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Corporate Social Responsibility and Rural Population Dynamics in Kazakhstan: A Structural Equation Modeling Analysis of the Akmola Region

Sunyoung Lee[1], Darima Zhenskhan[2], Song Soo Lim[3,*], Onggarbek Alipbeki[4] Aida Balkibayeva[5], Gulnar Orynbekova[2], Gulbanu Appazova[2], Tangat Azan[6]

[1] Center for Creative Convergence Education, Hanyang University, Seoul, Korea; skylarlee@hanyang.ac.kr
[2] Department of Management and Marketing, S. Seifullin Kazakh Agro Technical Research University, 62 Zhenis Avenue, Astana, Kazakhstan; azan_tanat@mai.ru (D.Z); gulnar_1669@mail.ru (G.O.); 1994@gmail.com (G.A.)
[3] Department of Food and Resource Economics, Korea University, Seoul, Korea.
[4] Department of Cartography and Geoinformatics, Al-Farabi Kazakh National University, 71 Al-Farabi Avenue, Almaty, Kazakhstan; oalipbeki@mail.ru
[5] Department of Social Humanitarian Disciplines, The Academy of Physical Education and Mass Sports, Expo Business Center, Mangilik El Avenue, B 2.2., Astana, Kazakhstan; ambal1974@mail.ru
[6] Department of Electrical Engineering and Information Technology, University of Naples Federico II, Naples, Italy; tanat8511@gmai.com
* Correspondence: e-mail: songsoo@korea.ac.kr

Abstract: Rural-urban migration in Kazakhstan has intensified, leading to rural depopulation and urban strain. This study analyzes migration drivers in the Akmola region, with a focus on the role of corporate social responsibility (CSR). Using Partial Least Squares Structural Equation Modeling (PLS-SEM), it examines the effects of agricultural production, economic vitality, local amenities, and CSR initiatives. The results show that agricultural modernization indirectly contributes to outmigration by reducing rural labor demand, while improvements in amenities and economic growth alone do not significantly retain rural populations. By contrast, CSR initiatives significantly enhance local amenities and living conditions, positively influencing population retention. Migration decisions are shaped in a complex manner, driven more by household risk diversification strategies and aspirations for better opportunities than by immediate local conditions. These findings highlight the need for integrated rural development policies that avoid restrictive migration controls, promote CSR engagement, diversify rural employment, and strengthen social infrastructure to foster sustainable and balanced regional development.

Keywords: Migration, corporate social responsibility (CSR), urbanization, economic vitality, welfare

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1. Introduction

Global urbanization has accelerated significantly in recent decades, surpassing the 50% threshold in 2007 and reaching 55.3% in 2020 (World Bank, 2020). As of 2024, approximately 56% of the world's population-4.4 billion people-reside in urban areas, and this figure is expected to increase to 68% by 2050 (United Nations, 2018). This urban shift is driven by multiple factors, including economic opportunities, better infrastructure, and improved social services. The global rural population, currently around 3.4 billion, is expected to decline to 3.1 billion by 2050 (United Nations, 2018). This trend is evident in both developed and developing regions-for instance, only 20% of the European Union's population currently resides in rural areas, while China's rural population has decreased by 28% between 2000 and 2020 (Conferences, 2023).

Kazakhstan has experienced significant shifts in rural-urban migration patterns since its independence. In 1991, the rural population accounted for 42.8% of the total, gradually increasing to 46.9% by 2008. However, since 2009, a steady decline has been observed, with the rural population dropping to 37.8% in 2024 (Bureau of National Statistics, 2024a). This decline is driven by economic disparities, lack of infrastructure, and limited access to social services, prompting migration to urban areas, particularly Astana, Almaty, and Shymkent. From 2020 to 2022, approximately 2 million rural residents migrated to Kazakhstan's three largest cities, exacerbating urban infrastructure pressures, rising housing costs, traffic congestion, and increased demand for public services (Bodauhan & Zhenshan, 2023).

Migration has disproportionately affected Kazakhstan's most agriculturally promising regions, such as Akmola, Kostanay, North Kazakhstan, and East Kazakhstan, where depopulation threatens agricultural sustainability and rural economic stability. This phenomenon has placed increasing pressure on state resources, highlighting the need for private sector engagement through CSR initiatives to support rural economic sustainability and mitigate the negative effects of migration (Bureau of National Statistics, 2024b).

CSR has emerged globally as an effective tool for fostering both economic and social progress. Research indicates that CSR not only enhances business competitiveness but also contributes to improvements in the broader social and economic environment (Bulkhairova et al., 2023). In Europe, CSR has played a particularly significant role in addressing public welfare challenges, especially in post-socialist economies, where it has helped fill the gaps left by retreating state policies (Grazhevska & Mostepaniuk, 2021). Companies that engage in CSR benefit from improved risk management, cost efficiency, customer trust, and overall business sustainability (Sprinkle & Maines, 2010).

In Kazakhstan, however, CSR remains largely underutilized in rural development strategies, despite its potential to address pressing social and economic issues. This research therefore aims to analyze the key drivers of rural population changes and to assess the role of CSR in mitigating migration pressures and promoting sustainable rural development. The study focuses on the Akmola region, a strategically located province in northern Kazakhstan with substantial agricultural and economic potential. Specifically, it seeks to answer the following research questions: (1) What are the primary factors driving rural population change in the Akmola region? (2) How can CSR contribute to addressing rural challenges and fostering sustainable development?

A key contribution of this study is its comprehensive analysis of migration dynamics using PLS-SEM. The research focuses on three core constructs-economic vitality, socioeconomic welfare, and urbanization-while offering nuanced insights into the role of CSR in shaping rural migration patterns.

The findings of this study reveal the pivotal role of welfare and urbanization in shaping migration patterns in Kazakhstan. While economic vitality does not have a direct effect on migration, its impact is more pronounced in highly industrialized regions. The study underscores the need for targeted policy interventions that prioritize urban development and social welfare improvements, as these factors are the key drivers of population movement. Most importantly, the research identifies CSR as a universally valuable tool for attracting and retaining populations, regardless of the level of industrialization in each region. To the best of our knowledge, this is the first study to apply the PLS-SEM model to analyze migration dynamics in Kazakhstan, providing empirical evidence on the differential impacts of CSR across rural and urbanized regions.

The remainder of this paper is structured as follows: Section 2 reviews the relevant literature, Section 3 describes the study area and dataset, Section 4 outlines the empirical methodology, Section 5 presents the key findings, and Section 6 concludes the study.

2. Data

2.1 The area of study

The Akmola region represents a critical case study for understanding rural population dynamics in Kazakhstan, characterized by significant agricultural potential, environmental vulnerabilities, and complex demographic challenges. Located in northern Kazakhstan and adjacent to the national capital, Astana, the Akmola oblast includes 17 administrative districts. This study focuses on eight strategically selected districts - Essil, Zharkaiyn, Zhaksy, Tselinograd, Shortandy, Arshaly, Zerendy, and Korgalzhyn - due to their representative characteristics and geographic, economic, and demographic relevance (see Figure 1).

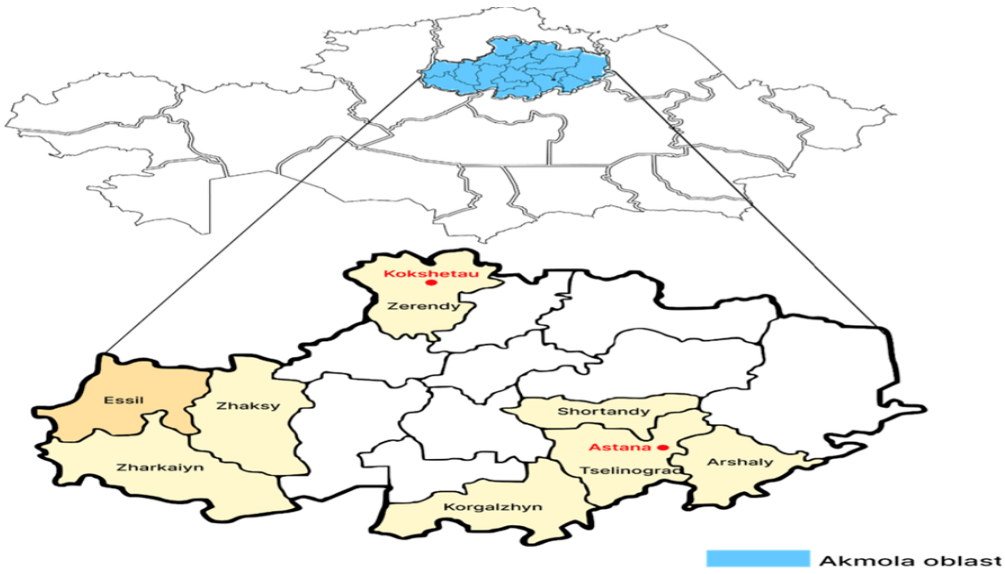

Figure 1. Eight districts of the Akmola region (oblast)

The Akmola region emerges as a key agricultural hub, ranking first in agricultural output nationwide in 2024. It contributes more than 25% of the country's grain production, with wheat and barley occupying over 84% of its cultivated land (Akshalov, 2024). Its diverse geographical landscape includes steppe zones, lakes, and resort areas, while its proximity to Astana enhances its logistical and economic connectivity (Prime Minister of Kazakhstan, 2023). The region's development is also supported by its growing engagement in agro-processing and tourism, evidenced by recent investments such as a planned wheat processing facility aimed at boosting value-added production (Times of Central Asia, 2024).

Despite these advantages, Akmola faces persistent demographic challenges. As of 2025, the region had a population of approximately 787,400, with 57.3% residing in urban areas and 42.7% in rural zones (Bureau of National Statistics, 2025). However, rural areas are experiencing steady depopulation: 7 out of the 8 studied districts have seen consistent population decline. These trends are largely driven by limited employment opportunities, uneven access to infrastructure and public services, and broader rural-urban migration patterns that reflect national development disparities (World Bank, 2020; Laruelle, 2022).

Environmental sustainability is also a concern. Around 40% of Akmola's rangelands are degraded, and livestock carrying capacity varies significantly across districts due to climate variability and land management issues (Asian Development Bank, 2022). These structural challenges constrain long-term agricultural productivity and increase pressure on rural livelihoods.

Given this complex interplay of agricultural capacity, geographic diversity, proximity to urban centers, and population decline, the Akmola region provides a valuable context for exploring the drivers of rural demographic change. It offers a compelling framework to assess how integrated approaches - such as the adoption of CSR strategies - can support sustainable development and mitigate rural depopulation in Kazakhstan.

3.2. Data sources and variables

The data for this study were sourced from the National Bureau of Statistics of the Agency of the Republic of Kazakhstan for Strategic Planning and Reforms. The datasets include social, economic, and demographic indicators for each district within the Akmola region, along with records of registered and operational legal entities, as well as entities engaged in corporate social responsibility activities. Additionally, to address any data gaps, supplementary information was obtained from the annual reports of the districts and the socio-economic development passports.

Table 2 provides descriptive statistics which shows the overview of key variables related to economic, social, and demographic indicators based on yearly data spanning from 2010 to 2021 across 8 districts.

The annual net migration has the mean value of -11.705 per 1000 people, highlighting a trend of net outmigration across the observed districts, with more people leaving than arriving on average. This negative migration trend is further emphasized by the substantial standard deviation of 19.007, indicating considerable fluctuations in migration patterns over the years. The range for these variable

spans from a minimum of -61.367, reflecting regions with significant population loss, to a maximum of 88.641, where net migration is notably positive.

Table 1. Descriptive statistics

Latent	Indicator	Measure	Mean	Min	Max.	S.D.
Migration	Migration	(Inflow - outflow) per 1,000 residents	-11.705	-61.367	88.641	18.578
CSR	CSR	Number of CSR per capita	1.039	0.478	2.28	0.357
Agriculture	Agricultural dependency	Ratio of agricultural output to total output	0.671	0.146	0.975	0.23
	Livestock	Stock of livestock per capita	0.317	0.067	1.341	0.224
	Crop	Crop production per capital in million tenge	1.163	0.059	13.812	1.71
Economic vitality	Business entities	Number of business entities per capita	1.751	0.704	5.086	0.837
	Total production	Total production per capita in million tenge	1.031	0.05	11.17	1.842
	Unemployment	Unemployment rate	0.936	0.2	2.6	0.517
Amenity	Distance to Capital	Highway distant to Astana in kilometers	237.963	58	487	161.131
	Highway	Total length of highway in kilometers	409.639	254	1037.5	209.351
	Medicine	Number of healthcare professionals per 100 residents	1.128	0.381	3.595	0.776
	Preschool	Number of preschools relative to school-aged children	0.239	0.058	0.731	0.119
	School	Number of standard schools relative to school-aged children	0.07	0.018	0.181	0.04

Note: Number of observations=112

3. Methodology and Methods: Empirical Strategy

3.1. Partial least squares structural equation modeling

Structural equation modeling (SEM) is a statistical technique used to estimate causal relationships among latent variables-unobservable concepts inferred through measurable indicators. SEM enables the simultaneous analysis of complex relationships between multiple dependent and independent variables. Two primary approaches exist: covariance-based SEM (CB-SEM), primarily used for theory validation, and PLS-SEM, which prioritizes prediction while offering causal insights (Fornell & Bookstein, 1982; Hair et al., 2017b; Willaby et al., 2015).

A PLS path model consists of two key components: the structural model (inner model), which represents relationships between constructs, and the measurement model (outer model), which links

constructs to their indicators. Measurement models classify constructs as exogenous, which only explain other constructs, or endogenous, which are explained by other constructs. PLS-SEM is particularly valuable for small sample sizes and models with numerous constructs and indicators, as it estimates relationships separately in the measurement and structural models using ordinary least squares regression (Fornell & Bookstein, 1982; Hair et al., 2017b; Willaby et al., 2015).

A key advantage of PLS-SEM is its minimal reliance on distributional assumptions, making it suitable for social science research where data often deviate from normality (Hair et al., 2012b; Nitzl, 2016; do Valle & Assaker, 2016). Additionally, it accounts for measurement error in observed variables, allowing for more precise estimation of theoretical constructs (Fornell & Bookstein, 1982; Hair et al., 2017b; Willaby et al., 2015; Hair et al., 2012b; Nitzl, 2016; do Valle & Assaker, 2016; Cole & Preacher, 2014). These methodological strengths make PLS-SEM a robust tool for handling complex, nonnormal datasets while maintaining analytical precision.

This study adopts PLS-SEM due to its suitability for small datasets and flexibility in handling the absence of distributional assumptions, aligning with the characteristics of population changes in Kazakhstan. Additionally, the potential for measurement error in the indicators, a common issue in developing country contexts, supports the appropriateness of PLS-SEM for this analysis.

3.2. Model specification

This study builds upon and extends the methodological frameworks developed by McGranahan and Beale (2000), as well as Lee et al. (2023) to investigate the factors shaping migration patterns in Kazakhstan. McGranahan and Beale (2000) examined rural population decline in the United States, highlighting the role of county-level characteristics such as poverty rates, geographic remoteness, limited natural amenities, and reliance on agriculture. These factors were conceptually grouped into economic base, geographic features, and demographic structure. While the original framework incorporated demographic indicators such as the proportion of the population aged 65 and older, such variables are not available in the current dataset and are thus excluded from this model. Instead, the present study integrates insights from Lee et al. (2023), who analyzed the determinants of population change in South Korea through the lens of regional economic vitality and service provision, thereby refining the original framework to suit the socio-economic context of Kazakhstan.

The model employs a SEM approach to investigate how structural, economic, and service-related factors shape population migration. The latent constructs include economic vitality, amenity, agriculture, and corporate social responsibility (CSR), each theorized to influence migration either directly or indirectly. This structure allows for a more nuanced understanding of the push and pull factors driving migration dynamics within a transitioning economy.

Economic vitality is operationalized through a set of indicators that capture regional entrepreneurial activity, human capital, and productivity. Specifically, it includes the number of business entities and total production, both normalized per capita, as well as the labor force measured per 1,000 residents. Together, these indicators reflect the economic attractiveness of a region and its capacity to retain or attract population through employment opportunities and investment potential.

The concept of amenity is incorporated to reflect the availability and quality of essential public services, which prior studies have identified as critical determinants of migration decisions (McGranahan & Beale, 2000). In this model, amenity is operationalized through indicators of educational access, healthcare provision, and transportation infrastructure, all normalized per capita where appropriate. Educational access is measured by the number of preschools and standard schools relative to the number of school-aged children, capturing both immediate accessibility and regional investment in human capital development. Healthcare access is represented by the number of healthcare professionals per 100 residents, indicating the capacity of the local health system to ensure well-being and demographic sustainability. Road infrastructure is included through the total length of gravel roads (in kilometers), which serves as a proxy for physical connectivity and mobility. In addition, the distant to capital can be These components are particularly salient in the context of Kazakhstan, where disparities in public service provision across regions significantly influence internal migration, particularly toward urban or better-served areas. In the context of this study, proximity to Astana-the capital and largest urban center of Kazakhstan-serves as an indicator for access to amenities. Urban centers such as Astana typically concentrate high-quality public services, healthcare, education, infrastructure, cultural institutions, and economic opportunities (Glaeser, 2011). Therefore, rural districts located closer to Astana are likely to benefit from spillover effects, including better transportation networks, greater access to secondary and tertiary healthcare, enhanced educational institutions, and stronger connectivity to markets and services compared to more remote regions.

The inclusion of corporate social responsibility (CSR) as a latent construct represents a novel contribution to the migration literature. In the context of this study, CSR reflects regional-level commitments to environmental management and social welfare. Indicators under this construct include environmental expenditure per capita, the proportion of households with access to clean water, and the availability of public green space. These variables capture how sustainable development and institutional performance influence both the livability and desirability of a location. It is hypothesized that CSR enhances regional amenity and may also exert a direct positive influence on migration patterns by signaling environmental security and quality of life.

Agricultural dependence is another crucial structural factor in this model, consistent with earlier findings by Cook and Mizwer (1994), who showed that reliance on farming or extractive industries is associated with out-migration in the United States. In this study, agricultural orientation is measured by the per capita stock of livestock (including cattle, sheep, goats, pigs, and poultry) and the ratio of agricultural output to the total economic output of the region. These indicators reflect both the scale and intensity of agrarian economic activity. It is hypothesized that regions with higher agricultural dependence may experience higher rates of out-migration, particularly among younger cohorts seeking non-agricultural opportunities in more urbanized areas.

The dependent variable, migration, is defined as net migration per 1,000 residents-calculated as the difference between in-migration and out-migration, adjusted for population size. This ratio-based specification facilitates comparability across regions of varying scales and population densities.

The model shown in Fig 2 specifies several direct and indirect paths. Economic vitality is expected to have a direct effect on migration by enhancing regional opportunities. Amenity is also expected to positively influence migration through its association with quality-of-life factors. CSR is hypothesized to contribute indirectly to migration through its positive influence on amenity, while also potentially exerting a direct effect by enhancing regional livability. Finally, agricultural dependence is expected to influence migration and economic vitality as the economy in the rural area of the Akmola region are highly dependent on agriculture. By integrating these components into a unified framework, this study offers a comprehensive analysis of the multi-dimensional factors shaping migration patterns in Kazakhstan.

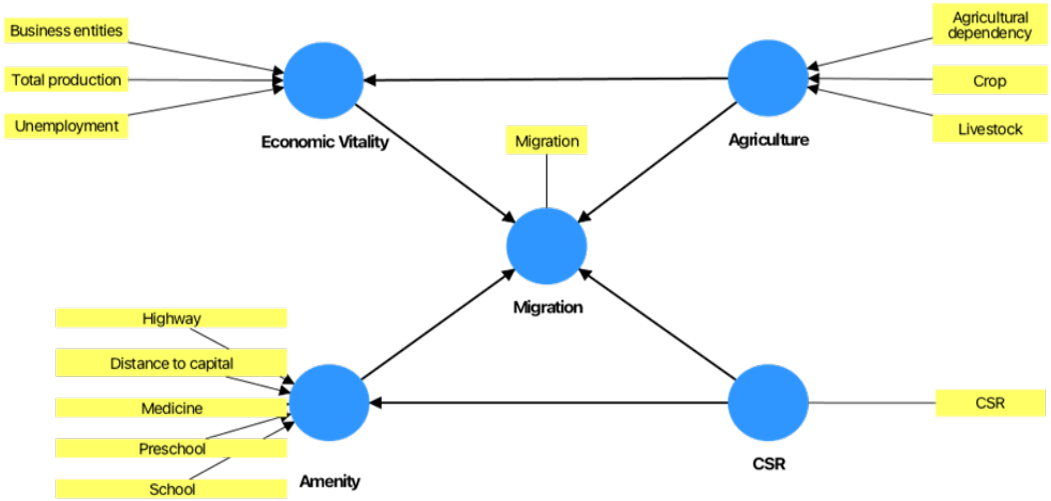

Figure 1. Visual description of constructs and interconnections within the structural model

4. Results

4.1. Model validation

Before estimating the structural relationships, the validity of the formative measurement model was rigorously evaluated. Following established guidelines (Hair et al., 2021), [40], the assessment focused on indicator collinearity, convergent validity, and the significance of indicator weights. These evaluations ensure that the constructs are appropriately specified and that the indicators adequately capture the multifaceted dimensions underlying rural migration in the Akmola region. The results of the model assessment are presented in Tables 2 through 5 and demonstrate the robustness of the formative measurement approach.

The empirical analysis adopts a formative measurement model following the guidelines of (Hair et al., 2021). Model evaluation is based on three key validity criteria: indicator collinearity,

convergent validity, and the significance of indicator weights, assessed through 5,000 bootstrap samples. A formative approach is appropriate given that the indicators are not highly intercorrelated and are not conceptually interchangeable; thus, omitting any indicator would alter the meaning of the construct (Diamantopoulos & Winklhofer, 2001). Additionally, the distinct nature of the indicators' relationships with external variables further justifies the formative specification.

Convergent validity was assessed using redundancy analysis, where the constructs were related to reflective measures capturing the same conceptual domain. The significance of indicator weights was evaluated as reported in Table 2. For Net Migration, most outer weights are statistically significant at the 5% level, except for the indicators Business Entities, Crop, School, and Total Production. However, as their outer loadings exceed 0.5, following recommendations by [40], their inclusion is justified given their substantive relevance and their adequate individual contribution to the construct's explanatory power. Notably, CSR and Migration constructs had a fixed loading of 1.0, reflecting single-indicator measures.

Overall, the model validity assessment confirms that the formative specification appropriately captures the multidimensional structure of factors influencing rural migration in the Akmola region. The results affirm the robustness of the measurement model and provide a strong foundation for the subsequent evaluation of structural relationships.

Table 2. Outer weight

	Original sample	SD	P values
Agricultural dependency -> Agriculture	0.488	0.167	0.003
Business entities -> Economic Vitality	-0.265	0.213	0.214
Crop -> Agriculture	0.323	0.255	0.206
CSR <- CSR	1	0	n/a
Distance to Capital -> Amenity	-0.293	0.113	0.01
Highway -> Amenity	0.113	0.055	0.038
Livestock -> Agriculture	0.469	0.225	0.037
Medicine -> Amenity	1.128	0.174	0
Migration <- Migration	1	0	n/a
Preschool -> Amenity	0.45	0.101	0
School -> Amenity	-0.16	0.168	0.342
Total production -> Economic Vitality	-0.169	0.108	0.119
Unemployment -> Economic Vitality	0.839	0.355	0.018

Collinearity among indicators was evaluated using the variance inflation factor (VIF) values, presented in Table 3.

Table 3. Collinearity check

Variable	VIF
Agricultural dependency	1.339
Business entities	1.338
CSR	1
Crop	2.431
Distance to Capital	4.547
Highway	2.007
Livestock	1.967
Medicine	13.289
Migration	1
Preschool	2.416

School	10.756
Total production	1.006
Unemployment	1.343

The majority of VIF values are below the conservative threshold of 5 (Hair et al., 2021), indicating acceptable levels of collinearity and suggesting that multicollinearity is not a threat to the model estimation. While Medicine (VIF = 13.289) and School (VIF = 10.756) exceed the recommended threshold, prior literature suggests that in formative models, such instances may occur when indicators capture distinct but strongly associated aspects of a concept (Petter, Straub, & Rai, 2007). Their theoretical relevance and empirical contribution were retained, considering the context of rural service provision in the Akmola region.

Table 4. Convergent validity (redundancy analysis)

	Original sample	SD	P values
Economic Vitality -> Economic Vitality_R	0.961	0.007	0
Agriculture -> Agriculture_R	0.731	0.057	0
Amenity -> Amenity_R	0.98	0.004	0

Table 4, the path coefficients from formative constructs to their reflective counterparts are high and statistically significant: Economic Vitality (β = 0.961, p < 0.001), Agriculture (β = 0.731, p < 0.001), and Amenity (β = 0.980, p < 0.001). These results provide strong evidence of convergent validity, satisfying an essential requirement for formative measurement models.

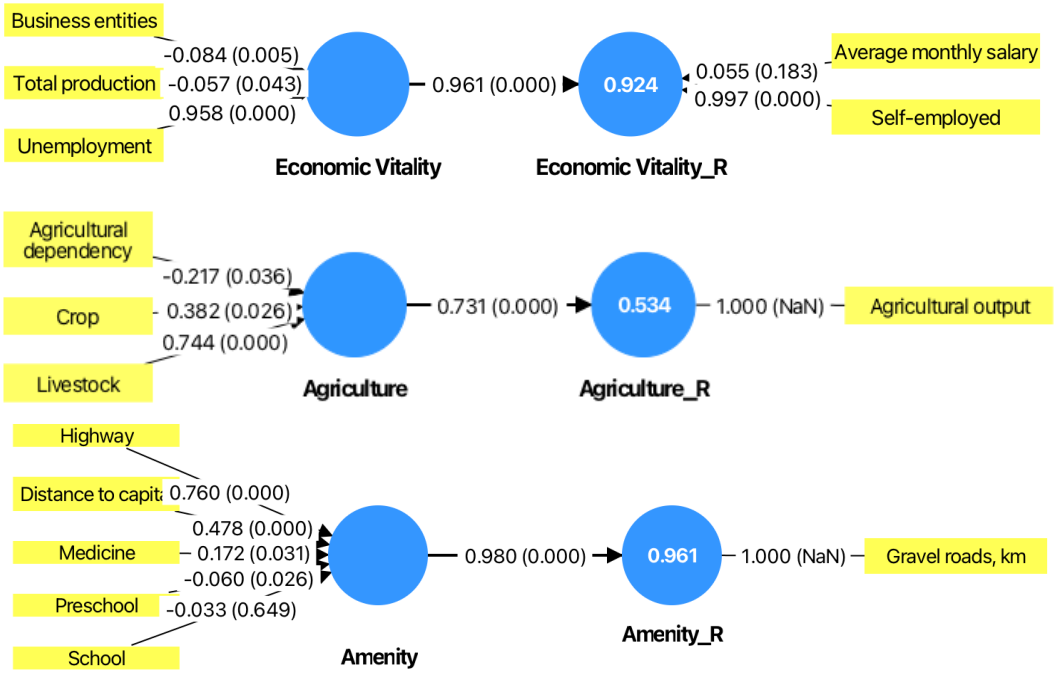

Figure 3. Redundancy analysis path coefficients

4.2 Analytic results

The structural model analysis provides the total effects along with path coefficients and corresponding p-values derived from bootstrapping with 5,000 resamples. The analysis aimed to examine the strength and statistical significance of the hypothesized relationships between constructs.

The relationship between agriculture and migration was negative but statistically non-significant (β = – 0.109, p = 0.294), indicating that higher agricultural production does not exert a strong or consistent influence on migration patterns within the studied context. Similarly, the path from agriculture to economic vitality was negative and non-significant (β = –0.733, p = 0.317), suggesting that agricultural improvements alone may not necessarily stimulate broader economic development

outcomes in this setting. A strong and statistically significant relationship was found between CSR and amenity ($\beta = 0.927$, $p < 0.001$), confirming that corporate social responsibility initiatives substantially enhance the availability and quality of local amenities. This result highlights the critical role of CSR activities in promoting community development. The path from amenity to migration was negative ($\beta = –0.210$, $p = 0.171$), but the effect was not statistically significant. The direct effect of CSR on migration was positive and statistically significant ($\beta = 0.520$, $p = 0.010$), suggesting that CSR programs may influence migration behavior independently of their impact on amenities, potentially through mechanisms such as employment generation, social cohesion, or improved quality of life. The path from economic vitality to migration was positive ($\beta = 0.830$, $p = 0.310$), but not statistically significant. While this indicates a possible positive association between local economic development and migration, the relationship lacks sufficient statistical support within the sample.

Overall, the results emphasize the pivotal role of CSR in shaping local development outcomes, while the effects of agriculture, amenities, and economic vitality on migration were generally weaker or non-significant, pointing to the complex and context-dependent nature of migration dynamics.

The results of PLS-SEM reveal notable discrepancies between the direct path coefficients and the corresponding total effects, particularly in the relationship between agriculture and migration. While the direct effect of agriculture on migration is relatively weak and statistically non-significant ($\beta = –0.109$, $p = 0.294$), the total effect is substantially larger in magnitude and statistically significant ($\beta = –0.717$, $p < 0.001$). This discrepancy suggests the existence of strong indirect effects that mediate the relationship between agriculture and migration.

Specifically, the negative indirect effect likely operates through agriculture's impact on economic vitality, which in turn affects migration outcomes. Although the direct path from agriculture to economic vitality is also statistically non-significant ($\beta = –0.733$, $p = 0.317$), the magnitude indicates a potential substantive, if unstable, negative influence. The strong total effect on migration thus indicates that even if the direct link is weak, the cumulative influence via intervening constructs like economic vitality is considerable. In PLS-SEM, such differences between direct paths and total effects are not unusual, especially in complex models where mediating variables significantly absorb and transmit influence from exogenous constructs to endogenous outcomes (Hair et al., 2022).

Moreover, a similar observation arises in the CSR-to-migration path, where the direct effect ($\beta = 0.520$, $p = 0.010$) is stronger than the total effect ($\beta = 0.326$, $p = 0.033$). This suggests that some of the positive influence of CSR on migration is counterbalanced by its indirect effect through amenities, which might slightly offset the overall magnitude of CSR's impact on migration. As suggested by Sarstedt et al. (2022), when total effects are smaller than direct effects, it typically indicates that indirect pathways may work in opposing directions or dilute the direct influence.

Table 5. Total effects

	Original sample	SD	P values
Agriculture -> Economic Vitality	-0.733	0.733	0.317
Agriculture -> Migration	-0.717	0.159	0
Amenity -> Migration	-0.21	0.153	0.171
CSR -> Amenity	0.927	0.016	0
CSR -> Migration	0.326	0.152	0.033
Economic Vitality -> Migration	0.83	0.817	0.31

Table 6. Net migration rate path coefficients

	Original sample	SD	P values
Agriculture -> Economic Vitality	-0.733	0.733	0.317
Agriculture -> Migration	-0.109	0.104	0.294
Amenity -> Migration	-0.21	0.153	0.171
CSR -> Amenity	0.927	0.016	0
CSR -> Migration	0.52	0.202	0.01

Economic Vitality -> Migration	0.83	0.817	0.31

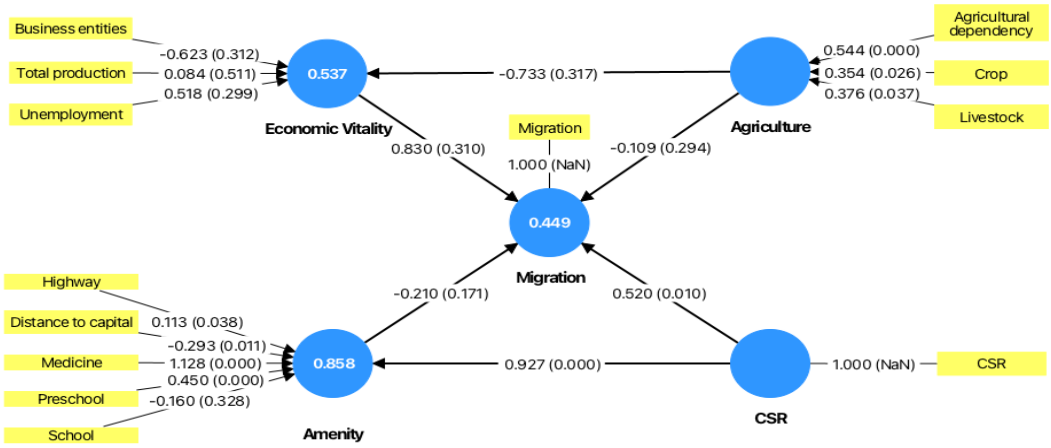

Figure 4. Path coefficient

note: p-value in parenthesis.

4.3 The impact of CSR on migration

The Tselinograd district has demonstrated significant population growth over the past decade, positioning itself as the leading district in the Akmola region in terms of demographic expansion. While other districts, such as Burabay and Zerendinsky, have experienced population decline, the Tselinograd district's upward trajectory suggests underlying economic and social factors influencing migration patterns. One key driver of this growth is corporate social responsibility (CSR), which has played a vital role in shaping the district's socio-economic landscape, thereby influencing net migration trends.

Migration decisions are often influenced by a combination of economic opportunities and social factors, including access to quality infrastructure, healthcare, and education. The Tselinograd district, being part of the Astana agglomeration, benefits from proximity to a major urban (Tsvetkova, V., 2024) while maintaining its rural character (Prime Minister of Kazakhstan, 2024) However, a critical aspect sustaining its population growth is the active involvement of local businesses in CSR initiatives, which enhance the quality of life for residents and reduce incentives for rural-to-urban migration.

CSR initiatives in the Tselinograd district have focused on several key areas, including (Akimat of Akmola region, 2024).

Social welfare and support: Local enterprises provide financial sponsorship for vulnerable populations, including veterans, people with disabilities, and students. They also contribute to kindergartens, schools, and healthcare facilities, ensuring essential services are accessible to rural residents.

Infrastructure development: Businesses contribute to road maintenance, heating, water supply, and street lighting projects, which improve living conditions and increase the attractiveness of the district for potential migrants.

Economic stability: With an increase in active business entities from 443 in 2010 to 931 in 2023 (Bureau of National Statistics, 2024), CSR-oriented businesses have played a role in sustaining employment opportunities. The presence of socially responsible agricultural enterprises such as Agrofirma Rodina LLP demonstrates how businesses invest not only in production but also in worker well-being and community development (Akimat of Akmola region, 2024).

These CSR-driven interventions help mitigate the factors driving migration to Astana and other urban centers. By improving rural conditions, businesses indirectly encourage population retention and even attract new residents seeking stable employment and social benefits.

Moreover, these enterprises frequently offer comprehensive "social packages" to their employees and the broader rural population, which include support for recreation, health resort treatments, and vouchers to children's health facilities. This suite of benefits, while not directly increasing wages, helps to compensate for income limitations and plays a vital role in improving overall living conditions. By addressing both material and quality-of-life concerns—such as access to healthcare, education, infrastructure, and cultural life - CSR efforts in these rural contexts help to mitigate key push factors that traditionally drive rural-urban migration (Verma, 2022).The social

benefits provided through these initiatives not only elevate community welfare but also serve strategic business interests by maintaining a stable and satisfied local labor force (Alipbeki et al., 2023).

The case of Agrofirma Rodina LLP in the village of Rodina exemplifies the tangible outcomes of long-term CSR investment. This agricultural enterprise has significantly improved local infrastructure by constructing water supply systems, heating networks, street lighting, and paved roads. All residential buildings in the central estate are connected to centralized heating, and water supply reaches all three nearby villages. In addition, the company provides funding for social, educational, and healthcare institutions, contributing to high living standards for residents. These efforts have earned Agrofirma Rodina LLP multiple national awards for corporate social responsibility, and the village itself has been repeatedly recognized as the "Best Settlement of the Region." From 2010 to 2023, the district experienced steady rural population growth, largely driven by migration inflows attracted by decent wages and improved quality of life. This case demonstrates how strategic CSR can foster community development, strengthen workforce retention, and reduce rural-urban migration.

4.4 Economic vitality

Based on previous studies, the relationship between economic factors and migration is recognized as highly complex, with inconsistent and context-dependent findings (Clemens, 2011). Therefore, deterministic interpretations based solely on the signs and significance of analytic outputs should be avoided. In the context of Kazakhstan, it is necessary to examine how individuals respond to shifts in opportunities and environmental conditions within both their home communities and potential migration destinations. The present analysis indicates that economic vitality did not exhibit a statistically significant direct effect on migration, underscoring the nuanced nature of the relationship between rural economic development and population movements. Specifically, given that Astana, the new capital of Kazakhstan, has recently experienced significant economic development, this dynamic may be particularly pronounced among individuals actively seeking better opportunities for education, employment, and other forms of socioeconomic advancement. Even when rural areas experience modest economic growth, persistent disparities in wages, career advancement opportunities, and service provision between rural and urban regions may continue to sustain migration flows (Glaeser & Gottlieb, 2009).

Besides, the limited significance of immediate economic viability may reflect the fact that migration decisions among rural populations often represent a strategic approach to risk diversification rather than a pursuit of complete relocation. Families in rural areas may intentionally support partial migration - encouraging younger or working-age members to seek employment opportunities in urban centers - to supplement household income and mitigate risks associated with climate variability, market fluctuations, and agricultural instability. In this context, migration acts not merely as a response to economic downturns but rather as a proactive household livelihood stabilization strategy. By spreading labor across different geographic and economic spaces, rural households enhance their resilience to environmental and economic shocks, ensuring a more stable and diversified portfolio of income sources (Warner, 2010; Gautam & Andersen, 2016; Nawrotzki & DeWaard, 2016; Marchetta, 2008; Wang et al., 2025; McDowell & De Haan, 1997; Asfaw et al., 2015; Choquette-Levy et al., 2021).

Additionally, it is important to note rural economic vitality may not necessarily translate into employment opportunities in the Akmola region in Kazakhstan, given the analytic results showing the economic vitality does not retain population. The expansion of capital-intensive, mechanized agriculture often generates limited additional demand for labor, especially for low-skilled rural workers (Lobley & Butler, 2010). As such, improvements in aggregate economic indicators may not significantly alter the structural labor market dynamics that underpin rural-urban migration.

In sum, the analytic results show that the migration dynamics in the Akmola region showcase the complexity of rural-urban population movements, where economic vitality alone does not straightforwardly retain rural populations. Instead, migration decisions reflect a combination of structural economic constraints, limited rural labor opportunities, and household-level strategies for risk diversification and livelihood stabilization. These findings highlight the need for a nuanced understanding of how broader socioeconomic transformations interact with localized rural realities in shaping migration patterns.

5.5. The impact of amenity on migration

Although amenities such as public services, education, transportation access, and healthcare are traditionally regarded as significant pull factors for population retention (Chen & Rosenthal, 2008), their impact on rural migration in this study was found to be statistically insignificant in this research. This finding contrasts with the previous literature, which emphasizes that the presence of

robust amenities enhances the attractiveness of a locality and discourages out-migration. However, it is important to recognize the specific characteristics of the present sample, which is confined to rural areas.

In rural contexts, improved access to amenities may not solely serve as an anchor but can also enhance individuals' capabilities and aspirations, enabling them to pursue broader opportunities, particularly in urban centers. Consistent with the "capability to migrate" framework (Haas, 2010), better amenities lower barriers to migration by reducing informational, financial, and social constraints. Thus, rather than acting purely as retention factors, amenities in rural settings may paradoxically facilitate out-migration by empowering residents to seek improved educational, economic, or social prospects in more urbanized environments.

Overall, the observed insignificance of amenities in the Akmola region highlights the complex and context-specific nature of migration drivers in rural areas, where access to local resources may, under certain circumstances, act as a catalyst for mobility rather than a deterrent.

5.6. The impact of agriculture on migration

At first glance, it appears paradoxical that rural outmigration would intensify concurrently with significant increases in agricultural production. However, the structural transformation currently unfolding within Kazakhstan's agricultural sector reveals a more nuanced dynamic. The sector's remarkable growth-exemplified by record grain harvests of 26.7 million tonnes in 2024 and an 18.8 percent increase in overall crop production-has been primarily driven by technological innovation, large-scale mechanization, and international investment partnerships (Menon, 2024). Rather than generating widespread employment opportunities, these productivity gains have been achieved predominantly through labor-saving technologies, resulting in a net reduction in rural labor demand. Initiatives under the Digital Kazakhstan programme and the Agro-Industrial Complex Development Concept (2021–2030) have accelerated the adoption of precision agriculture and automated systems, enhanced efficiency but simultaneously diminishing traditional employment pathways. Consequently, even as sectoral output rises, the erosion of rural labor markets continues to propel outmigration, particularly among younger cohorts seeking broader educational and economic prospects in urban areas.

However, rising productivity-particularly when enabled by labor-displacing technologies - often reduces the demand for agricultural labor. Precision farming systems, GPS-guided machinery, drones, and soil-monitoring technologies have increased output per hectare but also accelerated the substitution of capital for labor (Menon, 2024). This phenomenon is particularly pronounced in Kazakhstan's vast rural regions, where a declining need for human labor has coincided with rising youth outmigration. Many young people, unable to find work in an increasingly digitized agricultural economy or lacking the skills required to engage with new technologies, are drawn to urban centers in pursuit of better educational and employment opportunities.

The influx of international agribusiness investments—such as Coca-Cola's $55.2 million plant in Shymkent, the $500 million joint venture by PepsiCo and Carlsberg, and Chinese-led smart agriculture research centers-has further advanced this technological shift (Menon, 2024). While such collaborations increase productivity and economic value, they also consolidate production in large-scale, capital-intensive operations, marginalizing smallholder farmers and displacing traditional rural employment structures. Moreover, even as connectivity and digital literacy initiatives aim to bridge the rural-urban digital divide, the initial lack of infrastructure and financial access continues to limit the inclusion of rural populations in these innovations.

This dynamic illustrates a broader trend observed in developing economies: increases in agricultural productivity- especially when not matched with inclusive rural development policies - can intensify rural-urban migration. While Kazakhstan is strategically positioning itself as a global leader in sustainable agriculture, without parallel efforts to ensure equitable labor integration and rural community development, productivity gains may continue to coincide with demographic decline in rural areas.

5.7. Policy Implications

The findings of this study suggest several critical policy directions to address rural migration dynamics and promote sustainable rural development in Kazakhstan.

First, while corporate social responsibility (CSR) initiatives have proven effective in enhancing public welfare and improving rural living standards, future CSR strategies should more explicitly prioritize the creation of stable employment opportunities and the enhancement of job security. Job creation linked to CSR efforts can reduce rural households' exposure to labor market risks and encourage population retention by addressing rural residents' aversion to economic uncertainty

(Porter & Kramer, 2011; Jenkins, 2005). Policy incentives that reward CSR projects for employment generation, skills development, and local workforce participation could further amplify their positive social and economic impacts.

Second, while the transition to capital-intensive and mechanized agriculture is vital for national competitiveness, indiscriminate subsidies for technological upgrading risk disproportionately harming smallholder farmers. Without complementary support mechanisms, such transitions may exacerbate rural inequality and marginalize vulnerable farming communities (Pingali, 2007). Policymakers should therefore pair modernization subsidies with targeted rural education programs, vocational training, and extension services to equip small farmers with the necessary skills and resources to adapt successfully to the evolving agro-industrial economy.

Third, stronger policies are needed to support small farmers in building resilience to economic and environmental challenges. Rural communities in Kazakhstan remain highly vulnerable to climate change impacts, such as extreme weather events and agricultural volatility, which increase the incentive for income diversification. Promoting diverse non-farm employment opportunities — particularly during non-farming seasons — alongside agricultural support measures is essential for sustaining rural livelihoods (Ellis, 2000). Agricultural policies should assist smallholder farmers in adopting crop selection strategies that maximize resilience and profitability. Additionally, investments in value-added agricultural production, such as processing facilities, branding initiatives, and market access improvements, can help small farmers capture greater value within regional supply chains (Barrett et al., 2001). Together, these measures would enhance rural incomes, reduce dependence on climate-sensitive agriculture, and diminish migration pressures driven by economic insecurity.

Finally, it is crucial to avoid restrictive migration policies that seek to artificially anchor rural populations. Migration is a highly complex phenomenon influenced by multiple social, economic, and environmental factors and cannot be adequately addressed through restrictive or simplistic approaches. Moreover, empirical evidence shows that migration does not harm food security or agricultural output at the household level. Policies that tie welfare or public services to land tenure risk undermining economic efficiency, household autonomy, and rural resilience. Instead, migration should be recognized as an adaptive livelihood strategy, and policies should focus on empowering rural residents with the resources, education, and opportunities to make informed mobility decisions that support their long-term wellbeing.

Taken together, these policy recommendations emphasize the need for an integrated rural development strategy that balances technological advancement with social inclusion, smallholder support, climate resilience, and respect for the adaptive strategies rural households employ to secure their livelihoods.

6. Conclusion

This study investigated the determinants of rural migration in Kazakhstan, with a particular focus on the Akmola region, and assessed the role of corporate social responsibility (CSR) in shaping migration dynamics. Using PLS-SEM, the analysis uncovered several important insights into the complex and context-specific nature of rural mobility.

Contrary to conventional expectations, the growth in agricultural production exhibited a negative association with rural population retention. Although direct effects were weak and statistically insignificant, the total effects suggest that agricultural modernization—largely driven by mechanization, automation, and international investment—has indirectly contributed to increased rural outmigration. As productivity rises, the demand for manual labor declines, particularly among younger populations, prompting migration to urban centers in search of better educational and employment opportunities.

Amenities, traditionally viewed as strong retention factors, demonstrated a statistically insignificant relationship with migration. In the rural context, improved access to healthcare, education, and infrastructure appears to enhance individuals' capabilities and aspirations, facilitating rather than inhibiting outmigration, consistent with the "capability to migrate" framework (Haas, 2010). These findings highlight the paradox that better amenities can simultaneously improve living standards and reduce barriers to mobility.

The role of CSR emerged as a central factor influencing migration outcomes. CSR initiatives were found to significantly improve the availability and quality of local amenities and exerted a direct positive effect on migration behavior. Case evidence from the Tselinograd district, particularly through enterprises like Agrofirma Rodina LLP, demonstrated how CSR investments in social welfare, infrastructure, and employment stability can retain rural populations by enhancing quality of life and mitigating traditional push factors.

Importantly, economic vitality itself did not exhibit a significant direct effect on migration. This finding suggests that localized economic growth in rural areas, particularly when driven by

capital-intensive agricultural development, may not generate sufficiently broad or diverse employment opportunities to retain rural populations. Migration decisions appear to reflect broader opportunity comparisons with urban areas and strategies for household risk diversification, rather than simply responding to local economic conditions.

These findings carry critical policy implications. Investments in rural economic growth must be complemented by strategies for diversifying employment opportunities, particularly through supporting agricultural cooperatives of various directions (especially marketing and service-oriented), improving social services, and expanding educational access and opportunities. CSR represents an effective mechanism for improving rural sustainability by addressing both economic and quality-of-life factors. Encouraging private sector engagement in rural development initiatives can help stabilize rural populations and foster inclusive growth.

This study contributes to the rural migration literature by offering new empirical insights from Kazakhstan through the application of PLS-SEM. However, its focus on the Akmola region due to data availability limits generalizability, and future research should expand to other regions and explore additional mediating factors, such as digital inclusion, labor market diversity, and social capital, to build a more comprehensive understanding of rural migration processes.

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