration of deaths at older ages.

Methodologically, understanding this transition requires a clear distinction between cohort life-table Gini values, which track the lifetime outcomes of specific birth cohorts, and period life tables, which offer a synthetic snapshot of mortality rates at a single point in time. While nineteenth-century analyses rely heavily on reconstructed cohort data for a limited set of nations, these anchors provide the necessary contrast for modern period-

based metrics. Although the lack of linked socioeconomic microdata for the 1800s necessitates inferring stratification mechanisms from macro-distributional patterns, the correlation between industrial inequality and mortality dispersion remains a robust feature of the historical record.

Ultimately, the transition from high dispersion to age-at-death compression marks the emergence of a modern survival regime where the state increasingly manages health risks as universal concerns, gradually eroding the stark distributive frontiers of the nineteenth century (see Table 1).

Table 1. Transition of the mortality inequality regime

Feature	19th Century (High Dispersion)	Post-Equalization (Compression)
Mortality Gini	High (> 0.44 for US, UK, FR)	Significantly Low (Modern standards)
Age-at-death distribution	High dispersion (infant/child deaths)	Concentration at older ages
Social resource	Survival as a scarce/stratified resource	Survival as a universal right
Primary drivers	Infectious diseases, industrial hazards	Chronic diseases, managed aging
Risk governance	Embedded in class infrastructure	Reflexive, scale-managed Risk Society

Note: compiled by authors

The twentieth-century trajectory of mortality equalization represents a profound shift in the distributive logic of human survival, theorized as the systematic expansion of risk pooling and universalizing infrastructures. During this period, the institutionalization of sanitation, mass vaccination programs, maternal and child health initiatives, and the broader implementation of welfare-state social protections functioned as primary mechanisms for shifting the burden of death away from infancy and early adulthood. In the terminology of distribution science, this equalization is characterized by the left tail of the age-at-death distribution shrinking. As fewer individuals perish at young ages, the overall dispersion of survival time decreases, pulling the mortality Lorenz curve significantly closer to the line of perfect equality. This historical compression of mortality, or rectangularization of the survival curve, fundamentally reduced length-of-life inequality across populations (Shkolnikov et al., 2003).

This shift constitutes an important conceptual bridge between socioeconomic inequality research and mortality studies, as it enables the analysis of mortality inequality using evaluative tools such as the Lorenz curve and the Gini coefficient, which are traditionally applied to income and wealth inequality. Peltzman (2009) situates this equalization as a massive welfare transformation; whereas unequal longevity once stood as a primary dimension of social stratification in the nineteenth century, it fell drastically across high-income countries throughout the 1900s. The formalization of these metrics further enables decomposition, allowing analysts to attribute changes in the Gini coefficient to specific age- and cause-related

shifts in mortality. Methodologically, the dramatic reduction in mortality inequality was driven disproportionately by declines in early age-specific death rates. Because infant and child deaths occur far below the mean age at death, their reduction removes the most extreme disparities in lifespan, thereby exerting a stronger equalizing effect on the Gini index than mortality improvements at older ages (Shkolnikov et al., 2003).

From a sociological and mixed-methods perspective, this transition was not an inevitable byproduct of progress but rather the result of deliberate governance choices and the institutionalization of health services. These developments align with a biopolitical logic wherein populations are increasingly viewed as governable distributions of risk and survival (Mbembe, 2003; Foucault, 2003; 2008). The life-course became medicalized and surveilled through public health capacity and social insurance expansion, transforming the social meaning of death from a localized tragedy into a manageable statistical outcome. Empirical benchmarks reflect this transformation: cohort mortality Gini values in countries like the United States, England, and France plummeted from roughly 0.3 in the early 1900s to the low 0.1 range by mid-century (Peltzman, 2009).

However, this narrative of equalization must be approached with caution regarding its global applicability and data limitations. While high-income countries experienced rapid dispersion contraction, the historical narrative may overgeneralize patterns that are not yet universal. Furthermore, gains in average life expectancy do not automatically guarantee equalization; if improvements are

concentrated exclusively among the elderly, the reduction in dispersion may be weaker than expected. Consequently, equalization must be empirically tested rather than assumed, particularly in contexts where incomplete vital registration necessitates statistical modeling. Despite these caveats, the twentieth century stands as the era in which survival was transformed from a highly stratified privilege into a more equitably distributed social standard, mediated by the emergence of the modern administrative state.

The late twentieth century is best characterized as a period of continued improvement in average longevity coupled with a significant deceleration and, in some contexts, a cessation of declines in lifespan inequality. While the mid-twentieth century witnessed a rapid contraction of mortality dispersion, empirical evidence suggests that this equalizing trend has lost its momentum in recent decades. According to the research of Shkolnikov et al., the strong correlation between rising life expectancy and falling inequality weakened substantially after 1970. In many low-mortality nations, mortality inequality has reached a plateau even as mean ages at death continue to climb (Banks et al., 2021). This pattern is central to understanding that mortality equalization is a historically contingent process rather than an inevitable outcome of modernization, and it remains potentially reversible under shifting social and economic conditions.

The distributional logic explaining why dispersion might stop improving despite gains in the mean lies in the shifting age-structure of mortality. As infant and early-childhood deaths become increasingly rare, further longevity gains are driven primarily by

mortality reductions at older ages. When survival improvements are concentrated in the upper tail of the age distribution (the elderly) while premature deaths among disadvantaged groups remain stagnant, the result is a distributional divergence. In this scenario, the floor of premature death remains fixed for vulnerable populations, while the ceiling of survivorship expands for the advantaged, effectively maintaining or even increasing the dispersion of lifetimes. This transition shifts the locus of inequality from early-life survival to midlife and older-age gradients, which are increasingly shaped by chronic diseases, occupational exposures, and stratified access to preventive care (Prior, 2021).

The long-run empirical trend of this equalization, and its subsequent plateau, is clearly illustrated by the cohort mortality Gini benchmarks. The data demonstrate a dramatic long-run compression of mortality across high-income countries, alongside a notable catch-up trajectory among emerging economies such as Brazil.

The benchmarks in Table 1 confirm that while high-income countries reached an exceptionally low level of dispersion ($Gini < 0.10$) by the early twenty-first century, the rate of improvement has visibly flattened compared to the massive gains made between the early and mid-twentieth centuries. For instance, the high-income mean Gini dropped by 0.22 points between 1902 and 1952, but only by 0.04 points in the subsequent half-century. Furthermore, the divergence between the high-income mean (0.092) and Brazil (0.156) in the 2002 cohort illustrates that while global convergence is occurring, significant distributive frontiers remain (see Table 2).

Table 2. Cohort mortality Gini benchmarks across eras

Country / Group	Mid-19th Century Cohort	Early-20th Century Cohort	Mid-20th Century Cohort	Early-21st Century Cohort
United States	0.476 (1852)	0.335 (1902)	0.133 (1952)	0.099(2002)
England and Wales	0.443 (1852)	0.353 (1902)	0.145 (1952)	0.094(2002)
France	0.446 (1852)	0.366 (1902)	0.118 (1952)	0.083(2002)
Brazil	0.566 (1892)	0.548 (1902)	0.410 (1952)	0.156(2002)
High-income Mean	0.455 (1852)	0.352 (1902)	0.132 (1952)	0.092(2002)

Note: compiled by the authors based on Peltzman (2009)

This plateau phase necessitates the adoption of mortality Gini and related indices as essential distributional complements to life expectancy. In an era of risk society, where systemic hazards are managed at scale, but vulnerability remains stratified, aggregate gains in longevity can mask

deep-seated internal dispersion dynamics (Strozza et al., 2024). Future analysis must move beyond these historical cohort anchors to evaluate annual-period Gini fluctuations, thereby providing a baseline to distinguish between long-term structural plateaus and the acute shocks observed in the post-2020 era.

RESEARCH METHODS

The phenomenon of contemporary reversal in mortality trends is best understood not as an abrupt, singular event but as a complex, two-stage process that challenges the mid-twentieth-century narrative of linear equalization. The first stage consists of a pre-pandemic period characterized by a notable deceleration in longevity gains and an intensifying stratification of survival across socioeconomic strata. The second stage involves the acute pandemic shock, which functioned as a catalyst, amplifying pre-existing gradients and exposing the structural fragilities of modern health and social protection systems. This pre-pandemic phase provides crucial evidence that the distributional mechanism of survival has shifted;

even when aggregate life expectancy continues to rise, the distribution of survival time can become more unequal if the benefits of medical and social progress accrue disproportionately to high-income or highly educated populations.

This study employs a mixed-methods approach that combines historical-comparative analysis, a mortality Gini assessment, and an institutional analysis of socioeconomic and health inequalities. The study utilizes cohort and period life-table indicators, WHO and OECD datasets, and comparative historical evidence to evaluate long-term changes in mortality inequality. Figure 1 presents the study's analytical framework, illustrating the long-term evolution of mortality inequality and the mechanisms linking socioeconomic disparities, global risks, and unequal mortality outcomes.

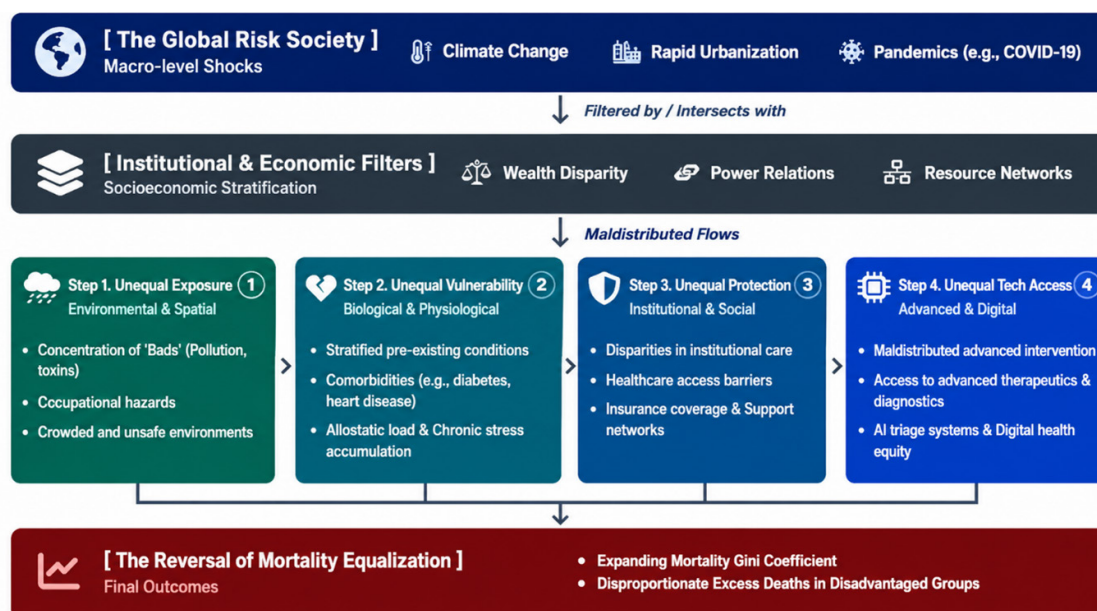


Figure 1. Conceptual framework on mortality inequality

Empirical data from the United States illustrate the magnitude of this socioeconomic divergence. Research by Chetty et al. (2016) reveals a staggering life expectancy gap between the richest and poorest 1% of the population, amounting to 14.6 years for men and 10.1 years for women. More importantly, the rate of progress has become fundamentally decoupled: between 2001 and 2014, life expectancy for the top 5% of the income distribution rose significantly by 2.34 years for men and 2.91 years for women, while the bottom 5% saw virtually no improvement, with gains as marginal as 0.32 years for men and a

negligible 0.04 years for women. This divergence represents a paradigmatic shift in the ecology of survival, where the floor of premature death stagnates for the disadvantaged while the ceiling of survivorship continues to expand for the elite.

This stratification is not a uniquely American phenomenon; similar educational gradients are observed across high-income nations. OECD estimates suggest that the gap in life expectancy at age 25 between high- and low-education groups remains substantial, averaging approximately 8 years for men and 5 years for women. Even at age

65, where biological factors might be expected to attenuate social differences, gaps of 3.5 years for men and 2.5 years for women persist. These figures highlight that the adult segment of the age-at-death distribution remains heavily stratified even in societies that have successfully compressed early-life mortality. At the macro level, the OECD has documented a general slowing of life expectancy gains across its member countries, noting that 2015 was a pivotal year when life expectancy actually fell in 19 countries, signaling a potential exhaustion of the previous century's equalizing momentum.

From a distribution-science perspective, these stagnation episodes are critical because inequality indices—such as the Gini coefficient are sensitive to age- and group-specific mortality trends. When midlife mortality or deaths at disadvantaged ages fail to improve, the overall dispersion of lifetimes increases, even if the mean age of death stays constant or rises slightly. Methodologically, this sub-chapter argues that stratified gains can drive a distributional inequality in survival that aggregate metrics fail to capture. By using period life-table Gini computations and decomposing Δ Gini into contributions from changes in mortality above and below key age thresholds (such as age 60), researchers can isolate the resurgence of premature mortality. Ultimately, while life expectancy provides a measure of average progress, the analysis of dispersion reveals a more sobering reality: a survival regime that is increasingly polarized by the stratified allocation of risk and protection.

RESULTS

The COVID-19 pandemic introduced a rare and devastating natural experiment: a global mortality shock superimposed on pre-existing gradients of inequality. According to official WHO reporting, the total death toll directly or indirectly associated with the pandemic, measured as excess mortality, was approximately 14.9 million between January 2020 and December 2021. From the perspective of distribution science, excess mortality serves as a vital metric of systemic shock rather than a mere disease-specific count. It encompasses direct viral deaths, indirect fatalities resulting from health-system disruptions, and even deaths averted through reduced mobility and fewer accidents. This comprehensive measure underscores how the

pandemic's impact was metabolized through the unequal capacities of national health infrastructures and social protection systems.

In parallel with excess mortality, global life expectancy trends reflect the severity of the crisis, effectively wiping out nearly a decade of progress. Between 2019 and 2021, global life expectancy fell by 1.8 years to 71.4 years, returning to 2012 levels. However, this decline was profoundly uneven across the globe. While the Americas and South-East Asia experienced life expectancy losses of approximately 3.0 years, the Western Pacific region saw a negligible decline of less than 0.1 years. These regional disparities directly influence mortality inequality, indicating that the shock altered the global distribution of deaths in a way that widened the gap between high-resilience and high-vulnerability populations.

A critical nuance for the analysis of mortality inequality is the dispersion ambiguity inherent in mortality shocks. Lifespan inequality indices, such as the Gini coefficient, can move in either direction depending on the age-pattern of excess deaths. For instance, data from England and Wales indicate that substantial declines in life expectancy occurred alongside a slight *decrease* in lifespan inequality. This paradox arises when excess mortality is heavily concentrated among the elderly; by removing individuals from the upper tail of the age distribution, the statistical dispersion of lifetimes may actually contract. This highlights that a reversal of the historical equalization trend may manifest as a collapse in mean life expectancy or a divergence between regions and socioeconomic strata, even if the internal dispersion indicator remains stable or declines in certain settings.

Methodologically, the analysis of the COVID-19 era requires computing period life-table Gini coefficients and decomposing changes into specific age contributions. This approach allows researchers to distinguish between the compression at old ages caused by elderly mortality and the resurgence of premature mortality among younger, disadvantaged groups. Ultimately, while life expectancy provides a measure of average loss, a distributional science lens reveals that the reversal of progress is fundamentally driven by the unequal metabolism of global risk across socioeconomic and geographic boundaries (Strozza et al., 2024).

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Table 3. COVID-era excess mortality and life expectancy change

Grouping	Excess Deaths (2020–2021)	Share of Global Excess Deaths	Life Expectancy Change (2019→2021)
Global	14.9 million (13.3–16.6)	100%	–1.8 years (to 71.4)
Lower-middle-income countries	≈7.9 million	53%	—
Upper-middle-income countries	≈4.2 million	28%	—
High-income countries	≈2.2 million	15%	—
Low-income countries	≈0.6 million	4%	—
WHO Region: Americas	—	—	≈–3.0 years
WHO Region: South-East Asia	—	—	≈–3.0 years
WHO Region: Western Pacific	—	—	<–0.1 years

Note: compiled by authors based on WHO (2022) and WHO (2024).

To establish a clearer link with distribution science, the political economy of unequal death must be specified in terms of distribution actors and channel mechanisms. Mortality inequality does not arise directly from macro-level shocks alone. It emerges through a layered chain in which different actors control distinct stages of sourcing, allocation, delivery, and access. In this framework, governments, hospitals, pharmaceutical firms, international organizations, wholesalers, logistics providers, pharmacies, and community health networks are not peripheral institutional contexts. They are the principal actors through which health-resource inequality is organized and translated into mortality outcomes.

At the upstream end of the chain stand pharmaceutical firms, manufacturers, and patent-holding innovators. These actors shape the initial supply of vaccines, therapeutics, and diagnostics through production capacity, licensing strategies, pricing, technology transfer, and contractual priority. Their decisions influence not only how much is produced, but also who receives timely access. International organizations, including the World Health Organization, multilateral procurement arrangements, and donor agencies, intervene at the transnational allocation stage. They attempt to reduce market concentration, coordinate procurement, standardize emergency guidance, and widen access across low-capacity settings. Yet their effectiveness depends on financing, political cooperation, and the willingness of states and firms to treat essential health resources as globally distributable goods rather than as instruments of national advantage (de Bengy Puyvallée & Storeng, 2022).

National governments occupy the pivotal middle position in the distribution chain. They decide procurement strategies, emergency stockpiling, import approvals, reimbursement rules, subsidy

design, territorial allocation, and priority-group sequencing. They determine whether limited resources are distributed according to purchasing power, administrative convenience, or social vulnerability. Government choices, therefore, shape the entire domestic architecture of access. Hospitals, public health agencies, and clinical networks translate these decisions into operational allocation. They govern intensive care admission, referral systems, emergency triage, continuity of non-COVID treatment, and the distribution of institutional care across metropolitan and peripheral regions. Finally, pharmacies, local clinics, mobile outreach systems, and community-level delivery networks determine whether resources reach end users, especially older adults, low-income households, migrants, rural populations, and medically underserved groups.

The channel pathway linking these actors to mortality inequality can be clearly stated. Macro-level shocks increase the demand for health protection. Upstream supply actors determine the availability and timing of critical resources. National and international allocators determine volume, price, territorial distribution, and eligibility. Delivery institutions determine whether resources are converted into effective services. End-user access is then shaped by distance, insurance, digital literacy, waiting times, and local service capacity. When any part of this chain is socially stratified, institutional inequality emerges. When multiple points along the chain are stratified simultaneously, institutional inequality is metabolized into mortality inequality. In practical terms, delayed procurement can become delayed vaccination; delayed vaccination can become differential infection and hospitalization; weak referral networks can become treatment delay; treatment delay can become

disproportionate excess death.

This model also clarifies how institutional inequality and mortality inequality should be connected analytically. The relevant causal path is not linear in a simplistic sense, but cumulative. Institutional inequality first appears as unequal availability, affordability, territorial reach, or service continuity. These then become unequal protection. Unequal protection interacts with pre-existing vulnerability such as age, comorbidity, poor housing, and insecure work. Mortality inequality is thus expressed as differential survival across populations. It should be understood not merely as an aggregate demographic outcome but as the final manifestation of cumulative failures across a multi-actor system of health resource production, allocation, logistics, and delivery (Sung et al., 2021).

This formulation preserves the central theoretical contribution of the present study while rendering its causal mechanism more concrete and institutionally observable. More specifically, a macro-level shock generates a sudden rise in demand for health resources, including vaccines, medicines, diagnostics, and medical services. This surge in demand is mediated first by pharmaceutical production capacity and licensing arrangements, then by international procurement and allocation mechanisms, and subsequently by national decisions regarding stockpiling, priority setting, and territorial allocation. These upstream decisions are translated into outcomes through regional logistics, healthcare delivery systems, and local service networks, which in turn shape household-level access, uptake, and continuity of care. When these stages are unevenly organized across territories and social groups, the result is unequal protection, which ultimately contributes to unequal mortality outcomes (Yan et al., 2023).

This actor-centered model adds a concrete distributional layer to the manuscript's existing mechanism chain of unequal exposure, vulnerability, protection, and technological access. The contribution is significant because it shows that mortality inequality is not only socially produced in the abstract; it is channel-produced through the structure and performance of real distribution systems. In this form, the article can speak more directly to distribution science by showing that failures in supply chains, access regimes, and delivery systems are not secondary administrative issues. They are one of the principal pathways through which survival becomes unequally

distributed.

To conceptualize mortality as a distributional outcome, it is necessary to adopt a theoretical framework that can connect sociology, political economy, and public health within a single explanatory logic. In contemporary society, life and death can no longer be understood as the simple products of biological chance or individual frailty. They are increasingly shaped by institutional arrangements, market hierarchies, technological infrastructures, and the unequal social allocation of risk. Unequal death, therefore, is not an incidental by-product of crisis but the cumulative result of historically structured disparities in exposure, vulnerability, protection, and access to survival-enhancing resources. To explain this process, the present study integrates three major theoretical perspectives Ulrich Beck's risk society, Michel Foucault's biopolitics, and Achille Mbembe's necropolitics — and brings them together through a chain of distributional mechanisms that links macro-level shocks to differentiated mortality outcomes.

Beck's theory of the risk society provides the macro-sociological point of departure. Beck argued that the central conflict of late modernity is no longer organized solely around the distribution of economic goods, such as income, property, and opportunity, but increasingly around the distribution of bads, including environmental hazards, systemic insecurity, toxic exposure, and pandemic disease (Beck, 1992). Scientific and technological development, far from eliminating insecurity, has generated new forms of manufactured risk whose scale exceeds national borders and whose consequences are often unpredictable. Climate change, rapid urbanization, and global pandemics exemplify this transformation. Yet while such risks are global in origin, they are never experienced evenly. They are filtered through preexisting structures of socioeconomic stratification. Wealth, power, and institutional capacity determine who is protected from risk, who is displaced into zones of exposure, and who bears the cost of uncertainty. In this sense, the distribution of risk is inseparable from the distribution of inequality itself.

This point is particularly important because inequality is not merely the passive setting in which mortality occurs; it is an active force that organizes the social metabolism of death. Oxfam (2022) estimated that inequality contributes to at

least 21,300 avoidable deaths each day, a figure that sharply illustrates how distributive injustice can become biologically consequential. The expansion of urban populations intensifies this dynamic. According to the United Nations, nearly 68% of the world's population is projected to live in urban areas by 2050 (United Nations, 2018). Urbanization, however, does not create uniform risk. Marginalized populations are disproportionately concentrated in overcrowded neighborhoods, polluted industrial zones, precarious housing, and environmentally degraded areas. As a result, the global risk society does not simply generate common threats; it localizes and stratifies them.

If Beck helps explain the structural distribution of hazards, Foucault clarifies how institutions manage the distribution of survival. Foucault's concept of biopolitics identifies a historical transformation in the exercise of power, from sovereign authority centered on the right to take life toward modern forms of governance concerned with fostering life, managing populations, and regulating biological processes (Foucault, 2003; Foucault, 2008). Mortality, from this perspective, is not merely observed and recorded by institutions; it is shaped by them. Public health systems, welfare arrangements, urban planning, risk communication,

and emergency triage protocols all function as mechanisms through which states and institutions decide how life is to be protected, optimized, and differentially sustained.

The COVID-19 pandemic made this biopolitical dimension especially visible. Decisions about who could work remotely and who had to remain in frontline labor, who had access to timely testing and treatment, who could isolate safely, and who received scarce hospital resources were not simply technical responses to the crisis. They were political decisions embedded in institutional allocation structures. The state's capacity to make life was distributed unevenly. Affluent populations were better able to convert income into distance, safety, and medical access, while disadvantaged communities were often exposed to greater risk and weaker institutional protection. In this way, biopolitics reveals that survival is not distributed according to vulnerability alone, but according to the social organization of care, infrastructure, and state capacity.

Taken together, these theoretical perspectives can be operationalized through a distributional mechanism chain of unequal death. Taken together, these theoretical perspectives can be operationalized through a chain of mechanisms linking global risks, unequal protection, and mortality inequality (Figure 2).

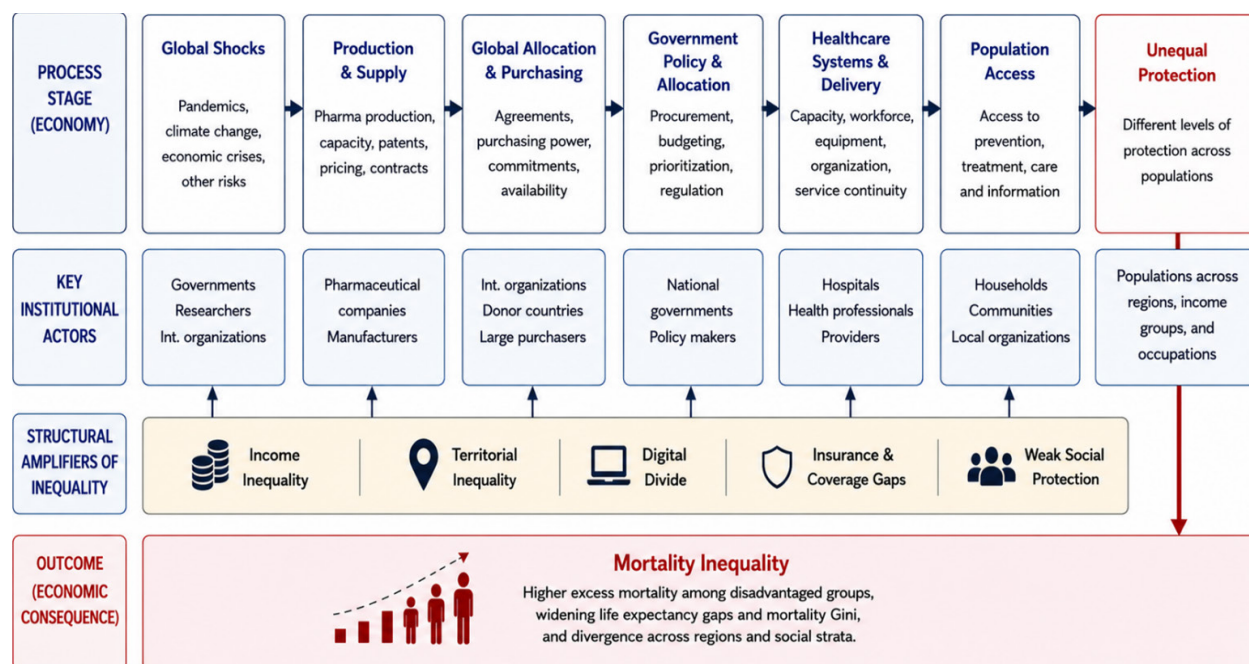


Figure 2. Mechanisms linking health-resource allocation and mortality inequality

This chain begins with macro-level shocks generated within the global risk society, including climate change, rapid urbanization, and pandemics. These shocks do not operate in a social vacuum. They are filtered through institutional and economic structures characterized by wealth disparities, power asymmetries, and unequal access to resource networks. The result is a sequence of cumulative disadvantages that progressively convert socioeconomic inequality into mortality inequality.

The first step in this chain is unequal exposure. In risk society, disadvantaged populations are more likely to be situated in environments characterized by pollution, occupational hazards, toxic infrastructure, and overcrowded living conditions (Beck, 1992). They are more likely to work in frontline or physically exposed occupations and less able to insulate themselves from hazards through mobility, property, or market purchasing power. The second step is unequal vulnerability. Exposure is not only spatial; it is embodied over time. Chronic deprivation, insecure housing, nutritional deficits, and cumulative stress contribute to higher levels of comorbidity and allostatic load, leaving socially disadvantaged groups biologically more susceptible to crisis shocks (Bambra, 2022; Bambra, 2024; Prior, 2021). What enters the body as chronic inequality reappears as differential frailty in moments of acute emergency.

The third step is unequal protection. Once hazards materialize, access to institutional care, social safety nets, emergency treatment, and reliable healthcare infrastructure becomes decisive. Yet these protective capacities are not distributed according to need alone. Insurance status, territorial inequality, welfare provision, and institutional responsiveness all shape who receives timely and effective protection and who remains exposed to preventable mortality (WHO, 2022). The fourth step is unequal access to technology. Advanced therapeutics, mRNA vaccines, precision diagnostics, digital health systems, and AI-assisted clinical tools all hold out the promise of extending survival. But these innovations do not diffuse equally. Their availability is often governed by intellectual property, profit-centered logistics, weak international solidarity, and digital exclusion. As a result, technologies that could reduce mortality gaps may instead widen them.

The cumulative effect of these mechanisms

appears in final mortality outcomes. Unequal death becomes visible not only in excess deaths and differential loss of life expectancy, but also in the widening dispersion of ages at death, which can be measured using indicators such as the mortality Gini coefficient (Peltzman, 2009). From this perspective, the recent reversal of mortality equalization is not simply a public health setback. It is a crisis of distributive justice. The concentration of excess mortality among already burdened populations demonstrates that survival itself has become one of the most unequally allocated resources of the contemporary world.

The political economy of unequal death, therefore, demands a fundamental shift in social and economic science. Death should no longer be treated as a purely biological endpoint detached from institutions, infrastructures, and systems of allocation. It must be understood as the final output of a wider distributive order in which risks and protections are unevenly organized. Addressing mortality inequality requires more than medical progress in the narrow sense. It requires equitable governance, universal social protection, and the ethical distribution of life-saving technologies. These priorities should become part of a long-term social strategy aimed at reducing inequalities in survival and access to protection. In this sense, the struggle against unequal death is not only a matter of public health. It is one of the central questions of distributive justice in the twenty-first century.

CONCLUSIONS

This study began with a simple but far-reaching proposition: survival is not merely a biological fact but a socially distributed resource. Once mortality is approached in that way, the history of life expectancy ceases to look like a neutral record of medical progress and instead becomes legible as a history of distributive struggle. The long movement from the nineteenth century to the present shows that the unequal allocation of death has never been fixed, natural, or immune to institutional change. It has been shaped by sanitation, vaccination, welfare provision, public health capacity, labor conditions, urban form, and the political terms on which protection is granted or withheld. The central contribution of this article has been to trace that history not only as a rise in average longevity, but as a changing distribution of

survival itself. In doing so, the paper has argued that the twentieth century should be understood as an era of mortality equalization, while the early twenty-first century increasingly appears as a period in which that equalizing trajectory has slowed, plateaued, and, under the pressure of systemic shocks, begun to reverse.

The historical record matters because it demonstrates that mortality inequality can be reduced. The dramatic fall in mortality Gini coefficients across the twentieth century, especially in high-income societies, was not a statistical accident. It reflected the broad diffusion of collective protections that shifted death away from infancy, childhood, and preventable early adulthood, compressing it toward later life. In that sense, the equalization of mortality was one of the most profound achievements of modern social organization. It signified more than longer lives. It signified that survival itself had become less unevenly developed. Yet the paper has also shown that this equalization was never unconditional. It was historically contingent, uneven across regions and classes, and deeply dependent on institutions capable of socializing risk and extending protection beyond privileged groups. Once those institutions weaken, fragment, or become selectively distributive, the equalizing trajectory becomes vulnerable to interruption. The slowing of gains in life expectancy, the persistence of large educational and income gradients, and the increasing concentration of survival benefits among the socially advantaged all point to a structural exhaustion of the earlier model of convergence.

It is precisely here that the concept of the risk society becomes indispensable. The contemporary world is marked not simply by persistent inequality, but by a new configuration in which manufactured risks are global while the capacities to absorb, avoid, or survive them remain sharply stratified. Climate change, rapid urbanization, pandemics, and technologically mediated crises do not replace older inequalities; they pass through them and intensify them. The paper has therefore argued that mortality inequality in the present era is best understood as the outcome of a chain of distributional mechanisms. Macro-level shocks do not translate automatically into deaths. They are filtered through wealth disparities, power asymmetries, institutional capacities, and resource

networks, which in turn generate unequal exposure, vulnerability, protection, and access to advanced technologies. By the time mortality appears in the form of excess deaths, declining life expectancy, or widening dispersion in ages at death, it is already the endpoint of a long social process. Death, in this framework, is not simply an event. It is a terminal distributional outcome.

The COVID-19 pandemic made this structure unusually visible. Rather than functioning as a universal human equalizer, the pandemic exposed the extent to which survival remained structured by labor precarity, housing conditions, chronic illness, institutional neglect, and geopolitical hierarchy. The striking unevenness of excess mortality across regions and income groups demonstrated that the burden of crisis was not borne symmetrically. At the same time, the pandemic underscored a crucial analytical point developed in this paper: the reversal of mortality equalization cannot be reduced to a single statistical indicator. In some contexts, extreme mortality shocks may compress certain dispersion measures if deaths are concentrated at older ages, even while welfare collapses and life expectancy falls. For that reason, this article has insisted that reversal must be understood in a broader sense: as the breakdown of long-term equalizing convergence, the reappearance of durable stratification in survival, and the concentration of mortality loss among populations already positioned at the margins of protection. What reverses is not only a trend line in a graph, but the political and institutional capacity to make survival more equally shareable across society.

The theoretical synthesis developed here helps explain why this reversal is not merely epidemiological. Beck clarifies the structural distribution of hazards, Foucault illuminates how institutions govern life through uneven protective capacities, and Mbembe reveals the darker threshold at which some populations are rendered more exposed, less protected, and ultimately more disposable. Together, these perspectives make clear that mortality inequality is not exhausted by the language of health disparity. It is also a question of valuation. Whose deaths are anticipated, normalized, and politically backgrounded? Whose vulnerability is recognized as a public problem, and whose is treated as an unfortunate but tolerable residue of crisis? Once framed this way, the

unequal distribution of vaccines, intensive care, emergency care, safe working conditions, and digital health technologies becomes inseparable from the larger political economy of life and death. The mixed-methods orientation proposed in this paper is important precisely because it allows these questions to be analyzed not only through demographic indicators, but also through the institutional and discursive logics that justify unequal protection.

The implications for distribution science are substantial. If the field continues to confine itself to the allocation of goods, services, and market opportunities, it risks leaving untouched the most consequential distributional problem of all: who gets to survive, for how long, and under what conditions. Mortality inequality forces a broader understanding of distribution, one that includes not only wealth and welfare but the infrastructures of protection that mediate life chances under conditions of systemic risk. This means that public health systems, social insurance, urban planning, environmental regulation, labor protection, and technology governance should not be treated as separate policy domains. They are all part of the distributive architecture of survival. The lesson of the twentieth century is that mortality equalization becomes possible when risk is collectivized and protection is widened. This requires the implementation of effective social strategies focused on equitable healthcare access and institutional resilience.

At this point, we can state the article's contribution more concretely in terms of health resource systems. Mortality inequality is shaped not only by who is socially exposed to danger, but also by how vaccines, medicines, diagnostics, and medical services are sourced, allocated, transported, and delivered across institutional and territorial channels. In this sense, unequal survival is mediated by supply chain performance, the inclusiveness of access regimes, and the effectiveness of delivery systems. Governments, pharmaceutical firms, hospitals, international organizations, and local care networks function as key actors whose decisions influence procurement, stockpiling, priority setting, regional allocation, and household-level uptake. Where these channels operate unevenly, institutional inequality is converted into unequal protection and, ultimately, into unequal mortality outcomes. The study, therefore, suggests that

mortality inequality should be analyzed not only as a problem of risk governance or health disparity, but also as a problem of healthcare allocation and institutional access systems through which life-saving resources are materially circulated.

For that reason, the normative conclusion of this paper is unavoidable. The reversal of mortality equalization is not simply a technical challenge for demographers or a temporary disturbance in global health indicators. It is a socioeconomic and institutional justice crisis. A world in which advanced medicine, public health knowledge, and digital technologies coexist with preventable excess death on such a scale is not suffering from a shortage of scientific capability alone. It is suffering from a failure to organize protection on equitable terms. The task ahead is therefore not just to restore average gains in life expectancy, but to rebuild the institutional and moral foundations of equal survival. That requires treating healthcare access, social protection, environmental security, and life-saving technology not as residual benefits to be distributed after markets have spoken, but as constitutive elements of a just social order. If mortality is the final register of distributional failure, then the struggle against unequal death must become one of the central intellectual and political projects of our time.

AUTHOR CONTRIBUTIONS

Conceptualization and theory: CC; research design: CC; data collection: CC; analysis and interpretation: CC; writing draft preparation: CC; supervision: CC; correction of article: CC; proofread and final approval of article: CC. All authors have read and agreed to the published version of the manuscript.

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Socio-Economic Aspects of Public Willingness to Participate in Pharmaceutical Insurance in Kazakhstan

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ABSTRACT

High levels of personal spending on medicines can increase household financial vulnerability and reduce access to medical care, especially in the context of regional and social inequalities in health care. The purpose of this study is to assess the relationship between willingness to pay for an insurance policy for medicines in Kazakhstan and socio-economic, medical and linguistic factors, as well as to determine the nature of differences between Kazakh-speaking and Russian-speaking respondents. The empirical basis of the study was made up of data from an online survey conducted in various regions of Kazakhstan. The final analytical sample included 2,695 respondents with their own source of income, including 2,044 Kazakh-speaking and 651 Russian-speaking respondents. The research uses methods of descriptive statistics, comparative analysis, t-tests, permutation tests and OLS regression. The results showed that the average willingness to pay for drug insurance among Kazakh-speaking respondents was about \$65.4, while among Russian-speaking respondents it was about \$46.4; the differences are statistically significant at the 5% level (t-test = 2.26; $p < 0.024$). Regression analysis showed that willingness to pay is related to current expenses for medicines, self-assessment of health status, region of residence, type of settlement and language of communication in the household. The results of the study emphasize the importance of a differentiated approach to the development of mechanisms for drug insurance and communication policy in order to increase the availability of medical care, reduce financial barriers to treatment and ensure the sustainable development of the healthcare economy in Kazakhstan.

KEYWORDS: Healthcare, Health Economics, Behavioral Economics, Population, Medicine, Health Insurance, Regional Inequality

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Қазақстанда халықтың дәрілік сақтандыруға дайындығының әлеуметтік-экономикалық аспектілері

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ТҮЙІН

Дәрілік заттарға жұмсалатын жоғары жеке шығындар үй шаруашылықтарының қаржылық осалдығын күшейтіп, медициналық көмекке қолжетімділікті төмендетуі мүмкін, әсіресе денсаулық сақтау саласындағы өңірлік және әлеуметтік теңсіздік жағдайында. Осы зерттеудің мақсаты – Қазақстандағы дәрілік сақтандыру полисі үшін төлеуге дайындықтың әлеуметтік-экономикалық, медициналық және лингвистикалық факторлармен байланысын бағалау, сондай-ақ қазақтілді және орыстілді респонденттер арасындағы айырмашылықтардың сипатын анықтау. Зерттеудің эмпирикалық базасын Қазақстанның әртүрлі өңірлерінде жүргізілген онлайн-сауалнама деректері құрады. Қорытынды аналитикалық іріктеме өз табыс көзі бар 2695 респондентті қамтыды, оның ішінде 2044 қазақтілді және 651 орыстілді респондент болды. Зерттеуде сипаттамалық статистика, салыстырмалы талдау, t-тесттер, permutation tests және OLS-регрессия әдістері қолданылды. Нәтижелер қазақтілді респонденттер арасында дәрілік сақтандыру үшін төлеуге дайындықтың орташа деңгейі шамамен 65,4 АҚШ долларын, ал орыстілді респонденттер арасында шамамен 46,4 АҚШ долларын құрағанын көрсетті; айырмашылықтар 5% деңгейінде статистикалық мәнді болып табылады (t-test = 2,26; p < 0,024). Регрессиялық талдау төлеуге дайындықтың дәрілік заттарға ағымдағы шығындармен, денсаулық жағдайын өзін-өзі бағалаумен, тұрғылықты өңірмен, елді мекен түрімен және үй шаруашылығындағы қарым-қатынас тілімен байланысты екенін көрсетті. Зерттеу нәтижелері медициналық көмектің қолжетімділігін арттыру, емделуге байланысты қаржылық кедергілерді төмендету және Қазақстандағы денсаулық сақтау экономикасының орнықты дамуын қамтамасыз ету мақсатында дәрілік сақтандыру тетіктері мен коммуникациялық саясатты сараланған тәсіл негізінде әзірлеудің маңыздылығын айқындайды.

ТҮЙІН СӨЗДЕР: денсаулық сақтау, денсаулық сақтау экономикасы, мінез-құлық экономикасы, халық, медицина, медициналық сақтандыру, аймақтық теңсіздік

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КІРІСПЕ

Егер қажетті медициналық қызметтер міндетті медициналық сақтандыру жүйесіне кірмесе, халық мұндай қызметтерді көбіне өз қаражаты есебінен төлеуге мәжбүр болады. Жеке медициналық шығындардың жоғары деңгейі үй шаруашылықтарының қаржылық тұрақсыздығына және кейінірек әлеуметтік-экономикалық мәселелерге алып келуі мүмкін. Сонымен қатар азаматтардың өз денсаулығын сақтауға жеткілікті ресурстар бөлуге дайын болмауы да елеулі әлеуметтік-демографиялық салдарға ұрындыруы ықтимал. Сондықтан мемлекеттік қолдау тетіктері мен медициналық қызметтерді саналы тұтынудың теңгерімді үйлесімі әлеуметтік тұрақтылық пен орнықты дамудың маңызды факторы болып табылады.

Қазақстан жағдайында бұл мәселе медициналық көмекке қолжетімділіктің өңірлік және әлеуметтік әркелкілігімен күрделене түседі. Медициналық қызметтерге және қажетті дәрі-дәрмекке қол жеткізу тек экономикалық мүмкіндікке ғана емес, үй шаруашылығының әлеуметтік мәртебесіне, тұрғылықты жеріне, ақпаратты қабылдау ерекшеліктеріне және мәдени-институционалдық факторларға да байланысты.

Зерттеудің эмпирикалық базасы ретінде Қазақстанның әртүрлі өңірлері тұрғындарының медициналық қызметтерді тұтыну саласындағы мінез-құлық ерекшеліктерін, экономикалық шешім қабылдауын және медициналық көмекке қолжетімділікке қатысты ұстанымдарын зерделеуге бағытталған сауалнама материалдары пайдаланылды.

Бұған дейін Қазақстан материалдары негізінде халықтың дәрілік сақтандыру жүйесін енгізуге дайындығы, сондай-ақ мұндай тетіктерге деген көзқарасты қалыптастырудағы ағартушылық жұмыстың және қоғамдық ұйымдардың рөлі талқыланды (Volkova et al., 2023a; Volkova et al., 2024). Осы зерттеу бұл бағытты жалғастыра отырып, тілдік топтар арасындағы төлеуге дайындық айырмашылықтарына және бұл айырмашылықтардың үй шаруашылықтарының әлеуметтік-экономикалық сипаттамаларымен байланысына басымдық береді.

Алайда қолданыстағы зерттеулерде Қазақстандағы дәрілік сақтандыруға қатысты тө-

леуге дайындық көбіне жалпы әлеуметтік-экономикалық факторлар арқылы түсіндіріліп, тілдік орта, институционалдық сенім және медициналық ақпаратты қабылдау ерекшеліктері жеке талдау объектісі ретінде жеткілікті қарастырылмаған. Қазақстан сияқты екітілді және өңірлік тұрғыдан әркелкі қоғамда үй шаруашылығындағы қарым-қатынас тілі тек мәдени белгі ғана емес, сонымен қатар медициналық және сақтандыру ақпаратына қол жеткізу, оны түсіну және ресми институттарға сенім білдіру деңгейімен байланысты индикатор болуы мүмкін. Осы тұрғыдан алғанда, тілдік, институционалдық және әлеуметтік-экономикалық факторларды бірге емес, өзара байланысты, бірақ аналитикалық тұрғыдан ажыратылатын факторлар ретінде қарастыру зерттеудің негізгі олқылығын толықтыруға мүмкіндік береді.

Қазақстандағы медициналық қызметтер тұтынушыларының таңдауларын түсіндіру үшін шешім қабылдаудың мінез-құлықтық ерекшеліктерін ескеретін теориялық тәсіл қолданылады. Перспективалар теориясына сәйкес, төлеуге дайындық (willingness to pay, WTP) индивид өзінің жағдайындағы ықтимал өзгерістерді қандай бастапқы күймен салыстырып қабылдайтынына тәуелді (Kahneman & Tversky, 1979; Köszegi & Rabin, 2006). Денсаулық экономикасы тұрғысынан мұндай шешімдер денсаулықты капитал ретінде қарастыратын тұжырымдама арқылы да түсіндіріледі, оған сәйкес медициналық көмек пен сақтандыруға деген сұраныс шектеулі ресурстар мен белгісіздік жағдайындағы инвестициялық таңдау ретінде қарастырылады (Grossman, 1972; Batinti, 2015).

Осы зерттеудің мақсаты – Қазақстандағы дәрілік сақтандыру полисі үшін төлеуге дайындықтың әлеуметтік-экономикалық, медициналық және лингвистикалық факторлармен байланысын бағалау, сондай-ақ қазақтілді және орыстілді респонденттер арасындағы айырмашылықтардың сипатын анықтау. Зерттеудің негізгі гипотезасы бойынша, дәрілік сақтандыру полисі үшін төлеуге дайындық тек табыс пен ағымдағы медициналық шығындарға ғана емес, сондай-ақ денсаулықты өзін-өзі бағалауға, медициналық көмекке жүгіну тәжірибесіне, тұрғылықты өңірге және үй шаруашылығындағы қарым-қатынас тіліне байланысты қалыптасады.

ӘДЕБИЕТТЕРГЕ ШОЛУ

Денсаулық экономикасында медициналық көмекке сұраныс көбіне денсаулықты ұзақ мерзімді капитал ретінде қарастыратын теориялық тәсілдер арқылы түсіндіріледі. Гроссман моделіне сәйкес, индивид денсаулығын сақтау мен қалпына келтіруге бағытталған шешімдерді шектеулі ресурстар, уақыт және белгісіздік жағдайында қабылдайды (Grossman, 1972). Осы тұрғыдан медициналық қызметтерге, дәрі-дәрмекке немесе сақтандыру полисіне жұмсалатын шығындар ағымдағы тұтыну ғана емес, болашақ денсаулық жағдайына жасалатын инвестиция ретінде қарастырылуы мүмкін. Кейінгі зерттеулер бұл логиканы кеңейтеді (Batinti, 2015).

Бұл ретте әлеуметтік-экономикалық мәртебе, денсаулықты өзін-өзі бағалау және дәрі-дәрмекке ағымдағы шығындар сақтандыру полисі үшін төлеуге дайындықтың мәнді факторлары ретінде көрінеді. Бұл қорытындылар Ресейде, Сауд Арабиясында, Германияда және басқа елдерде жүргізілген медициналық сақтандыру үшін willingness to pay жөніндегі эмпирикалық зерттеулердің нәтижелерімен сәйкес келеді (Kaneva et al., 2015; Kaneva et al., 2019; Al-Hanawi et al., 2018; Bock et al., 2016; Tambor et al., 2014; Dong et al., 2003).

Бұл бағыттағы зерттеулердің артықшылығы – олар сақтандыруға сұранысты сандық тұрғыдан бағалауға және нақты саясат құралдарына байланыстыруға мүмкіндік береді. Алайда көптеген зерттеулер WTP көрсеткішін негізінен экономикалық және демографиялық айнымалылар арқылы түсіндіреді, ал ақпаратты түсіну, институционалдық сенім, тілдік орта және мінез-құлықтық ұстанымдар сияқты факторлар көбіне жанама түрде ғана ескеріледі.

Мінез-құлықтық экономика бұл талдауды толықтырады. Перспективалар теориясына сәйкес, төлеуге дайындық индивид өзінің жағдайындағы ықтимал өзгерістерді қандай бастапқы күймен салыстырып қабылдайтынына тәуелді (Kahneman & Tversky, 1979; Köszegi & Rabin, 2006). Денсаулық сақтау саласында бұл сақтандыру полисінің бағасы тек объективті табыс деңгейімен ғана емес, ауру қаупін субъективті қабылдаумен, шығыннан қашу мінез-құлқымен және болашақ медициналық шығындарға қатысты күтілімдермен де байланысты болуы мүмкін екенін білдіреді. Сондықтан

WTP көрсеткішін түсіндіруде классикалық табыс-шектеу логикасын ғана емес, тәуекелді қабылдау және субъективті шығындарды бағалау механизмдерін де ескеру қажет.

Емге қолжетімділіктегі теңсіздік қызметтердің болуын ғана емес, олардың географиялық, қаржылық және ұйымдастырушылық қолжетімділігін де қамтитын көпөлшемді конструкт болып табылады (Penchansky & Thomas, 1981; Oladosu et al., 2023). Медициналық көмекті нақты пайдалану іске асқан қолжетімділіктің көрсеткіші ретінде қарастырылуы мүмкін, өйткені ол профилактикалық жүгінулерді, дәрігерге қаралуды, ауруханаға жатқызылуды және дәрі-дәрмек көмегін пайдалануды бейнелейді. Кейінгі зерттеулер бұл ұғымды кеңейтіп, медициналық көмекке қол жеткізудегі құрылымдық, қаржылық және когнитивтік кедергілерді бөліп көрсетеді (Carrillo et al., 2011; Oladosu et al., 2023).

Жоғары жеке медициналық шығындар медициналық көмекке қолжетімділікті табыс деңгейіне тәуелді етеді. Мұндай жағдайда табысы төмен үй шаруашылықтары қажетті емді кейінге қалдыруы, дәрі-дәрмек сатып алудан бас тартуы немесе медициналық қызметтерді толық көлемде пайдалана алмауы мүмкін. Бұл өз кезегінде денсаулық саласындағы әлеуметтік теңсіздіктің тереңдеуіне алып келеді (Balabanova et al., 2012; Kaminska & Wulfgramm, 2019). Демек, дәрілік сақтандыруға дайындықты талдау кезінде тек жеке табыс деңгейін емес, өңірлік және институционалдық контексті де ескеру қажет (Kireyeva et al., 2018). Осы тұрғыдан дәрілік сақтандыру медициналық шығындар тәуекелін бөлу және емге қолжетімділіктегі теңсіздікті азайту құралы ретінде қарастырылуы мүмкін. Қазақстан жағдайында бұл мәселе өңірлік және әлеуметтік әркелкілікпен күрделене түседі, ол медициналық көмекке қолжетімділікке де, оны қаржыландыру тетіктерін қабылдауға да әсер етеді (Spankulova et al., 2020; Kireyeva et al., 2021; Spankulova et al., 2026a).

Дәрілік сақтандыру халықтың дәрі-дәрмекке жұмсайтын шығындарын азайту және емге қолжетімділікті кеңейту құралы ретінде талқыланып келеді (Volkova et al., 2023a; Volkova et al., 2023b; Volkova et al., 2024). Демек, дәрілік сақтандыруға дайындықты талдау кезінде тек жеке табыс деңгейін емес, өңірлік және институционалдық контексті де ескеру қажет.

Сақтандыру өнімін сатып алу туралы шешім тек қаржылық есепке негізделмейді. Тұтынушы сақтандыру шартының мазмұнын, төлем тәртібін, өтелетін және өтелмейтін қызметтерді, сондай-ақ болашақтағы ықтимал пайдасын түсінуі тиіс. Сондықтан медициналық және сақтандыру сауаттылығы WTP көрсеткішін түсіндірудегі маңызды факторлардың бірі болып табылады. Эмпирикалық зерттеулер тұтынушылардың сақтандыру нарығындағы шешімдері сақтандыру сауаттылығына, полис талаптарын түсінуіне, қолжетімді ақпарат көлеміне және баламалы өнімдерді салыстыра алу қабілетіне тәуелді екенін көрсетеді (Barnes et al., 2015).

Медициналық сауаттылық жөніндегі әдебиетте тіл, ақпаратты қабылдау және пациент пен дәрігер арасындағы коммуникация сапасы медициналық шешімдерге тікелей байланысты екені көрсетіледі. Бұл еңбектерде тілдік сәйкестік, ақпаратты түсіну деңгейі және коммуникация сапасы жүйеге деген сенімге, пациенттің жайлылығына және ресми медициналық әрі сақтандыру институттарын пайдалануға әсер ететіні атап көрсетіледі (Sudore et al., 2009; Paasche-Orlow & Wolf, 2007; Barnes et al., 2015; Barnes & Hanoch, 2017).

Осы бағыттағы зерттеулердің күшті жағы – олар медициналық көмекке қолжетімділікті тек табыс пен инфрақұрылым арқылы емес, ақпаратты түсіну және пайдалану қабілеті арқылы да түсіндіреді. Бірақ олардың көпшілігі тілдік ортаны жеке экономикалық айнымалы ретінде емес, коммуникациялық кедергі немесе медициналық сауаттылықтың бір бөлігі ретінде қарастырады. Бұл әсіресе екітілді немесе көптілді қоғамдар үшін жеткіліксіз болуы мүмкін, өйткені мұндай ортада тіл тек ақпарат алмасу құралы ғана емес, сонымен бірге институционалдық тәжірибе, ресми жүйеге жақындық және әлеуметтік сенім деңгейінің индикаторы болуы ықтимал.

Зерттеулер мәдени және әлеуметтік практикалардың денсаулық саласындағы мінез-құлыққа және денсаулық сақтау жүйесімен өзара әрекеттесуге ықпал етуі мүмкін екенін көрсетеді. Денсаулық туралы ақпаратты ұжымдық талқылау және бірлесіп пайымдау тетіктері шешім қабылдауға және денсаулықты сақтау практикасына қатысуға әсер ете алады (Munté-Pascual et al., 2025). Кең мағынада мәдени

факторлар денсаулықтағы теңсіздіктің детерминанттары ретінде көрініс тауып, жекелеген әлеуметтік топтардың осалдығына ықпал етуі мүмкін (Fernandez, 2014; Mossop et al., 2025; Balakrishnan et al., 2025).

Ғылыми әдебиетте тілдің пациенттердің мінез-құлқына және медициналық сақтандыруға қатысты шешімдеріне әсер етуінің екі негізгі тетігі бөлінеді. Біріншісі — ақпараттық-коммуникациялық тетік. Тілдік кедергі медициналық сауаттылық деңгейін төмендетіп, медициналық және институционалдық ақпаратты түсінуді қиындатуы, пациент пен дәрігер арасындағы коммуникация сапасын нашарлатуы мүмкін. Бұл медициналық ұсынымдарды дұрыс түсінбеу қаупін арттырып, ресми медициналық көмекке жүгіну ықтималдығын төмендетеді (Sudore et al., 2009; Paasche-Orlow & Wolf, 2007). Сақтандыру шешімдері жағдайында тілдік айырмашылықтар полис талаптарын түсінуді және баламалы сақтандыру өнімдерін салыстыруды да қиындатуы мүмкін (Barnes et al., 2015). Екіншісі — мәдени-институционалдық және мінез-құлықтық сипатта. Тіл мәдени қашықтықтың маркері ретінде ресми институттарға деген сенім деңгейіне ықпал етуі мүмкін. Көптілді қоғамдарда мұндай айырмашылықтар көмек іздеу тәсілдерінде, ресми денсаулық сақтау жүйесіне жүгінуге дайындықта және емдеу туралы шешім қабылдауда отбасы мен қауымдастық қолдау желілерінің ролінде көрінуі мүмкін (Balakrishnan et al., 2025; Mossop et al., 2025).

Тілдік топтар арасындағы айырмашылықтар ресми институттарға әркелкі кірігу деңгейімен және ұжымдық мінез-құлықтың әртүрлі модельдерімен байланысты болуы мүмкін. Отбасы және қауымдастық қолдау желілерінің ролі айқын көрінетін ортада сақтандыруға деген көзқарас өзгеше қалыптасуы ықтимал, өйткені ақпарат іздеу, қолдау алу және емдеу туралы шешім қабылдау функцияларының бір бөлігі бейресми институттарға ауысады (Gerry et al., 2017; Munté-Pascual et al., 2025).

Посткеңестік контексте бұл мәселе ерекше сипатқа ие. Орыс тілі ұзақ уақыт бойы мемлекеттік басқару, ресми құжат айналымы және институционалдық коммуникация тілі ретінде қолданылды. Бұл бір жағынан ресми ережелерді түсінуді жеңілдетуі мүмкін, екінші жағынан, мемлекетпен байланысты формалды-

бюрократиялық тәжірибені де күшейтуі ықтимал. Қазақ тілінің қоғамдық және институционалдық қолданысының кеңеюі сақтандыру өнімдерін ұлттық тілдік ортаға жақындатуы мүмкін, бірақ арнайы медициналық және сақтандыру терминдерінің жеткілікті түсінікті болмауы кейбір азаматтар үшін қосымша когнитивтік жүктеме туғызуы ықтимал. Сондықтан Қазақстан жағдайында тілдік факторды тек этникалық белгі ретінде емес, ақпаратты қабылдау, ресми институттармен өзара әрекеттесу және сақтандыру шарттарын түсіну шығындарымен байланысты кешенді индикатор ретінде қарастыру орынды.

Бұл тұрғыдан алғанда, тілдің сақтандыру шешімдеріне ықтимал байланысы тікелей себеп-салдарлық әсер ретінде емес, әлеуметтік-экономикалық, ақпараттық және институционалдық жағдайлармен қабаттасқан статистикалық ассоциация ретінде түсіндірілуі тиіс. Мұндай сақтық маңызды, өйткені тілдік топтар арасындағы айырмашылықтар табыс, өңір, білім, медициналық көмекке жүгіну тәжірибесі және ресми институттарға сенім сияқты басқа факторлармен де байланысты болуы мүмкін.

МАТЕРИАЛДАР МЕН ӘДІСТЕР

Бұл бөлімде зерттеудің эмпирикалық базасы, айнымалыларды таңдау логикасы, дәрілік сақтандыру полисі үшін төлеуге дайындықты бағалау тәсілі және қолданылған эконометрикалық модельдердің әдіснамалық шектеулері сипатталады. Айнымалыларды іріктеу денсаулық экономикасы, медициналық көмекке қолжетімділік, медициналық сауаттылық және мінез-құлықтық экономика жөніндегі теориялық және эмпирикалық әдебиетке сүйенеді (Grossman, 1972; Kahneman & Tversky, 1979; Batinti, 2015; Barnes et al., 2015; Paasche-Orlow & Wolf, 2007; Sudore et al., 2009).

Зерттеудің эмпирикалық негізін Қазақстанның әртүрлі өңірлерінде жүргізілген онлайн-сауалнама деректері құрады. Бастапқы деректер базасында 2714 бақылау болды. Талдауға сауалнаманы толық толтырған және өзіндік табыс көзі бар респонденттер енгізілді; студенттер мен жұмыссыздар негізгі аналитикалық іріктемеден шығарылды. Мұндай шектеу сақтандыру полисі үшін төлеуге дайындықты нақты төлем қабілеттілігімен байланыстыра талдау қажет-

тілігімен түсіндіріледі, өйткені willingness to pay зерттеулерінде табыс пен төлем қабілеттілігі негізгі түсіндіруші факторлардың бірі ретінде қарастырылады. Қорытынды аналитикалық іріктеме 2695 бақылауды қамтыды. Респонденттер этникалық белгісі бойынша емес, үй шаруашылығындағы қарым-қатынас тілі бойынша жіктелді: қазақтілді топ (негізінен қазақ тілі) – 2044 респондент; орыстілді топ (негізінен орыс тілі) – 651 респондент.

Сауалнама Қазақстанның барлық негізгі макроөңірлерін және елді мекендердің әртүрлі түрлерін қамтыды: астана, облыс орталықтары, шағын қалалар және ауылдық елді мекендер. Сонымен бірге деректер онлайн форматта және ықтимал өзін-өзі іріктеу механизмі арқылы жиналғандықтан, бұл іріктеме Қазақстан халқы үшін толық статистикалық репрезентативті деп қарастырылмайды. Сондықтан зерттеу нәтижелері бүкіл халыққа тікелей жалпыланбайды; олар зерттелген респонденттер тобы ішіндегі статистикалық байланыстарды және мінез-құлықтық заңдылықтарды анықтауға бағытталған.

Тәуелсіз айнымалыларды таңдау пайдалықты максимизациялаудың неоклассикалық логикасына негізделеді, оған сәйкес индивидтің шешімі тұтынуға, денсаулық жағдайына және ресурстық шектеулерге тәуелді болады (Batinti, 2015). Осы логикаға сәйкес тәуелсіз айнымалылар үш негізгі топқа бөлінді: әлеуметтік-экономикалық факторлар, этномәдени және лингвистикалық факторлар, әлеуметтік-демографиялық бақылау айнымалылары.

Әлеуметтік-экономикалық факторларға табыс, қаржылық кедергілер, білім және жұмыспен қамтылу енгізілді. Табыс айнымалылары out-of-pocket шығындардың медициналық көмекке қолжетімділікті төмендетіп, денсаулық саласындағы әлеуметтік теңсіздікті күшейтуі мүмкін екендігін ескеру үшін алынды (Kaminska & Wulfgramm, 2019). Білім денсаулық туралы сауаттылықтың прокси-көрсеткіші ретінде қарастырылады, өйткені ол медициналық ақпаратты түсіну және емдеуге қатысты ақпараттандырылған шешім қабылдау қабілетіне ықпал етеді (Sudore et al., 2009; Paasche-Orlow & Wolf, 2007). Жұмыспен қамтылу түрі мен тұрақтылығы әлеуметтік кепілдіктер мен медициналық сақтандыруға қолжетімділікті сипаттайтын фактор ретінде енгізілді (Oladosu et al., 2023).

Этномәдени және лингвистикалық факторлар дәстүрлі практикалар мен қарым-қатынас тілін қамтиды. Дәстүрлі практикалар отбасы және қауымдастық желілерінің көмек іздеу тәсілдеріне, емдеу туралы шешім қабылдауға және денсаулық сақтаудың ресми жүйесімен өзара әрекеттесуге ықпалын көрсету үшін пайдаланылды (Munté-Pascual et al., 2025; Mossop et al., 2025). Қарым-қатынас тілі медициналық ақпаратты түсінуге, денсаулық сақтау жүйесіне деген сенімге және сақтандыру шарттарын қабылдауға әсер етуі мүмкін лингвистикалық әрі мәдени қашықтықтың индикаторы ретінде қарастырылады (Barnes et al., 2015).

Әлеуметтік-демографиялық бақылау айнымалылары ретінде жас, жыныс және отбасылық жағдай енгізілді. Жас пен жыныс емге мұқтаждықтағы, медициналық көмекті пайдаланудағы және денсаулық саласындағы мінез-құлық үлгілеріндегі айырмашылықтарды көрсету үшін алынды (Bock et al., 2016; Al-Hanawi et al., 2018). Отбасылық жағдай медициналық көмекке жүгінуді жеңілдетуі және қанағаттандырылмаған медициналық қажеттіліктер қаупін азайтуы мүмкін әлеуметтік қолдаудың жанама индикаторы ретінде қарастырылады (Kaminska & Wulfgramm, 2019).

Зерттеудің теориялық негізі денсаулық экономикасы мен мінез-құлықтық экономика тәсілдерінің үйлесіміне сүйенеді. Денсаулық экономикасы тұрғысынан индивид өз табысын ағымдағы тұтыну, денсаулықты сақтау және ықтимал медициналық шығындарға дайындалу арасында бөледі (Grossman, 1972; Batinti, 2015). Егер индивид ауруға шалдығу ықтималдығын және осы аурудан туындайтын қаржылық шығындарды ескерсе, сақтандыру полисін сатып алу болашақтағы белгісіз шығындарды алдын ала белгілі төлеммен алмастыру құралы ретінде қарастырылуы мүмкін.

Баламалы шешім – сақтандыру полисін алдын ала сатып алу. Бұл жағдайда сақтандыру болашақтағы ықтимал медициналық шығындарды төмендету тетігі ретінде қарастырылады. Полис үшін төлеуге дайындық ауру ықтималдығын субъективті бағалауға, денсаулық жағдайына және дәрі-дәрмекке жұмсалатын шығындарға байланысты қалыптасады. Модельдің эмпирикалық бағалануы барысында сақтандыру полисі үшін төлеуге дайындық

көрсеткіші (WTPP) тәуелді айнымалы ретінде пайдаланылды. Денсаулық жағдайы респонденттердің өзін-өзі бағалауы арқылы (healthstate), ал медициналық шығындар отбасының дәрі-дәрмекке жұмсайтын орташа шығындары арқылы (dcost) проксиленді.

Зерттеу әдіснамасы Канеман–Тверскидің тәуекел жағдайындағы шешім қабылдаудың мінез-құлықтық моделіне негізделеді (Kahneman & Tversky, 1979). Бұл тәсілге сәйкес, индивид ықтимал медициналық шығындар мен сақтандыру арқылы оларды азайту мүмкіндігін субъективті түрде бағалайды. Полис үшін төлеуге дайындық денсаулық жағдайын қабылдауға, күтілетін медициналық шығындарға және тәуекелді субъективті бағалауға байланысты қалыптасады. Сонымен қатар, бұл тәсіл бастапқы күймен салыстырылатын күтілетін жоғалтулар мен ұтыстарға негізделген референс-тәуелді талғамдар тұжырымдамасына жақын (Köszegi & Rabin, 2006).

Алайда wtp айнымалысының үлестірімі айқын асимметриямен сипатталады: респонденттердің едәуір бөлігі сақтандыру полисі үшін төлеуге дайын емес екенін көрсеткен, сондықтан нөлдік мәндердің үлесі жоғары. Осыған байланысты классикалық OLS моделі мұндай үлестірім ерекшеліктерін толық ескермеуі мүмкін. Денсаулық сақтау шығындары мен WTP сияқты асимметриялы айнымалыларды талдауда логарифмдік трансформациялар мен екі кезеңді модельдер жиі қолданылады (Cragg, 1971; Manning & Mullahy, 2001).

Осы ерекшелікті ескере отырып, бұл зерттеуде OLS моделі негізгі сипаттамалық және салыстырмалы тәсіл ретінде қолданылды. Нәтижелер себеп-салдарлық әсер ретінде емес, айнымалылар арасындағы статистикалық ассоциациялар ретінде түсіндіріледі.

Канеман–Тверски құндылық функциясына сәйкес, сауалнама деректері негізінде сақтандыру полисі үшін төлеуге дайындық көрсеткіші үшін базалық регрессиялық модель құрылды (1):

$$\begin{aligned} WTPP = & \alpha + \beta_1 \text{healthstate2} + \\ & + \beta_2 \text{healthstate3} + \beta_3 \text{healthstate4} + \\ & + \beta_4 \text{healthstate5} + \beta_5 \text{cost} + \\ & + \beta_6 \text{langkaz} + \beta_7 \text{age} + \beta_8 \text{female} + \varepsilon \quad (1) \end{aligned}$$

мұнда:

$WTPP$ – респонденттің сақтандыру полисі үшін төлеуге дайындық көрсеткіші;

$healthstate_i$ – респонденттің денсаулық жағдайын өзін-өзі бағалауы;

$dcost_i$ – отбасының дәрі-дәрмекке жұмсайтын орташа шығындары;

$lanqkaz_i$ – тілдік топты сипаттайтын бинарлық айнымалы;

age_i – респонденттің жасы;

$female_i$ – жынысты сипаттайтын бинарлық айнымалы;

α – тұрақты шама;

ε – кездейсоқ қателік мүшесі.

Денсаулық жағдайы бес санат бойынша өлшенді: «өте жақсы», «жақсы», «қанағаттанарлық», «нашар» және «өте нашар». Регрессиялық модельде базалық санат ретінде «өте жақсы» денсаулық жағдайы пайдаланылды. Дәрі-дәрмекке жұмсалатын шығындар бірнеше шығын диапазондары бойынша топтастырылды.

$WTPP$ айнымалысында нөлдік мәндердің үлесі жоғары және үлестірім оң жақ асимметриямен сипатталады. Осыған байланысты классикалық OLS моделі мұндай үлестірім ерекшеліктерін толық ескермеуі мүмкін. Денсаулық сақтау шығындары мен WTP сияқты асимметриялы айнымалыларды талдауда екі кезеңді модельдер мен шектеулі тәуелді айнымалылар тәсілдері жиі қолданылады (Cragg, 1971; Manning & Mullahy, 2001). Осы ерекшелікті ескере отырып, бұл зерттеуде OLS моделі негізгі сипаттамалық және салыстырмалы тәсіл ретінде қолданылды. Сонымен қатар two-part/hurdle модельдерінің логикасы сақтандыруға қатысу шешімі мен төлем көлемін жеке бағалау үшін болашақ зерттеулерде пайдаланылуы мүмкін.

Модельді интерпретациялау кезінде бірқатар әдіснамалық шектеулер ескеріледі. Біріншіден, кейбір түсіндіруші айнымалылар бойынша эндогендік қаупі бар. Мысалы, денсаулықты өзін-өзі бағалау және дәрігерге қаралу жиілігі сақтандыруға сұраныстың экзогенді себептері ғана емес, респонденттің жалпы денсаулық мінез-құлқының, медициналық жүйемен бұрынғы тәжірибесінің және сақтандыруға қатысты жеке көзқарасының нәтижесі де болуы мүмкін. Сондықтан бұл айнымалылардың коэффициенттері себеп-салдарлық әсер ретінде емес, wtp көрсеткішімен статистикалық байланыс

ретінде түсіндіріледі. Көлденең қималық сауалнама деректері мұндай каузалдық механизмдерді толық ажыратуға мүмкіндік бермейтіндіктен, нәтижелерді интерпретациялау кезінде сақтық қажет.

Екіншіден, сауалнама деректері өзін-өзі бағалауға негізделген. Респонденттер өз денсаулығын, шығындарын немесе төлеуге дайындық деңгейін дәл көрсетпеуі мүмкін. Бұл өлшеу қателіктеріне және декларативті жауаптардың пайда болуына алып келуі ықтимал. Әсіресе WTP көрсеткіші нақты төлем емес, гипотетикалық төлеуге дайындық болғандықтан, алынған бағалар респонденттердің нақты нарықтық мінез-құлқынан ерекшеленуі мүмкін.

Үшіншіден, модельдің түсіндіруші қабілеті шектеулі болуы мүмкін, өйткені сақтандыруға сұранысқа әсер ететін бірқатар маңызды мінез-құлықтық факторлар деректерде толық қамтылмаған. Оларға сақтандыру институттарына сенім, қаржылық сауаттылық, тәуекелді субьективті қабылдау, бұрынғы сақтандыру тәжірибесі, отбасы ішіндегі шешім қабылдау құрылымы және бейресми қолдау желілері жатады. Бұл бақыланбайтын гетерогенділік коэффициенттердің шамасына және модельдің түсіндіруші қабілетіне әсер етуі мүмкін.

Осы шектеулерге байланысты зерттеу нәтижелері каузалдық қорытынды ретінде емес, дәрілік сақтандыру үшін төлеуге дайындықпен байланысты факторларды сипаттайтын эмпирикалық ассоциациялар ретінде қарастырылады. Болашақ зерттеулерде репрезентативті іріктеме, панельдік деректер, инструменталды айнымалылар немесе эксперименттік дизайн элементтері қолданылса, сақтандыруға сұраныстың себеп-салдарлық механизмдерін тереңірек талдауға мүмкіндік туады.

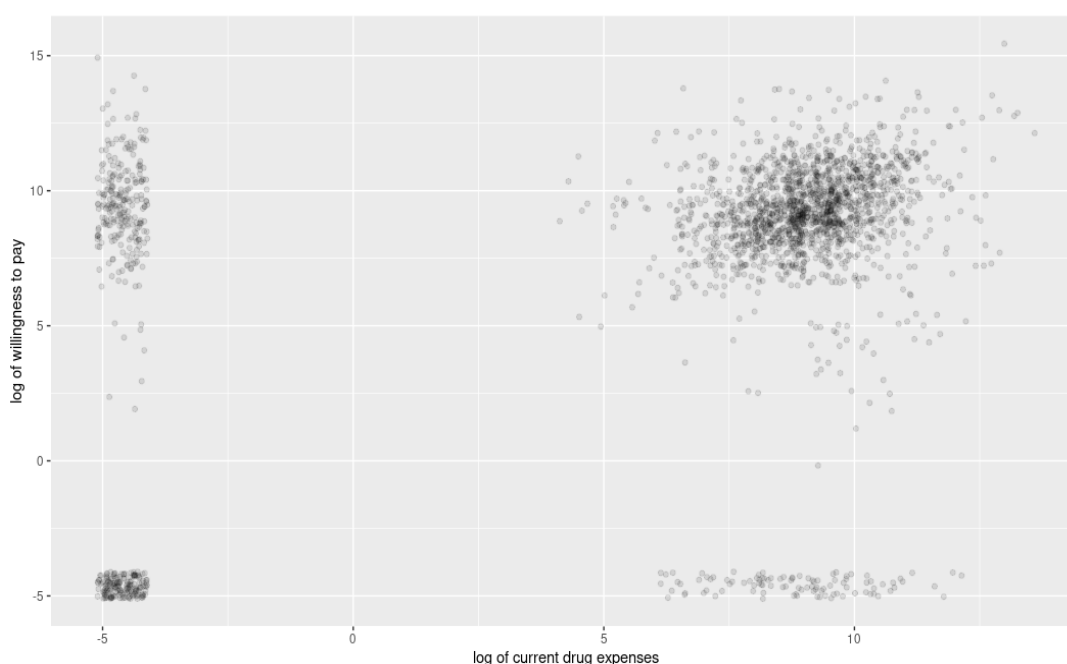
НӘТИЖЕЛЕР

Дәрі-дәрмекке ағымдағы шығындар мен төлеуге дайындықтың бірлескен үлестірімін талдау келесі нәтижелер берді. Респонденттердің басым көпшілігі (1744, бұл 87 %-ды құрайды) дәрі-дәрмекке шығынданбайтынын және сақтандыру полисі үшін төлеуге дайын емес екенін көрсетті. Дәрі-дәрмекке шығын шығарып жүргендердің арасында (276) оң төлеуге дайындық танытатындардың үлесі ($WTP > 0$) айтарлықтай

жоғары (63 %): дәлірек айтқанда 276 адамнан 175 адам сақтандыру үшін төлеуге дайын. Базалық талдау үшін жеке табыс көзі жоқ респонденттер, сондай-ақ дәрі-дәрмекке шығындары нөл болғанымен, төлеуге оң дайындық көрсеткендер (101 бақылау – 37 %) іріктемеден шығарылды, өйткені мұндай жағдайда төлеуге дайындық көбіне декларативті сипатқа ие болады. Дәрі-дәрмекке шығын шығарып жүргенімен, сақтандыру полисі үшін төлеуге дайын емес респонденттер ерекше қызығушылық тудырады — 253 бақылау немесе 13 %. Бұл топ нақты шығын тәжірибесі мен сақ-

тандыру тетігінен бас тарту арасындағы алшақтықты көрсетеді, бұл мінез-құлықтық және институционалдық кедергілерді талдау үшін маңызды. Дәрі-дәрмекке шығынданбайтын және сақтандыру үшін төлеуге дайын емес респонденттер іріктемеде базалық бақылау тобы ретінде қалдырылды.

1-суретте дәрі-дәрмекке ағымдағы шығындар мен дәрілік сақтандыру үшін төлеуге дайындықтың бірлескен үлестірімі; оң мәндер логарифмдік түрде көрсетіліп, көрнекілікті арттыру үшін қосымша шашыратылған (jittered).



Сурет 1. Ағымдағы шығындар және дәрілік сақтандыру үшін төлеуге дайындық
Figure 1. Current expenditure and willingness to pay for pharmaceutical insurance

1-суреттен көрсетілгендей, бақылаулар дәрі-дәрмекке ағымдағы шығындар мен сақтандыру полисі үшін төлеуге дайындықтың әртүрлі үйлесімдеріне сәйкес келетін бірнеше айқын кластер құрайды. Ең көп санды топ — дәрі-дәрмекке шығын шығармайтын әрі бір мезгілде сақтандыру үшін төлеуге дайын емес респонденттер тобы. Сонымен қатар, мазмұндық тұрғыдан маңызды екі топ та ерекшеленеді: дәрі-дәрмекке оң шығындары бар және полис үшін төлеуге оң дайындық танытатын респонденттер, сондай-ақ дәрі-дәрмекке шығын шығарып жүргенімен, сақтандыру схемасына қатысуға да-

йындық білдірмейтін респонденттер. Соңғы топ кейінгі талдау үшін ерекше қызығушылық тудырады, өйткені ол нақты шығындардан сақтандыру қорғанысына өтудегі кедергілерді айқындайды.

Іріктеменің жыныстық құрылымы шамамен 60% әйелдер құралған. Респонденттердің орташа жасы — 32 жас, бұл олардың басым бөлігінің экономикалық белсенді топқа жататынын көрсетеді. Отбасылық жағдайы бойынша 57%-ы некеде тұрған, бұрын некеде болған немесе тұрақты қарым-қатынаста болған, оның ішінде жесір қалғандар да бар, ал 43%-ы — бойдақтар.

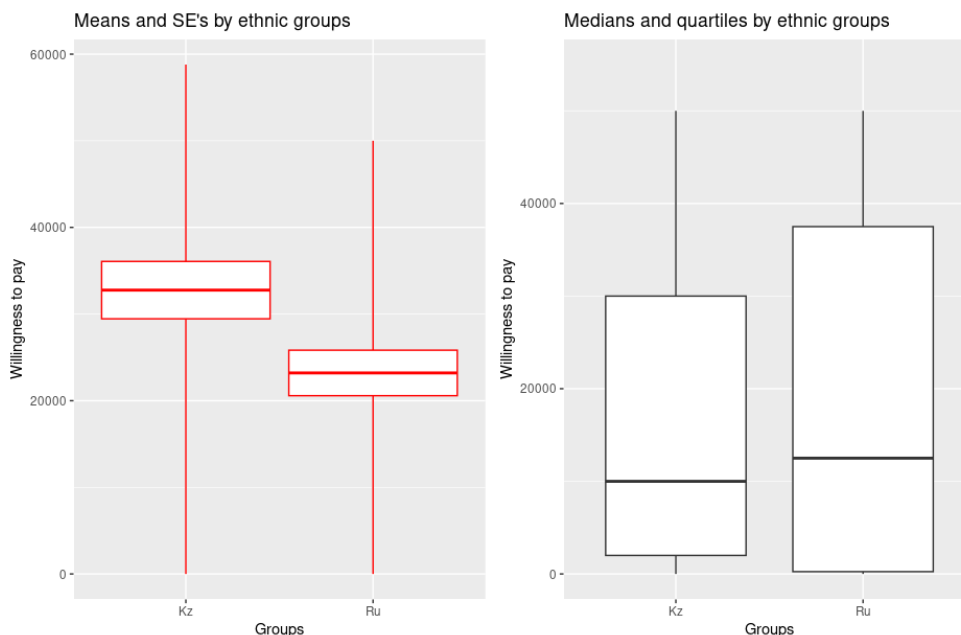
Бұл сипаттамалар нәтижелерді түсіндіру үшін маңызды, өйткені жас, жыныс және отбасылық жағдай денсаулық жағдайымен, медициналық көмекке жүгіну үлгілерімен және сақтандыру полисі үшін төлеуге дайындықпен байланысты болуы мүмкін.

Респонденттердің өзін-өзі бағалауы бойынша қатысушылардың көпшілігі өз денсаулығын «өте жақсы» (35%) немесе «жақсы» (41%) деп бағалайды, ал «қанағаттанарлық», «нашар» немесе «өте нашар» деп бағалағандардың үлесі едәуір төмен.

Сонымен қатар, өзі денсаулықтарын бағалау медициналық көмекке жүгінудің нақты үлгілерімен сәйкес келеді: денсаулық жағдайын төмен бағалау дәрігерге жиірек қаралумен байланысты. Бұл денсаулықты өзін-өзі бағалау айнымалысы тек субъективті қабылдауды ғана емес, сонымен бірге медициналық көмекке мұқтаждықтағы нақты айырмашылықтарды да көрсететінін растайды. Респонденттердің 25 % соңғы бір жылда дәрігерге мүлде қаралмаған, 35 % - 2 ретке дейін, 21 % - 5 ретке дейін, 10 % - 10 ретке дейін, 6% - кемінде 10 рет қаралған болып

шықты. Медициналық көмекке жиі жүгінетін респонденттердің үлесі салыстырмалы түрде аз болып қала береді.

Осылайша қалыптастырылған іріктемеде қазақтілді және орыстілді респонденттердің төлеуге дайындықтарының орташа мәндері арасында айырмашылықтар байқалады: қазақтілді топ үшін орташа мән ≈ 65.4 USD болса, орыстілді топ үшін ≈ 46.4 USD. Бұл айырмашылықтар 5% деңгейінде статистикалық мәнді ($t\text{-test}=2.26$, $p<0.024$). Сонымен қатар, екі топтағы медианалық мәндер сәйкес келеді және шамамен 20 USD құрайды, бұл топтар арасындағы айырмашылықтардың үлестірімнің орталық тенденциясына қарағанда орташа мәндерде айқынырақ көрінетінін білдіреді. Параметрлік еместестер де айырмашылықтарды осы бағытта растайды: Fisher–Pittman permutation test $p < 0.08$ деңгейінде мәнділік көрсетеді, бұл орыстілді топпен салыстырғанда қазақтілді топта төлеуге дайындықтың жоғарылауына қарай әлсіз, бірақ орнықты үрдіс бар екенін айтуға мүмкіндік береді (2-суретті қараңыз).



Сурет 2. Қазақтілді және орыстілді топтардағы төлеуге дайындықты салыстыру
Figure 2. Comparison of willingness to pay in the Kazakh-Speaking and Russian-Speaking groups

Тілдік топтар бойынша WTP үлестірімдерін көрнекі салыстыру үшін 2-суретте стандартты қате шектерімен берілген орташа мәндер, сондай-

ақ медианалар мен кватильаралық интервалдар көрсетілген. Көріп отырғанымыздай, төлеуге дайындықтың орташа мәні қазақтілді топта

орыстiлдi топқа қарағанда жоғары, ал медианалар бiр-бiрiне жақын. Бұл айырмашылықтардың үлестiрiмнiң орталық тенденциясына қарағанда оның жоғарғы бөлiгiнде және орташа мәндерiнде айқынырақ байқалатынын көрсетедi. Визуалды талдау статистикалық тесттердiң нәтижелерiн растайды және қазақтiлдi респонденттер арасындағы төлеуге дайындықтың жоғары болуы WTP-дiң жоғары мәндерi бар бақылаулардың көбiрек болуымен түсiндiрiлетiнiн көрсетедi.

Бұл қорытындыны регрессиялық талдау нәтижелерi де толықтырады: үйдегi қарым-қатынас тiлiн көрсететiн айнымалының (nat1) мәндiлiгi өңiрлiк, әлеуметтiк-демографиялық

және медициналық сипаттамалар ескерiлгеннен кейiн де тiлдiк топтар мен төлеуге дайындық арасында статистикалық байланыс сақталатынын көрсетедi. Бұл нәтиже себеп-салдарлық әсер ретiнде емес, басқа ковариаттар ескерiлгеннен кейiн сақталатын статистикалық ассоциация ретiнде түсiндiрiлуi тиiс. Тiлдiк айнымалы ақпараттық, институционалдық және әлеуметтiк айырмашылықтармен байланысты прокси-айнымалы болғандықтан, оның коэффициентiн сақтықпен интерпретациялау қажет.

Бұл айырмашылықтардың орнықтылығын тексеру үшiн модельдiң бiрнеше спецификациясы бағаланды, нәтижелер 1-кестеде берiлген.

Кесте 1. Регрессиялық талдау

Table 1. Regression analysis

Айнымалылар	Тәуелді айнымалы: дәрілік сақтандыру үшін төлеуге дайындықтың логарифмі			
Factor(nat1)Ru	0.215 (0.314)	0.636** (0.322)	0.628* (0.326)	0.710** (0.323)
Factor(regcode)West		-1.682*** (0.460)	-1.727*** (0.461)	-1.466*** (0.460)
Factor(regcode)North		-1.202** (0.536)	-1.239** (0.539)	-1.232** (0.534)
Factor(regcode)Center		-0.435 (0.674)	-0.445 (0.675)	-0.202 (0.669)
Factor(regcode)East		-1.289* (0.707)	-1.251* (0.711)	-1.211* (0.704)
Factor(rescode)RegCities		0.278 (0.430)	0.392 (0.436)	0.342 (0.433)
Factor(rescode)Townns		-0.035 (0.782)	0.319 (0.792)	0.366 (0.784)
Factor(rescode)Countryside		0.662* (0.365)	0.722* (0.372)	0.669* (0.371)
Age			-0.002 (0.014)	-0.014 (0.014)
Factor(gender) Male			-0.514* (0.298)	-0.321 (0.299)
Minc			0.00000 (0.00000)	0.00000** (0.00000)
Factor(marst)1			-0.440 (0.317)	-0.433 (0.315)
Factor(visitdoc) Өте жиі емес, жылына 5-тен 10 ретке дейін				0.818 (0.525)
Factor(visitdoc) Өте сирек, 2 ретке дейін				1.020*** (0.369)
Factor(visitdoc) Өте жиі, кем дегенде 10 рет				1.290** (0.629)
Factor(visitdoc) Сирек, 2-ден 5-ке дейін				1.849***

				(0.415)
Factor(bheal)2				-0.249
				(0.373)
Factor(bheal)3				-1.133***
				(0.400)
Constant	7.383***	7.543***	7.635***	7.274***
	(0.166)	(0.249)	(0.531)	(0.671)
Observations	1 214	1 160	1 152	1 152
R^2	0.0004	0.022	0.029	0.058
Adjusted R^2	-0.0004	0.015	0.019	0.043
Residual	4.903	4.807	4.799	4.739
Std. Error	(df = 1212)	(df = 1151)	(df = 1139)	(df = 1133)
F Statistic	0.468	3.252***	2.847***	3.902***
	(df = 1; 1212)	(df = 8; 1151)	(df = 12; 1139)	(df = 18; 1133)

*p<0.1; **p<0.05; ***p<0.01

Ескерту: авторлармен құрастырылған

Ковариаттарды таңдау сақтандыруға сұраныстың теориялық моделіне және емге қолжетімділік жөніндегі әдебиетке негізделген. Тіл айнаымалысы (nat1) топтар арасындағы ақпараттық, коммуникациялық және желілік айырмашылықтарды көрсетеді. Өңір мен елді мекен түрі медициналық көмекке қолжетімділіктегі және институционалдық ортадағы аумақтық айырмашылықтарды ескереді. Жас, жыныс және отбасылық жағдай емге мұқтаждықпен және медициналық көмекке жүгіну үлгілерімен байланысты базалық әлеуметтік-демографиялық сипаттамалар ретінде енгізілген. Табыс үй шаруашылығының төлем қабілеттілігін көрсетеді. Дәрігерге қаралу жиілігі мен денсаулықты өзін-өзі бағалау емге ағымдағы және күтілетін мұқтаждықтың прокси-көрсеткіштері ретінде қарастырылып, полис үшін төлеуге дайындықпен статистикалық байланысы бар факторлар ретінде түсіндіріледі.

Модельдің түсіндіруші қабілеті шектеулі екенін атап өткен жөн (ең жоғары $R^2 = 0.058$). Субъективті WTP бойынша көлденең қималық деректер үшін бұл күтілетін нәтиже, өйткені вариацияның елеулі бөлігі бақыланбайтын жеке гетерогенділікпен — тәуекелді қабылдаудағы, сақтандыру тетіктеріне сенімдегі, мінез-құлықтық ұстанымдардағы және бейресми институттардағы айырмашылықтармен анықталады. Сондықтан интерпретация кезінде басты назар модельдің болжамдық күшіне ғана емес,

коэффициенттердің бағыты мен орнықтылығына аударылады.

Кестеден көрінгендей, қосымша ковариаттарды енгізу тілдік топтар арасындағы төлеуге дайындық айырмашылықтарын жоймайды. factor(nat1)Ru айнаымалысының коэффициенті орыстілді респонденттердің төлеуге дайындығының базалық тілдік санатпен салыстырғандағы айырмашылығын көрсетеді. Алынған бағалаулар бұл айырмашылықтардың өңірлік, әлеуметтік-демографиялық және медициналық сипаттамаларды ескергеннен кейін де статистикалық мәнді болып қалатынын көрсетеді. Сонымен бірге, тілдік әсердің бағыты айнаымалының кодталуына тәуелді болғандықтан, оны сақтықпен түсіндіру қажет.

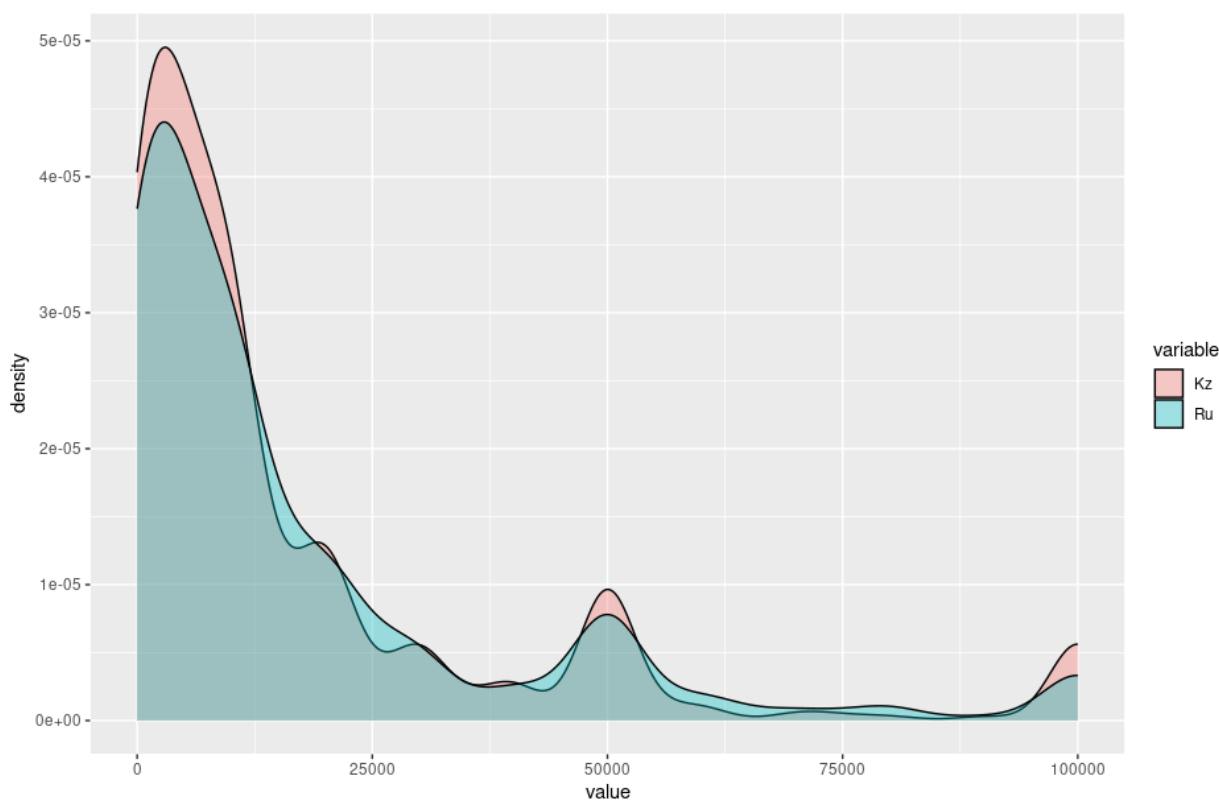
Өңірлік коэффициенттер базалық санатпен (оңтүстік өңірлер) салыстырғанда батыс, солтүстік және шығыс өңірлер респонденттерінің төлеуге төменірек дайындық танытатынын көрсетеді. Анықталған айырмашылықтар Қазақстандағы өңіраралық саралану жөніндегі неғұрлым кең нәтижелермен сәйкес келеді, мұнда аумақтық айырмашылықтар әлеуметтік-экономикалық теңсіздік пен даму жағдайларының әркелкілігінің орнықты факторы ретінде қарастырылады (Spankulova et al., 2026b; Spankulova et al., 2026a). Кейбір спецификацияларда ауылдық жерде тұру астаналармен салыстырғанда төлеуге жоғары дайындықпен байланысты. Табыс коэффициенті статистикалық

мәнді, алайда оның сандық шамасы үлкен емес, бұл табыстың теңгемен өлшенуімен байланысты. Кейбір модельдерде дәрігерге жиірек қаралу және денсаулық жағдайын төмен бағалау дәрілік сақтандыру полисі үшін төлеуге жоғары дайындықпен байланысты.

Жалпы алғанда, кестедегі нәтижелер төлеуге дайындықтың аумақтық, әлеуметтік-демографиялық және медициналық факторлармен байланысты екенін көрсетеді. Модельдің шектеулі түсіндіруші қабілеті респонденттердің елеулі бақыланбайтын мінез-құлықтық гетерогенділігін көрсетеді.

Регрессиялық талдау нәтижелері статистикалық мәнді рөлді тұрғылықты өңір, елді мекен түрі, денсаулық жағдайы және аз дәрежеде

табыс атқаратынын көрсетеді. Базалық санатпен салыстырғанда бірқатар өңірлердегі респонденттерде төлеуге төмен дайындық байқалады, ал кейбір спецификацияларда ауылдық жерде тұру астаналармен салыстырғанда төлеуге жоғары дайындықпен байланысты. Бұдан бөлек, денсаулықты өзін-өзі бағалаудың нашарлауы дәрілік сақтандыру полисі үшін төлеуге дайындықтың өсуімен байланысты. Табыс коэффициенті статистикалық мәнді болғанымен, оның экономикалық шамасы шағын болып қалады. Тілдік топтар бойынша төлеуге дайындық үлестірімдеріндегі айырмашылықтарды қосымша визуализациялау үшін 3-суретте WTP үлестірімінің тығыздық бағалары ұсынылған.



Сурет 3. Қазақтілді және орыстілді топтардағы дәрілік сақтандыру полисі үшін төлеуге дайындық үлестірімінің тығыздығы

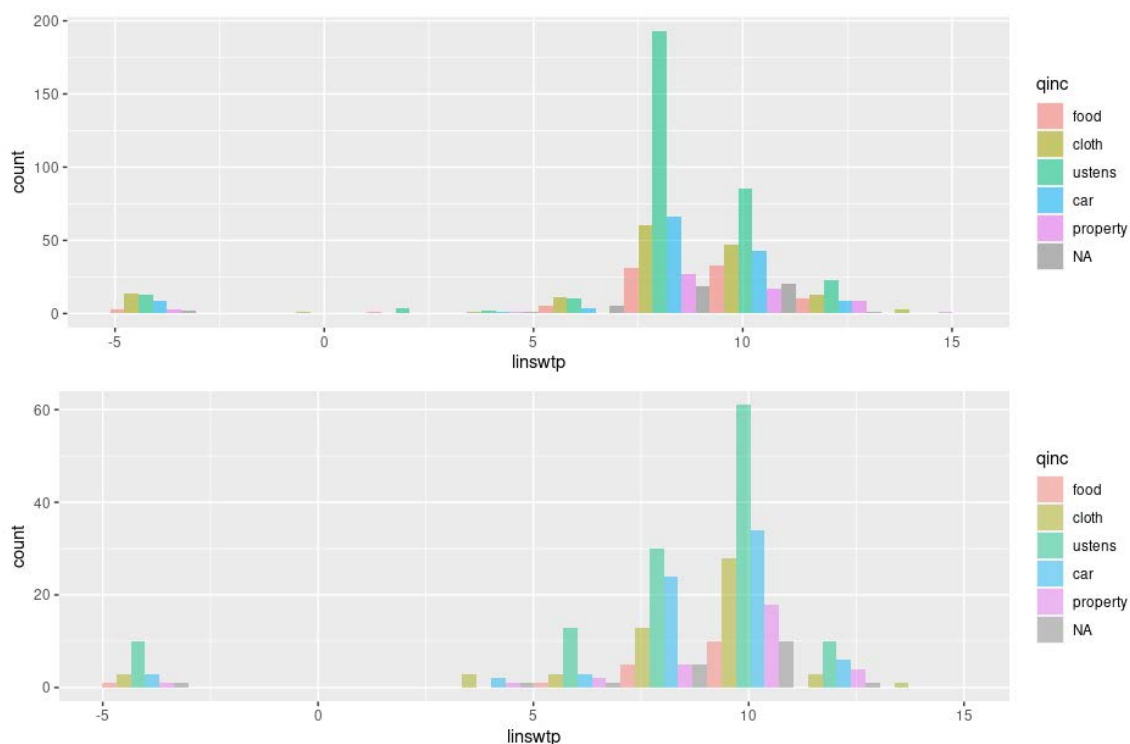
Figure 3. Density distribution of willingness to pay for a pharmaceutical insurance policy in the Kazakh-Speaking and Russian-Speaking groups

3-суреттен көрінгендей, екі топтағы да төлеуге дайындық үлестірімдері нөлге жуық мәндер маңында бақылаулардың айқын шоғырлануымен сипатталады, бұл төлеуге өте төмен немесе

нөлдік дайындық танытатын респонденттердің саны көп екенін көрсетеді. Сонымен қатар, қазақтілді топқа тән үлестірімнің оң жақ «құйрығы» неғұрлым айқын, бұл бұған дейін

алынған WTP-дің жоғары орташа мәндерімен сәйкес келеді. Осылайша, топтар арасындағы айырмашылықтар үлестірімнің тек орталық сипаттамаларынан ғана емес, сонымен бірге төлеуге дайындықтың салыстырмалы түрде жоғары мәндері бар респонденттердің көбірек ұсынылуынан да байқалады.

Айырмашылықтардың сипаты туралы қосымша ақпаратты табыс топтарының ішіндегі төлеуге дайындықты салыстыру береді. 4-суретте WTP-дің табыстың сапалық санаттары бойынша үлестірімі қазақтілді және орыстілді респонденттер үшін жеке-жеке көрсетілген.



Сурет 4. Қазақтілді және орыстілді топтардағы табыстың сапалық топтары бойынша төлеуге дайындық
Figure 4. Willingness to pay across qualitative income groups in the Kazakh-Speaking and Russian-Speaking groups

4-суреттен көрінгендей, табыстың сапалық бағалары салыстырмалы болған жағдайда, қазақтілді топтағы төлеуге дайындықтың үлестірімі бірқатар санаттар бойынша орыстілді топқа қарағанда оңға қарай ығысқан. Бұл топтар арасындағы айырмашылықтар тек ағымдағы төлем қабілеттілігімен ғана шектелмей, денсаулыққа төнетін тәуекелдерді субъективті бағалаудағы, сақтандыру тетіктеріне деген сенім деңгейіндегі және сақтандыру өнімі туралы ақпаратқа қолжетімділіктегі айырмашылықтарды да көрсетуі мүмкін деген жорамал жасауға мүмкіндік береді. Демек, дәрілік сақтандыру саласындағы бірыңғай әлеуметтік саясат схемасы әртүрлі тілдік топтар тарапынан әрқалай қабылданып, әртүрлі пайдаланылуы мүмкін,

сондықтан бірге қаржыландыру тетіктері мен халықпен коммуникацияны әзірлеу кезінде қалаулардың әркелкілігін ескеру қажет.

Сондай-ақ WTP үлестірімі нөлге жақын мәндер маңында бақылаулардың күшті шоғырлануымен сипатталатынын атап өткен жөн (3-суретті қараңыз). Осыған байланысты стандартты сызықтық спецификация респонденттердің мінез-құлқын толық сипаттау үшін жеткіліксіз болуы мүмкін. Болашақта екі бөліктен тұратын модельді пайдалану орынды: бірінші кезеңде — оң төлеуге дайындық ықтималдығын бағалау, екінші кезеңде — $WTP > 0$ болатын респонденттердің ішкі іріктемесінде WTP шамасын бағалау. Мұндай тәсіл сақтандыру схемасына кіру туралы шешімді және қолайлы

сақтандыру төлемі мөлшері туралы шешімді жеке-жеке талдауға мүмкіндік берер еді.

Модельдің қойылымына сәйкес, аурудың күтілетін ауыртпалығын сипаттайтын *healthstate* айнымалысы жанама түрде ауыр ауруға шалдығу ықтималдығының нормаланбаған көрсеткіші болып табылады, ал осы коэффициенттің *dcost* айнымалысы коэффициентіне көбейтіндісі модельдегі *pX* терминдерімен алғанда полис үшін төлеуге дайындықтың дәрі-дәрмекке ағымдағы шығындар бойынша икемділігі ретінде түсіндіріледі. Модельдің бағаланған коэффициенттері негізінде төлеуге дайындықтың дәрі-дәрмекке ағымдағы шығындар бойынша икемділігін есептеуге болады. Бүкіл іріктеме үшін ағымдағы шығындардың \$2.00 артуы төлеуге дайындықтың шамамен \$0.17 өсуімен байланысты.

Бұл — көптеген өлшемдер бойынша шектеулі болып табылатын модельдің тек алғашқы жуықтауы ғана. Біріншіден, модель мінез-құлықтық ерекшеліктерді, атап айтқанда *P* ықтималдығын бағалаудағы ығысуларды есепке алмайды. Модельде өткізіп алынған айнымалылар өте көп, көптеген адамдар полис үшін мүлде төлеуге дайын емес, сәйкесінше олар үшін WTP бағасы жоқ. Бұл айнымалылардың кейбірін симуляция арқылы бағалауға болады, алайда мұндай шешім бәрібір әмбебап болмайды.

Базалық модельді бағалау *healthstate2*, *healthstate3*, *healthstate5* және *dcost* айнымалыларының статистикалық мәнді екенін көрсетті. Бүкіл іріктеме үшін бағаланған тендеу (1) түрінде берілген. Толығырақ талдау үшін тілдік топтар бойынша жеке модельдер бағаланды:

$$\begin{aligned} WTP_{kz} &= 5.154 + 1.926healthstate5 + \\ &+ 0.007dcost + \varepsilon \\ WTP_{pru} &= 5.029 + 0.507healthstate2 + \\ &+ 0.593healthstate3 + 8.207healthstate5 \\ &+ 0.019dcost + \varepsilon \end{aligned}$$

Алынған бағалаулар қазақтілді топта төлеуге дайындықпен статистикалық мәнді оң байланысы бар факторлар ретінде «өте нашар» санатындағы денсаулықты өзін-өзі бағалау мен отбасының дәрі-дәрмекке ағымдағы шығындары көрінетінін көрсетеді. Орыстілді топта мәнді факторлар ретінде дәрі-дәрмекке ағымдағы шығындар, сондай-ақ

денсаулықты «жақсы», «қанағаттанарлық» және «өте нашар» санаттарында өзін-өзі бағалау көрінеді. Осылайша, тілдік топтар арасындағы айырмашылықтар тек төлеуге дайындық деңгейінен ғана емес, сонымен бірге осы дайындықты айқындайтын факторлар құрылымынан да байқалады.

Теориялық тұрғыдан мұндай айырмашылықтар тілдің өзімен емес, онымен байланысты ақпараттық, институционалдық және желілік тетіктермен түсіндірілуі мүмкін. Қарым-қатынас тілі сақтандыру өнімі туралы ақпаратқа қолжетімділіктің әркелкілігін, медициналық сауаттылық (*health literacy*) деңгейіндегі айырмашылықтарды, ресми институттарға деген сенімді және бейресми қолдау желілерінің даму деңгейін көрсететін прокси-айнымалы ретінде көрінеді. Осы мағынада тіл төлеуге дайындықпен тікелей себеп-салдарлық байланыс ретінде емес, сақтандыру тетігін іздеу, түсіну және пайдалану кезіндегі трансакциялық шығындармен байланысты прокси-фактор ретінде қарастырылады. Демек, қазақтілді және орыстілді респонденттердің төлеуге дайындықтарындағы айырмашылықтар шешім қабылдаудың ақпараттық және институционалдық жағдайларының бірдей еместігін көрсетуі мүмкін.

Денсаулық экономикасы тұрғысынан бұл әртүрлі тілдік топтар үшін болашақ денсаулықтың субъективті құндылығы да, сақтандыру туралы ақпаратқа қол жеткізудің субъективті бағасы да әртүрлі болуы мүмкін екенін білдіреді. Егер бір тілдік ортада ресми сақтандыру тетіктерін пайдалану тәжірибесі көбірек жинақталған болса, ал екіншісінде отбасы мен бейресми қолдау жүйелері анағұрлым маңызды рөл атқарса, бұл әлеуметтік-экономикалық сипаттамалар ұқсас болғанның өзінде мінез-құлық стратегияларындағы айырмашылықтарға әкелуі мүмкін.

ТАЛҚЫЛАУ

Ұсынылған талдау дәрі-дәрмек шығындарын өтеуге бағытталған сақтандыру полисі үшін төлеуге дайындықтың әлеуметтік-экономикалық, медициналық және лингвистикалық факторлармен байланысты екенін көрсетті. Денсаулықты өзін-өзі бағалау, дәрі-дәрмекке ағымдағы шы-

ғындар, тұрғылықты өңір, елді мекен түрі және үй шаруашылығындағы қарым-қатынас тілі респонденттердің сақтандыруға қатысуға дайындығын түсіндіруде маңызды рөл атқарады. Алайда бұл нәтижелер себеп-салдарлық әсер ретінде емес, көлденең қималық сауалнама деректері негізінде анықталған статистикалық ассоциациялар ретінде түсіндірілуі тиіс.

Алынған нәтижелер мемлекеттік кепілдіктер бағдарламасы мен міндетті әлеуметтік медициналық сақтандырудың базалық пакеті толық қамтымайтын дәрі-дәрмек шығындары үшін ерікті немесе қосымша сақтандыру тетіктерінің ықтимал маңызын көрсетеді. Дегенмен бұл қорытынды бірлесіп қаржыландырудың тиімділігін автоматты түрде дәлелдемейді. Нәтижелер тек кейбір үй шаруашылықтары үшін жеке төлем жүктемесін төмендету сақтандыру полисінің қолайлылығын арттыруы мүмкін екенін көрсетеді. Сондықтан дәрілік сақтандыруды енгізу немесе кеңейту кезінде халықтың орташа төлеуге дайындық деңгейін ғана емес, төлем қабілеттілігіндегі, денсаулық тәуекелдеріндегі және сақтандыру өнімін түсіну деңгейіндегі айырмашылықтарды да ескеру қажет.

Бірлесіп қаржыландыру медициналық көмекті төлеудің қосымша тетігі ретінде қарастырылуы мүмкін. Белгілі бір институционалдық жағдайларда ол денсаулық сақтау жүйесіне қосымша ресурстар тартуға және пациенттердің емді қаржыландыруға қатысуға дайындығын бағалауға мүмкіндік береді (Kaneva et al., 2015; Kaneva et al., 2019). Willingness to pay жөніндегі эмпирикалық зерттеулер халықтың мұндай схемаларға қатысуы табыс деңгейіне, әлеуметтік-экономикалық сипаттамаларға және сақтандыру тетігін қабылдауына тәуелді екенін көрсетеді (Al-Hanawi et al., 2018; Bock et al., 2016; Dong et al., 2003). Мұндай схемалардың тиімділігі автоматты түрде қалыптаспайды. Бірлесіп қаржыландыру емге қолжетімділіктің қосымша кедергісіне айналмауы үшін оның параметрлері халықтың төлем қабілеттілігіндегі, аурудың ауырлығындағы және пациенттердің әлеуметтік-экономикалық жағдайындағы айырмашылықтарды ескеруі тиіс.

Практикалық тұрғыдан дәрілік сақтандыру пакеттерін кемінде үш деңгейде жобалау орынды. Бірінші деңгей — төмен жарналы базалық пакет. Ол халықтың төлем қабілеті төмен топтарына

бағытталып, ең қажетті дәрі-дәрмек түрлерін өтеуді қамтуы мүмкін. Екінші деңгей — орташа жарналы стандартты пакет. Бұл пакет тұрақты табысы бар және дәрі-дәрмекке орташа шығын жұмсайтын респонденттер үшін қолайлы болуы мүмкін. Үшінші деңгей — кеңейтілген пакет. Ол дәрі-дәрмекке шығындары жоғары, дәрігерге жиі жүгінетін немесе денсаулық тәуекелін жоғары бағалайтын азаматтарға бағытталуы мүмкін. Мұндай көпдеңгейлі тәсіл бір ғана әмбебап сақтандыру өнімінің шектеулерін азайтып, әртүрлі әлеуметтік топтардың нақты қажеттіліктеріне жақынырақ шешім ұсынуға мүмкіндік береді.

Со-payment механизмін жобалау кезінде сақтандыру жарнасының мөлшері ғана емес, азаматтың нақты қаржылық жүктемесі де ескерілуі тиіс. Бірдей жарна табысы әртүрлі респонденттер үшін әртүрлі ауыртпалық туғызады. Сондықтан бірлесіп қаржыландыру деңгейін табыс топтары, дәрі-дәрмекке ағымдағы шығындар және медициналық қажеттілік деңгейі бойынша саралау орынды. Мысалы, төмен табысты және дәрі-дәрмекке тұрақты шығын жұмсайтын азаматтар үшін жарна төмендетілуі немесе субсидиялануы мүмкін, ал табысы жоғары топтар үшін сақтандыру жарнасының үлесі жоғарырақ белгіленуі мүмкін. Мұндай тәсіл со-payment тетігінің емге қолжетімділікке қосымша кедергіге айналу қаупін төмендетеді (Tambor et al., 2014; Dong et al., 2003).

Зерттеу нәтижелері ақпараттық және коммуникациялық саясаттың да маңызды екенін көрсетеді. Сақтандыру өнімі халыққа тек заңдық немесе қаржылық терминдер арқылы емес, қарапайым әрі түсінікті тілмен түсіндірілуі тиіс. Азаматтарға сақтандыру полисінің бағасы, қандай дәрілер өтелетіні, қандай жағдайларда төлем жасалатыны, қандай шектеулер бар екені және сақтандырудың нақты қаржылық пайдасы қысқа мысалдар арқылы көрсетілуі қажет. Бұл әсіресе сақтандыру сауаттылығы төмен, ресми институттарға сенімі әлсіз немесе медициналық ақпаратты түсінуде қиындықтары бар топтар үшін маңызды. Бұған дейінгі зерттеулер де сақтандыру шешімдері сақтандыру шарттарын түсіну, ақпарат көлемі және тұтынушының шешім қабылдау қабілетімен байланысты екенін көрсетеді (Cunningham et al., 2001; Barnes et al., 2015; Barnes & Hanoch, 2017).

Тілдік топтар арасындағы айырмашылықтарды түсіндіруде сақтық қажет. Үй шаруашылығындағы қарым-қатынас тілі төлеуге дайындыққа тікелей себеп болатын фактор ретінде емес, ақпараттық, институционалдық және әлеуметтік айырмашылықтармен байланысты прокси-айнымалы ретінде қарастырылады. Қазақтілді және орыстілді респонденттер арасындағы айырмашылықтар сақтандыру өнімін түсіну, ресми институттарға сенім білдіру, медициналық ақпаратқа қол жеткізу және отбасы мен қауымдастық желілерінің рөлі арқылы қалыптасуы мүмкін. Сондықтан ақпараттық жұмыс екі тілде ғана жүргізіліп қоймай, әр тілдік ортаға түсінікті терминологиямен, нақты мысалдармен және сенім тудыратын коммуникациялық арналар арқылы ұйымдастырылуы тиіс.

Қазақстан үшін бұл мәселе медициналық көмекке қолжетімділіктегі сақталып отырған аумақтық айырмашылықтарды, дәрілік қамтамасыз етудің маңызын және денсаулық сақтауға байланысты апаттық шығындар қаупін төмендету қажеттілігін ескере отырып, ерекше өзекті болып табылады. Ұлттық және халықаралық шолулар, әсіресе халықтың осал топтары мен ауылдық аумақтар тұрғындары үшін, созылмалы ауруларды емдеуді және дәрілік қамтамасыз етуді қаржыландырудың орнықты тетіктерін дамыту қажеттігін атап көрсетеді (WHO, 2020; Turgambayeva et al., 2021).

Денсаулық экономикасы теориясы тұрғысынан тәуекелді қабылдамау маңызды рөл атқарады. Сақтандыру жағдайы басталған кезде ірі медициналық шығындар тәуекелін төмендетудің субъективті құндылығы неғұрлым жоғары болса, қаржылық жоғалтуларды тегістеу тетігі ретінде сақтандырудың тартымдылығы да соғұрлым жоғары болады (Arrow, 1963; Kahneman & Tversky, 1979). Дәрілік сақтандыру үшін қолайсыз іріктеу тәуекелі сақталады: егер сақтандыру схемасына негізінен дәрі-дәрмекке күтілетін мұқтаждығы жоғары тұлғалар кірсе, бұл жүйенің қаржылық орнықтылығын төмендетуі мүмкін (Wang et al., 2006). Бұдан бөлек, ерікті схемаларға қатысуға дайындық бұрыннан жоғары медициналық шығындарға тап болған тұлғаларда артуы мүмкін, бұл да сақтандыру тетігінің дұрыс дизайнының маңызын күшейтеді (Dror et al., 2007).

Алынған нәтижелер жұмыспен қамтылған халық арасында дәрілік сақтандыруға қатысуға деген өлшенетін сұраныс бар екенін көрсетеді. Бұл ретте әлеуметтік-экономикалық мәртебе, денсаулықты өзін-өзі бағалау, дәрі-дәрмекке ағымдағы шығындар және тілдік орта сақтандыру полисі үшін төлеуге дайындықпен байланысты факторлар ретінде көрінеді. Бұл қорытындылар Ресейде, Сауд Арабиясында, Германияда және басқа елдерде жүргізілген medical insurance және willingness to pay зерттеулерінің нәтижелерімен сәйкес келеді (Kaneva et al., 2015; Kaneva et al., 2019; Al-Hanawi et al., 2018; Bock et al., 2016; Tambor et al., 2014; Dong et al., 2003).

Сонымен бірге зерттеудің шектеулерін ескеру қажет. Іріктеме онлайн сауалнама және «карлы кесек» әдісі арқылы қалыптастырылғандықтан, ол Қазақстан халқы үшін толық репрезентативті емес. WTP көрсеткіші нақты төлем емес, респонденттің гипотетикалық төлеуге дайындық бағасы болып табылады, сондықтан жауаптарда декларативті мінез-құлық болуы мүмкін. Сонымен қатар көлденең қималық деректер себеп-салдарлық қорытынды жасауға мүмкіндік бермейді. Сондықтан алынған нәтижелерді зерттелген респонденттер тобы ішіндегі статистикалық байланыстар ретінде түсіндіру қажет. Соған қарамастан, іріктеменің елдің негізгі өңірлері мен елді мекен түрлерін қамтуы дәрілік сақтандыруға төлеуге дайындықпен байланысты факторларды бастапқы эмпирикалық деңгейде бағалауға мүмкіндік береді.

ҚОРЫТЫНДЫ

Жүргізілген зерттеу Қазақстан халқының дәрі-дәрмек шығындарын өтеуге бағытталған сақтандыру полисі үшін төлеуге дайындық деңгейі бір ғана экономикалық фактормен түсіндірілмейтінін көрсетті. Алынған нәтижелер WTP көрсеткіші дәрі-дәрмекке ағымдағы шығындармен, денсаулықты өзін-өзі бағалаумен, табыс деңгейімен, тұрғылықты өңірмен, елді мекен түрімен және үй шаруашылығындағы қарым-қатынас тілімен байланысты екенін айқындайды. Бұл қорытынды денсаулық экономикасының негізгі ұстанымдарымен сәйкес келеді: медициналық көмек пен дәрілік қамтамасыз ету тек денсаулық сақтау жүйесінің техникалық элементі ғана емес, ол үй

шаруашылығының қаржылық мүмкіндігімен, ақпаратқа қолжетімділікпен, институционалдық сеніммен және жеке мінез-құлықтық шешімдермен тығыз байланысты.

Зерттеу нәтижелері дәрілік сақтандыру бағдарламаларын әзірлеу кезінде халықты біртекті топ ретінде қарастыру жеткіліксіз екенін көрсетеді. Бірдей немесе ұқсас табыс деңгейіне ие респонденттердің өзі сақтандыру өнімін әртүрлі қабылдауы мүмкін, өйткені олардың денсаулық тәуекелін бағалауы, медициналық шығындар тәжірибесі, сақтандыру шарттарын түсінуі және ресми институттарға сенім деңгейі әркелкі болуы ықтимал. Осы тұрғыдан алғанда, сақтандыру саясаты тек орташа төлеуге дайындық деңгейіне емес, халықтың әлеуметтік-экономикалық және ақпараттық әркелкілігіне де сүйенуі тиіс.

Практикалық тұрғыдан алғанда, дәрілік сақтандырудың тиімді дизайны икемді және сараланған болуы қажет. Төлем қабілеті төмен топтар үшін төмен жарналы базалық пакет, дәрі-дәрмекке тұрақты шығындары бар азаматтар үшін кеңейтілген өтемі бар пакет, ал табысы жоғары топтар үшін со-раумент үлесі жоғарырақ сақтандыру нұсқалары қарастырылуы мүмкін. Сонымен қатар сақтандыру шарттары халыққа қарапайым, түсінікті және сенім тудыратын тілмен жеткізілуі тиіс. Ақпараттық жұмыс тек формалды хабарландырумен шектелмей, нақты мысалдар, екі тілдегі түсіндірме материалдар және әртүрлі әлеуметтік топтардың қажеттіліктеріне бейімделген коммуникация арқылы жүргізілгені орынды.

Болашақ зерттеулерде дәрілік сақтандыруға сұранысты тереңірек түсіндіру үшін репрезентативті іріктемені, two-part немесе hurdle модельдерін, сондай-ақ сақтандыру институттарына сенім, қаржылық сауаттылық, тәуекелді қабылдау және бұрынғы сақтандыру тәжірибесі сияқты мінез-құлықтық айнымалыларды енгізу маңызды. Мұндай кеңейтілген талдау сақтандыру бағдарламасына қатысуға дайындық ықтималдығын және нақты төлем көлемін жеке-жеке бағалауға мүмкіндік береді. Осы бағыттағы зерттеулер Қазақстанда дәрілік сақтандырудың әлеуметтік тұрғыдан қолайлы, экономикалық жағынан орнықты және халықтың нақты қажеттіліктеріне бейімделген моделін қалыптастыруға негіз бола алады.

AUTHOR CONTRIBUTIONS

Conceptualization, K.A. and A.B.; methodology, A.B.; K.A.; software, K.A., A.B.; validation, K.A., A.B.; formal analysis, A.B., K.A...; investigation, A.B.; resources, K.A.; data curation, A.B.; writing—original draft preparation, A.B.; writing—review and editing, K.A., A.B.; visualization, A.B.; supervision, K.A.; project administration, K.A.; funding acquisition, K.A. All authors have read and agreed to the published version of the manuscript.

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