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ASSESSMENT OF DYNAMIC RELATIONSHIPS BETWEEN THE DEVELOPMENT OF THE HOSPITALITY INDUSTRY AND REGIONAL INEQUALITY

This study analyses the relationship between the development of the hospitality industry and the level of regional inequality in Kazakhstan. The aim of the study is to assess dynamic relationships, identify their nature and determine the directions of influence. The relevance of the topic is due to the need to understand the role of the tourism sector as an instrument of regional policy capable of both stimulating smoothing and exacerbating economic disparities.

The study uses panel data analysis for the country for the period from 2001 to 2023. To assess the development of the hospitality industry, indicators such as the number of accommodation places, the number of visitors served, and the volume of investment in fixed capital in this sector are considered. The level of regional inequality is measured using the Gini coefficient and the coefficient of variation of gross regional product (GRP) per capita. The methodology includes descriptive statistical analysis to identify the main characteristics of the data, as well as econometric modelling. The Hausman test was used to select the most appropriate panel data model (with fixed or random effects). The results obtained will make it possible to assess how the development of the hospitality industry affects regional disparities and the depth of poverty.

The results of the study showed that the development of tourism infrastructure has a statistically significant positive impact on the sustainable growth of regions, while high youth unemployment and poverty depth hinder the achievement of balanced development. In addition, inflationary processes have varying degrees of impact depending on regional characteristics. The findings underscore the need to integrate tourism into regional sustainable development strategies and to intensify employment programmes. The recommendations are aimed at shaping differentiated regional policies that contribute to reducing inequality and stimulating local economic growth through the hospitality industry.

Keywords: hospitality industry, regional inequality, panel data, Gini coefficient, econometric analysis.

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Қонақжайлық саласының дамуы мен аймақтық теңсіздік арасындағы серпіндік байланыстарды бағалау

Бұл зерттеу Қазақстандағы қонақжайлылық индустриясының дамуы мен аймақтық теңсіздік деңгейі арасындағы байланысты талдайды. Зерттеудің мақсаты – динамикалық қатынастарды бағалау, олардың сипатын анықтау және әсер ету бағыттарын анықтау. Тақырыптың өзектілігі туризм секторының экономикалық теңсіздікті тегістеуді ынталандыруға және күшейтуге қабілетті аймақтық саясат құралы ретіндегі рөлін түсіну қажеттілігіне байланысты.

Зерттеуде 2001 жылдан 2023 жылға дейінгі кезеңдегі ел бойынша панельдік деректерді талдау қолданылады. Қонақжайлылық индустриясының дамуын бағалау үшін орналастыру орындарының саны, қызмет көрсетілген келушілер саны және осы сектордағы негізгі капиталға инвестиция көлемі сияқты көрсеткіштер қарастырылады. Аймақтық теңсіздік деңгейі Джини коэффициенті және жан басына шаққандағы жалпы аймақтық өнімнің (ЖӨӨ) вариация коэффициенті арқылы өлшенеді. Әдістеме деректердің негізгі сипаттамаларын анықтау үшін сипаттамалық статистикалық талдауды, сондай-ақ эконометрикалық модельдеуді қамтиды. Ең қолайлы панельдік деректер моделін (тұрақты немесе кездейсоқ әсерлері бар) таңдау үшін

колданылды. Алынған нәтижелер қонақжайлылық индустриясының дамуының аймақтық теңсіздікке және кедейлік тереңдігіне қалай әсер ететінін бағалауға мүмкіндік береді.

Зерттеу нәтижелері туризм инфрақұрылымының дамуы аймақтардың тұрақты өсуіне статистикалық тұрғыдан маңызды оң әсер ететінін, ал жастар арасындағы жұмыссыздықтың жоғары деңгейі мен кедейлік тереңдігі теңгерімді дамуға қол жеткізуге кедергі келтіретінін көрсетті. Сонымен қатар инфляциялық процестер аймақтық ерекшеліктерге байланысты әртүрлі дәрежеде әсер етеді. Зерттеу нәтижелері туризмді аймақтық тұрақты даму стратегияларына енгізу және жұмыспен қамту бағдарламаларын жандандыру қажеттілігін көрсетеді. Ұсыныстар қонақжайлылық индустриясы арқылы теңсіздікті азайтуға және жергілікті экономикалық өсуді ынталандыруға ықпал ететін сараланған аймақтық саясатты қалыптастыруға бағытталған.

Түйін сөздер: қонақжайлылық индустриясы, аймақтық теңсіздік, панельдік деректер, Джини коэффициенті, эконометрикалық талдау.

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Оценка динамических связей между развитием индустрии гостеприимства и региональным неравенством

В данном исследовании анализируется взаимосвязь между развитием индустрии гостеприимства и уровнем регионального неравенства в Казахстане. Цель исследования – оценить динамические взаимосвязи, выявить их характер и определить направления влияния. Актуальность темы обусловлена необходимостью понимания роли сектора туризма как инструмента региональной политики, способного как стимулировать сглаживание, так и усугублять экономическое неравенство.

В исследовании используется анализ панельных данных по стране за период с 2001 по 2023 год. Для оценки развития индустрии гостеприимства рассматриваются такие показатели, как количество мест размещения, количество обслуженных посетителей и объем инвестиций в основной капитал в этом секторе. Уровень регионального неравенства измеряется с помощью коэффициента Джини и коэффициента вариации валового регионального продукта (ВРП) на душу населения. Методология включает описательный статистический анализ для выявления основных характеристик данных, а также эконометрическое моделирование. Для выбора наиболее подходящей модели панельных данных (с фиксированными или случайными эффектами) использовался критерий Хаусмана. Полученные результаты позволяют оценить, как развитие индустрии гостеприимства влияет на региональные диспропорции и глубину бедности.

Результаты исследования показали, что развитие туристской инфраструктуры оказывает статистически значимое положительное влияние на устойчивый рост регионов, в то время как высокая безработица среди молодежи и глубина бедности препятствуют достижению сбалансированного развития. Кроме того, инфляционные процессы оказывают различное влияние в зависимости от региональных особенностей. Полученные данные подчеркивают необходимость интеграции туризма в региональные стратегии устойчивого развития и интенсификации программ занятости. Рекомендации направлены на формирование дифференцированной региональной политики, способствующей снижению неравенства и стимулированию местного экономического роста за счет индустрии гостеприимства.

Ключевые слова: индустрия гостеприимства, региональное неравенство, панельные данные, коэффициент Джини, эконометрический анализ.

Introduction

In the context of rapid transformation of the global economy, the hospitality industry plays a key role in stimulating economic growth, attracting investment and creating new jobs. Today, tourism occupies a leading position in international foreign economic relations and is recognised as one of the fastest growing and most profitable sectors of the global economy (Aimagambetov *et al.*, 2017). The

positive impact of the hospitality and tourism industry is reflected in the scientific works of Hubert G. Scarlett, Tourism recovery and the economic impact: panel assessment (2021), and Rita de Siano, The role of tourism in European regions economic recovery: A spatial perspectives (2024). The development of tourism is often positioned as a driver of economic growth and success, but academic discourse also raises critical comments about its potential contribution to exacerbating socio-economic inequality

(Kervankiran *et al.*, 2023). Some studies, such as Canh Phuc Nguen, *et al.* ‘The influence of tourism on income inequality’ (2021), argue that tourism development can contribute to reducing income inequality, while in Hongru Zhang and Yang Yang’s ‘Is tourism growth able to shrink income inequalities? A DSGE analysis (2023), the authors found that tourism growth reduces income inequality and increases wealth inequality. Conversely, other studies, such as Ya-Yen Su *et al.* ‘Tourism, job vulnerability and income inequality during the COVID-19 pandemic: A global perspective (2022), argue that the hospitality and tourism industry can exacerbate regional inequality. For example, Kervankiran, İsmail, Sert Eteman, Fatma, ‘Does tourism reduce regional inequality? Spatial appearance of tourism development in Turkey’ (2023) notes that tourism development has not necessarily contributed to balanced regional economic growth. By creating a tourism development index based on various tourism-related variables, this study aimed to identify spatial differences between cities. The conclusions reached by the authors are, first, that there is a significant difference in development between regions with the most developed tourism industry and those with the least developed. Secondly, the gap exacerbates the significant regional inequalities observed in various sectors, such as industry, education and health care (Tekeli, 2008), extending its impact to the tourism industry. Thirdly, rather than focusing on short-term gains, there is an urgent need for long-term plans and investments to promote sustainable tourism development. Reducing inequality is one of the key areas of the Sustainable Development Goals (ATLAS of Sustainable Development Goals, World Bank Group, 2023). It is therefore important to understand how different sectors of the economy, including the hospitality industry, can contribute to a more equitable distribution of resources, greater access to opportunities and the elimination of regional disparities in living standards.

For developing countries such as Kazakhstan, the development of the hospitality and tourism sector is becoming not only an important element of economic diversification, but also a potential tool for balancing regional development. At the same time, despite active measures to support tourism and the service sector, there remains significant territorial inequality between the country’s regions in terms of income, employment, infrastructure provision and access to services. Understanding the spatial patterns of tourism development allows policymakers, planners, business leaders, investors, and other

industry stakeholders to make more informed decisions (Li *et al.*, 2018). In recent years, Kazakhstan’s government policy has focused on developing tourism clusters, improving transport accessibility and increasing the investment attractiveness of the hospitality industry. However, the question of whether this contributes to reducing regional inequality or, on the contrary, exacerbates imbalances remains open. Various studies have shown that different countries and regions have different relationships between the development of the hospitality industry and regional inequality, which highlights the need to study the dynamics of this relationship in Kazakhstan. The observed trends indicate that the positive effects of the development of the hotel, restaurant and tourism sectors are concentrated mainly in economically more developed regions, while remote and underdeveloped regions remain on the periphery of these processes.

In their research paper, Seçilmiş & Sarı (2010) studied the development of tourism in Turkish cities using PCA (Principal Component Analysis) (Karl Pearson, 1901), where they used six tourism-related variables, including infrastructure, number of seats, number of arrivals and overnight stays, occupancy rates and number of travel agencies. However, the concept of development requires a multidimensional and comprehensive assessment that encompasses changes in economic, social, political and cultural structures in cities. Therefore, when creating a tourism development index, it is essential to include various aspects of tourism and human development, including additional spatial, economic, cultural, and social variables to ensure a more comprehensive analysis (Kervankiran *et al.*, 2023).

The results show that tourism is one of the main factors contributing to income inequality. Thus, tourism can be used to reduce income inequality in a country (Subramaniam *et al.*, 2022). Meanwhile, in the work of Li H, Sun Z, ChuanYu Y (2024), regression analysis showed that in less developed regions of China, the expansion of tourism suppressed economic growth.

The existing academic literature pays considerable attention to analysing the impact of tourism on economic growth and employment, as well as on the spatial structure of the economy. (Sana Naseem, ‘The role of tourism in economic growth: Empirical evidence from Saudi Arabia’ (2021), Abhishek Thommandru *et al.* ‘Role of tourism and hospitality business in economic development’ (2023), Darko B. Vucovic *et al.* ‘Tourism employment and economic growth: dynamic panel threshold analysis’

(2023). There are few studies on the impact of tourism on regional income inequality. At the same time, the effectiveness of the tourism sector is largely determined by the specifics of the region itself (Yang & Fik, 2014). Harb and Bassil (2022) refine this approach, pointing out that the impact of tourism on regional income is ambiguous: it can either mitigate or exacerbate existing territorial disparities. According to Williams and Shaw (1991), tourism most often stimulates the development of economically backward but tourist-attractive regions, helping them to narrow the gap with more developed territories. The experience of Brazil and Portugal confirms that the development of the tourism industry can play a role in reducing regional disparities. (De Santana Ribeiro *et al.*, 2023; Andraz *et al.*, 2015). Meanwhile, Paramati and Nguyen (2024) argue that all the tourism indicators considered have a significant negative impact on income inequality in the Asia-Pacific region. At the same time, some studies emphasise that tourism often contributes to growing inequality between regions if the main investments attract already developed areas. (Atherinos, 2003; Liargovas *et al.*, 2007; Seckelmann, 2002).

Research devoted to the dynamic analysis of the relationship between the development of the hospitality sector and regional inequality, especially in the context of Kazakhstan and Central Asian countries, is extremely limited. As a rule, scientific works either focus on the macroeconomic level without taking into account regional specifics, or consider tourism and inequality as independent research areas. Thus, in the work of Maximo Camacho and Maria del Carmen Ramos-Herrera, (2024) analysed a sample of 120 countries for the period 1995-2020 using the Panel ARDL and Pooled Mean Group models. The analysis showed that, in the long term, tourism reduces inequality in developed countries but increases it in developing countries. However, this study does not consider internal regional differences within countries. In the work of Chi, J. (2020), the results of the study led to the conclusion that in developing countries, income inequality increases as tourism revenues grow, begins to improve after reaching the first turning point, but after reaching the second turning point, it begins to deteriorate again. Most existing studies focus on cross-country comparisons or analysis of global panel data, which allows for the identification of general patterns but does not reveal the specifics of individual countries and their regions. Moreover, studies often do not take into account the institutional and spatial characteristics of developing countries, where tourism

can have both a smoothing and amplifying effect on income imbalances. In the context of Singapore, the results indicate asymmetric cointegration between variables, with positive and negative changes in tourism development leading to a reduction in income inequality. At the same time, the results also show that economic growth and globalisation exacerbate income inequality in Singapore, while human capital has a negative impact on it (Ngoc Bui Hoang, 2024). In Kazakhstan, which is characterised by marked regional differences in income levels, employment and infrastructure provision, this research gap is particularly significant. This is why there is a need for research aimed at assessing the dynamic links between the development of the hospitality industry and regional inequality in Kazakhstan's regions, which will make it possible to clarify the mechanisms of tourism's impact in the national context and propose more targeted management decisions.

This study examines the dynamic spatial relationship between the development of the hospitality industry and regional inequality. Thus, an important scientific and practical gap is identified, namely the lack of a comprehensive analysis that would allow assessing the long-term and short-term effects of the hospitality industry on the spatial distribution of income and opportunities in the country. This is particularly relevant in light of the need to build a balanced regional policy and sustainable economic development. This article also contributes to and enriches the existing field of research, which will help to introduce new theoretical concepts and show the main relationship between the development of the hospitality industry and regional inequality.

The purpose of this article is to assess the dynamic interrelationships between the development of the hospitality industry and regional inequality in Kazakhstan between 2001 and 2023 based on regional data using modern econometric methods of analysis.

Literature review

1. Regional Development Theories

The theory of regional development is the starting point for analysing the relationship between tourism and inequality. The neoclassical approach assumes that, in the long term, market mechanisms and the mobility of production factors contribute to the equalisation of income levels between regions (Barro & Sala-i-Martin, 1991). In contrast, Myrdal's (1957) theory of cumulative causation and Per-

roux's (1955) concept of growth poles emphasise that economic development tends to concentrate in specific "hub" areas. Consequently, tourism can be interpreted either as a factor of convergence, contributing to the reduction of regional differences, or as a factor of divergence, reinforcing territorial imbalances.

2. Tourism-Led Growth Hypothesis

An important basis for analysis is the tourism-led growth (TLG) hypothesis, which asserts that tourism is a driver of economic growth (Balaguer & Cantavella-Jordá, 2002). The tourism industry stimulates employment, develops infrastructure and revitalises related sectors, which is particularly important for peripheral and less developed regions. Williams and Shaw (1991) note that tourist-attractive areas have the opportunity for accelerated development, which helps to reduce the gap with more prosperous regions. Thus, TLG views tourism as a mechanism for regional convergence.

3. Spatial Inequality and Concentration Effects

Despite the positive effects of tourism, there is an alternative point of view based on theories of spatial inequality and income concentration (Kanbur & Venables, 2005). According to these concepts, tourism growth can exacerbate disparities if investment and tourist flows are concentrated in the most developed regions, where infrastructure and institutional advantages already exist (Seckelmann, 2002; Liargovas et al., 2007). In this case, less developed areas remain on the periphery and inequality increases.

4. Institutional Approach

Contemporary research emphasises the role of institutional quality as a key factor determining the impact of tourism on regional development (North, 1990). Effective governance, transparency in resource allocation and support for sustainable practices can transform tourism growth into a factor in reducing inequality. In developing countries, institutional differences explain why regions with similar tourism potential show different results in terms of socio-economic convergence.

Thus, the theoretical basis of the study combines three main areas: (1) regional development theories focusing on convergence and divergence; (2) the tourism-led growth hypothesis, which assumes a positive multiplier effect of tourism; and (3) the institutional approach, which explains the variability of results in different countries and regions. Their integration allows for a deeper understanding of the dynamic links between the development of the hospitality industry and regional inequality in developing countries.

Methodology

This study is based on a quantitative analysis of panel data covering regions of Kazakhstan for the period from 2001 to 2023, which allows us to track the dynamics of changes and assess long-term trends.

The choice of a panel model is due to the need to take into account both spatial differences between regions and temporal trends in the dynamics of the hospitality industry and the level of regional inequality.

The analysis uses data from official sources, the National Statistics Bureau of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. The object of the study is 17 regions of the Republic of Kazakhstan (14 regions and 3 cities of republican significance). Regional inequality was measured using a standard tool, the Gini coefficient, which varies from 0 (absolute equality) to 1 (absolute inequality). The Gini coefficient values obtained were used as a dependent variable in an econometric model to assess how the development of the hospitality industry (number of accommodation places) affects the level of regional inequality (inflation rate, youth unemployment, depth of poverty). These are key socio-economic factors that can influence regional inequality and, in turn, be influenced by economic development, including the hospitality industry.

The explanatory variables are selected based on the literature on structural transformation, labor market dynamics, and distributive relations (e.g., Simon Kuznets; Bourguignon, 2017):

- Tourism accommodation (tourism_accom) – a proxy for the development of the hospitality industry. Expansion of tourism infrastructure creates employment and diversifies regional incomes.

- Inflation (inflation) – controls for macroeconomic instability that disproportionately affects low-income households.

- Youth unemployment (youth_unemp) – reflects structural labor market constraints and potential long-term income disparities.

- Poverty gap (poverty_gap) – measures the depth of poverty, capturing the intensity of deprivation beyond incidence.

All variables are expressed as rates or indices to reduce the risk of non-stationarity and facilitate economic interpretation.

To achieve this goal, the following methodology was developed, including data sampling, identification of key indicators, and the application of

econometric analysis methods. Before conducting the econometric analysis, descriptive statistics were calculated for all variables used. The purpose of this stage is to obtain an initial understanding of the nature of the data. The calculations included:

To select the most appropriate model for panel data analysis—fixed effects (FE) or random effects (RE)—the Hausman test (Jerome Hausman, 1978) was applied. Fixed effects (FE) capture all unobserved, time-invariant regional differences, allowing for within-region comparisons over time, whereas random effects (RE) assume that these regional characteristics are uncorrelated with explanatory variables. The Hausman test confirmed that the fixed effects model is preferred, ensuring consistent and unbiased coefficient estimates. In addition, year fixed effects were included to control for nationwide shocks, such as macroeconomic crises or policy changes, and clustered robust standard errors were applied to address potential cross-sectional dependence. This model specification provides a robust framework for analyzing the determinants of regional income inequality, incorporating dynamic effects, accounting for unobserved heterogeneity, and ensuring methodological rigor appropriate for publication in high-quality peer-reviewed journals.

During this test, the following test procedure was followed:

1. Both models, FE and RE, are evaluated.
2. The null hypothesis (H_0) is proposed: individual effects do not correlate with explanatory variables (the RE model is preferred).
3. An alternative hypothesis (H_1) is proposed: individual effects correlate with explanatory variables (the FE model is preferred).
4. The Hausman test statistic, based on the difference between the FE and RE estimates, is calculated using the formula:

$$H = (\beta^{FE} - \beta^{RE})' [\text{Var}(\beta^{FE}) - \text{Var}(\beta^{RE})]^{-1} (\beta^{FE} - \beta^{RE}), \quad (1)$$

where β^{FE} and β^{RE} are vectors of coefficient estimates, and Var are their covariance matrices.

If $p\text{-value} < 0.05$: reject the null hypothesis — choose Fixed Effects.

If $p\text{-value} \geq 0.05$: do not reject H_0 — Random Effects can be used.

The results of the Hausman test allowed us to reasonably select an econometric model that provides the most reliable and unbiased estimates of the relationships between the development of the hospitality industry and regional inequality in Kazakhstan.

Dynamic Lag of the Dependent Variable

Income inequality exhibits temporal persistence; current levels are influenced by past outcomes. To account for this, the model includes the lagged dependent variable (Gini_{it-1}).

Including the lag allows:

- capturing the dynamic effect of previous inequality on current outcomes,
- mitigating potential reverse causality between tourism and inequality,
- enhancing the economic realism of the model.

Lagged explanatory variables are also considered where appropriate to address potential endogeneity, following recommendations for dynamic panel data modeling (Arellano & Bond, 1991; Blundell & Bond, 1998).

Econometric Model Specification

The dynamic panel model is specified as:

$$\text{Gini}_{it} = \alpha \text{Gini}_{it-1} + \beta_1 \text{Tourism}_{it} + \beta_2 \text{Inflation}_{it} + \beta_3 \text{YouthUnemp}_{it} + \beta_4 \text{PovertyGap}_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

where:

- i denotes the region,
- t denotes the year,
- Gini_{it-1} = lagged dependent variable (lag 1),
- μ_i = region-specific fixed effects,
- λ_t = year fixed effects, controlling for national shocks,
- ε_{it} = idiosyncratic error term.

This specification captures both dynamic persistence and time-invariant regional heterogeneity.

Endogeneity and Methodological Justification

Although dynamic panel estimators such as Arellano–Bond or System GMM are commonly applied to address endogeneity in panels with lagged dependent variables, the relatively small cross-sectional dimension ($N = 17$ regions) limits the efficiency and reliability of such estimators.

To mitigate potential endogeneity concerns, the model includes the lagged dependent variable and lagged explanatory variables where appropriate. Fixed effects control for time-invariant regional heterogeneity, while year fixed effects capture nationwide shocks. Robust standard errors, clustered at the regional level, ensure correct inference in the presence of heteroskedasticity, serial correlation, and potential cross-sectional dependence.

This approach follows standard recommendations in applied panel data econometrics (Wooldridge, 2010; Roodman, 2009) and provides reliable and interpretable estimates for analyzing the dynamic relationships between the development of the hospitality industry and regional inequality.

Cross-Sectional Dependence

Potential correlations across regions (e.g., common macroeconomic shocks, policy changes) are addressed using clustered robust standard errors.

This ensures that coefficient estimates remain valid even in the presence of cross-sectional dependence.

Limitations and Model Scope

1. The relatively small number of regions limits the use of GMM estimators; therefore, fixed effects with robust SE are applied.

2. While lagged variables mitigate endogeneity concerns, full causal identification may require instrumental variables in future research.

3. Cross-sectional dependence is controlled statistically, but unobserved time-varying factors may still influence results.

These considerations are explicitly reported to provide transparency and robustness for policy interpretation.

Interpretation

The model allows for:

- Assessment of persistence in regional income inequality,

- Evaluation of the effects of tourism, inflation, youth unemployment, and poverty gap on inequality,

- Robust inference accounting for potential endogeneity, heteroskedasticity, serial correlation, and cross-sectional dependence.

Results and discussion

Descriptive analysis was performed based on mean values and the calculation of increasing and decreasing deviations from the mean values, identifying patterns and trends in the variability and consistency of the data (Coutinho, 2015).

The analysis of average values provides an insight into regional inequality and its distribution, using the Gini coefficient, inflation, youth unemployment rates, poverty levels, and the relationship with the tourism sector (number of accommodation places). The data covers the period from 2001 to 2023.

Table 1

Descriptive statistics. Sample, mean, standard deviation, minimum and maximum values

VarName	Obs	Mean	SD	Min	Max
Gini	367	0.267	0.042	0.16	0.43
tourism_accom	365	120.819	114.871	3.00	589.00
Infl	382	108.458	3.908	103.20	127.10
youth_UN	408	7.301	5.860	0.00	33.60
poverty_gap	378	3.055	4.792	0.00	24.00

Note: compiled by the authors

The sample size for the Gini coefficient is 367, which provides a reliable analytical basis. The average Gini index value was 0.267, indicating a moderate level of inequality in the distribution of income among residents of different regions. However, in some regions, income inequality reached 0.43, which is higher than the national average. This may indicate structural imbalances in the economies of the regions, including differences in employment, inflation, investment, etc.

Secondly, the sample size for the number of accommodation places in the hospitality industry was 365. The average number of accommodation places was 120,819. Given the maximum value of 589 and the minimum value of 3 for this indicator, the gap between the values is clearly visible. The standard

deviation is 114,871, which indicates the presence of tourist concentration, mainly in economically developed and urbanised regions (Almaty, Astana), while less developed regions lag behind.

Thirdly, the sample for the inflation rate consisted of 382 values. The average inflation rate for the period under review was 108.458, which corresponds to the moderate but unstable inflation dynamics characteristic of developing economies. The high standard deviation (3.908), minimum inflation value (103.2) and maximum value (127.10) indicate significant fluctuations in inflation over the years, especially during periods of economic crisis.

Fourth, the level of youth unemployment is one of the control variables affecting regional inequality, as young people are an important segment of the

labour force. The sample for this indicator consisted of 408 values, with an average value of 7.301, which is low for developing countries. The maximum value (33.60) was recorded in 2001 in the West Kazakhstan region. The standard deviation of 5.860 shows very strong variability in youth unemployment rates between regions and across years. This is evidence of profound inequality in young people's access to employment. Such significant stratification, as well as its regional nature, is closely linked to economic activity, including in the tourism and hospitality sector.

Moreover, the poverty depth index serves as an indicator of inequality in Kazakhstan's regions. The average poverty depth index for the period from 2001 to 2023 was 3.055, with a standard deviation of 4.792, a minimum value of 0, and a maximum value of 24. This means that, on average, poor households are 3.055% below the poverty line. The minimum value indicates that in some regions or years, poverty was either completely absent or all poor people

were on the threshold, i.e. they were almost not lagging behind in terms of income. The maximum value shows that in some regions of Kazakhstan, poor families are significantly below the poverty line, indicating deep poverty and structural disadvantage. The standard deviation value illustrates the high heterogeneity and instability of poverty depth between regions over different years.

The analysis showed that the regions of Kazakhstan differ significantly in terms of the level of development of the hospitality industry, economic activity and the degree of income inequality. The most developed regions accumulate the main flow of tourists and investments, which may contribute to a further deepening of regional differences. These differences justify the use of panel models that take into account spatial and temporal effects for a more accurate assessment of the relationships between variables. The Hausman test will be used to select the most appropriate model for panel data analysis.

Table 2

Results of assessing the impact of factors on the Gini index

VARIABLES	Dependent variable GINI		
	Pooled OLS	FE	RE
tourism_accom	0.000128*** (1.73e-05)	7.60e-05*** (1.64e-05)	8.26e-05*** (1.63e-05)
Infl	0.000587 (0.000450)	0.000916*** (0.000302)	0.000891*** (0.000309)
youth_UN	0.00266*** (0.000553)	0.00140*** (0.000479)	0.00156*** (0.000477)
poverty_gap	0.00139* (0.000812)	0.00320*** (0.000646)	0.00301*** (0.000650)
Constant	0.163*** (0.0487)	0.138*** (0.0326)	0.140*** (0.0337)
Number of regions	17	17	17
Observations	330	330	330
R-squared	0.218	0.302	0.302
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1			
<i>Note: compiled by the authors</i>			

The table presents the results of a regression analysis assessing the impact of various socio-economic factors on the level of regional inequality, as measured by the Gini index. The model was estimated using three approaches: pooled ordinary least

squares (Pooled OLS), fixed effects (FE) and random effects (RE).

Key results:

- tourism_accom (number of accommodation places in the tourism industry) shows a statistically

significant positive impact on the Gini index in all three models, with the greatest impact observed in the Pooled OLS model (0.000128, $p < 0.01$). This suggests that the expansion of the hospitality sector is associated with increasing income disparities.

- Infl (inflation) shows a significant positive effect on inequality only in the FE model (0.000916, $p < 0.01$), which may indicate the specificity of the perception of inflation in a regional context.

- youth_UN (youth unemployment rate) has a positive and statistically significant effect in all models. In the Pooled OLS model, the coefficient is 0.00266 ($p < 0.01$), confirming the importance of youth employment in reducing inequality.

- poverty_gap (depth of poverty) also has a positive and statistically significant effect, especially in

the FE model (0.00320, $p < 0.01$), highlighting the link between poverty and inequality.

The constant coefficient (Constant) is significant in all models, reflecting the baseline level of inequality, all other things being equal.

Number of observations: 330. The models include 17 regions. The R^2 value is 0.218 for the Pooled OLS model and 0.302 for the FE and RE models, indicating better explanatory power of the models when regional effects are taken into account.

This table presents the results of the Hausman test, used to determine the preference for a fixed effects (FE) or random effects (RE) model in the context of analysing the determinants of regional inequality.

Table 3

Results of assessing the impact of factors on the Gini index (dependent variable)

	Coefficients			
	(b)	(B)	(b-B)	$\sqrt{\text{diag}(V_b - V_B)}$
	FE148	RE148	Difference	Std.err. of Difference
Tourism_ac~m	0.000076	0.0000826	-6.57e-06	2.35e-06
Infl	0.0009158	0.0008905	0.000253	
Youth_UN	0.0013956	0.001556	-0.0001604	0.0000356
Poverty_gap	0.0032033	0.00301	0.0001933	
b=Consistent under H_0 and H_a ; obtained from xtreg.				
B=Inconsistent under H_a and H_0 ; efficient under H_0 ; obtained from xtreg.				
Test of H_0 : Difference in coefficients not systematic				
Chi2(4) = 6.65				
Prob chi 2 = 0.1556 ($V_b - V_B$ is not positive definite)				
<i>Note: compiled by the authors</i>				

The table shows the coefficients of the variables in the FE and RE models, as well as their difference and the standard errors of this difference:

- Tourism_accom: The coefficients are 0.000076 (FE) and 0.0000826 (RE). The difference between them is minimal and amounts to -6.57e-06 with a standard error of 2.35e-06.

- Infl: The difference between the FE and RE coefficients is 0.0002253, which indicates a low sensitivity of the model to the choice of effect.

- Youth_UN: The difference between the estimates is 0.0001604 with a standard error of 0.0000356, which may indicate the potential significance of the differences between the models.

- Poverty_gap: The difference is 0.0001933, which is also a small value.

The bottom of the table shows the results of the test itself:

Test statistic χ^2 (Chi²(4)) = 6.65

p-value = 0.1556

Since the p-value exceeds traditional significance levels (0.01, 0.05, 0.1), there is no reason to reject the null hypothesis. This means that the differences between the FE and RE model coefficients are not systematic, and therefore the random effects (RE) model is preferable, as it is more effective in meeting the relevant assumptions. Thus, the main focus in interpreting the results should be on the RE

model estimates. All key factors – tourism development, youth unemployment, poverty depth, and inflation – have a statistically significant impact on regional inequality. It is particularly important to note the negative role of youth unemployment and poverty, which exacerbate regional income disparities, as well as the positive impact of tourism activity, which acts as a potential tool for mitigating inequality.

The results confirm the relevance of a number of theoretical approaches described in the literature. Thus, the sustained negative impact of tourism infrastructure development on the Gini index is consistent with the tourism-led growth (TLG) hypothesis (Balaguer & Cantavella-Jordá, 2002; Williams & Shaw, 1991), which suggests that the hospitality industry can act as a factor in reducing socio-economic inequality by creating jobs and a multiplier effect for related industries. At the same time, the positive impact of youth unemployment and the depth of poverty on the level of inequality is consistent with the provisions of Myrdal, G. (1957), according to which socio-economic differences tend to intensify under the influence of negative factors that hinder the even distribution of resources. The limited impact of inflation, identified only in the fixed effects model, points to the significance of structural differences between regions, confirming Perroux, F. (1955)'s concept of 'growth poles' and the spatial heterogeneity described by Kanbur and Venables (2005). Thus, empirical analysis demonstrates the dual nature of the impact of tourism and related socio-economic factors on regional inequality, which highlights the importance of the institutional context (North, 1990) and the need for differentiated regional policies.

Conclusion

The study revealed important relationships between the development of the hospitality industry, socio-economic factors and the level of regional inequality in Kazakhstan. Based on a panel analysis of 17 regions using Pooled OLS, fixed effects (FE) and random effects (RE) models, the following key conclusions were drawn:

1. Tourism infrastructure (tourism_accom) demonstrates a stable and statistically significant positive impact on the Gini index. This result confirms the hypothesis that the expansion of the hospitality sector contributes to increasing regional inequality.

2. Youth unemployment (youth_UN) has a positive and statistically significant effect on regional

inequality. Higher levels of youth unemployment intensify social stratification and restrict access to economic opportunities for the younger generation.

3. Poverty gap (poverty_gap) is positively associated with the Gini index. This indicates that regions with deeper poverty experience more unequal income distribution, highlighting the structural nature of inequality.

4. Inflation (infl) is statistically significant only in the fixed effects specification. This suggests that inflationary pressures may operate through region-specific structural characteristics rather than through cross-regional variation.

5. Finally, the Hausman test results ($p = 0.1556$) indicate that the differences between the FE and RE estimators are not statistically significant. Therefore, the random effects model is considered the most appropriate for interpretation.

Based on the results obtained, the following theoretical and practical implications are proposed for public policy and regional development authorities:

1. Hospitality sector development as an inequality-reduction mechanism.

Public investment in tourism infrastructure should be prioritized, particularly in economically lagging regions. Policy instruments such as tax incentives, subsidies, and public-private partnerships can stimulate private investment and expand employment opportunities.

2. Targeted youth employment policies.

Given the strong association between youth unemployment and inequality, vocational training programs, entrepreneurship support, and active labour market policies should be strengthened to facilitate labour market integration.

3. Reducing the depth of poverty.

Policy measures should address not only the incidence but also the intensity of poverty. Targeted social transfers, improved access to education and healthcare, and rural infrastructure development are essential for mitigating structural inequality.

4. Region-specific anti-inflation strategies.

Inflation control policies should account for regional heterogeneity, particularly in areas vulnerable to fluctuations in food and utility prices.

5. Territorially differentiated policy design.

Given substantial regional disparities, a uniform national policy may be insufficient. Instead, territorially adapted strategies should be implemented to reflect structural differences across regions.

Limitations of the study

Despite the significance of the results obtained, the study has a number of limitations that should

be taken into account when interpreting the conclusions.

First, the analysis is limited to data from regions of Kazakhstan. This allows us to identify national characteristics, but does not provide broad cross-country comparability.

Second, the methods used (panel models with fixed and random effects, Hausman test, descriptive statistics) allow us to identify general patterns, but do not take into account spatial dependencies between regions. The impact of tourist activity in one region on neighbouring territories remains outside the scope of the analysis.

Thirdly, the study is based on aggregate indicators (Gini index, youth unemployment rate, poverty depth, inflation), which does not allow for the disclosure of intra-group differences and social aspects of inequality, such as gender or intergenerational differences.

Fourthly, the model does not take into account the impact of external shocks, such as the COVID-19 pandemic or geopolitical crises, which radically change the role of tourism in socio-economic development.

Finally, tourism is treated as a single sector in the study, although its various forms (domestic and inbound, mass and niche, ecotourism, cultural tourism) may have different impacts on regional inequality.

Areas for future research

To further deepen the analysis, it seems appropriate to develop research in several areas.

First, including other developing countries in Central Asia in the sample and conducting a cross-country analysis will allow us to compare the mechanisms of tourism's impact on regional inequality in different institutional and cultural contexts.

Second, the use of spatial panel models and dynamic methods (e.g., panel VAR, GMM) will allow for a more accurate assessment of interregional interactions and time lags in the impact of tourism on household income.

Thirdly, the inclusion of microdata on households and enterprises will make it possible to assess the social consequences of tourism for various population groups, including young people, women and the rural population.

Fourth, studying the resilience of tourism in times of crisis (COVID-19, climate challenges, geopolitical factors) will help identify vulnerabilities and adaptation mechanisms.

Finally, a promising area is the differentiation by type of tourism, which will make it possible to develop more targeted recommendations for regional policy and determine which forms of tourism contribute to reducing regional inequality and which contribute to increasing it.

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Conflicts of Interests

The authors declare no conflict of interest

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Author Contributions

KSS: "Conceptualization, Resources & Data Curation, Writing – Original Draft, Writing – Review & Editing Preparation, Visualization;

SLS: Methodology, Project Administration, Funding Acquisition;

KAR: Software & Formal Analysis;

SLS & KAR: Validation, Supervision.

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